THE EFFECTS OF A RECURRENT STROKE PREVENTION PROGRAM ON BLOOD PRESSURE, LOW DENSITY LIPOPROTEIN CHOLESTEROL, AND BLOOD GLUCOSE AMONG PATIENTS WITH FIRST ISCHEMIC STROKE

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ผลของโปรแกรมป้องกันการเกิดโรคหลอดเลือดสมองซ้ำ ต่อความดันโลหิต ไขมันในเลือดชนิดความหนาแน่นต่ำ และน้ำตาลในเลือด ในผู้ป่วยโรคหลอดเลือดสมองชนิดขาดเลือดครั้งแรก

น.ส.อรพิน จุลมุสิ

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาพยาบาลศาสตรดุษฎีบัณฑิต
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อรพิน จุลมุสิ : ผลของโปรแกรมป้องกันการเกิดโรคหลอดเลือดสมองซ้ำ ต่อความดันโลหิต ไขมันในเลือดชนิดความหนาแน่นต่ำ และน้ำตาลในเลือด ในผู้ป่วยโรคหลอดเลือดสมองชนิดขาดเลือดครั้งแรก. (THE EFFECTS OF A RECURRENT STROKE PREVENTION PROGRAM ON BLOOD PRESSURE, LOW DENSITY LIPOPROTEIN CHOLESTEROL, AND BLOOD GLUCOSE AMONG PATIENTS WITH FIRST ISCHEMIC STROKE) อ.ที่ปรึกษาหลัก : รศ. ดร.จินตนา ยูนิพันธุ์, อ.ที่ปรึกษาร่วม : รศ. ดร.ชนกพร จิตปัญญา

การวิจัยนี้เป็นการวิจัยเชิงทดลอง มีกลุ่มเปรียบเทียบ แบบวัดซ้ำ วัตถุประสงค์เพื่อศึกษาผลของโปรแกรมป้องกันการเกิดโรคหลอดเลือดสมองซ้ำต่อความดันโลหิต ไขมันในเลือดชนิดความหนาแน่นต่ำ และน้ำตาลในเลือดของผู้ป่วยโรคหลอดเลือดสมองชนิดขาดเลือดครั้งแรก กลุ่มตัวอย่างเป็นผู้ป่วยที่ได้รับการวินิจฉัยว่าเป็นโรคหลอดเลือดสมองชนิดขาดเลือดครั้งแรก ทำการศึกษาที่หอผู้ป่วยโรคหลอดเลือดสมองของโรงพยาบาลระดับตติยภูมิของเขตพื้นที่สุขภาพที่ 2 ในประเทศไทย กลุ่มตัวอย่างจำนวน 60 คน ได้มาด้วยวิธีการสุ่ม แบ่งเป็นกลุ่มทดลองและกลุ่มควบคุม กลุ่มละ 30 คน ผู้ป่วยกลุ่มทดลองได้รับการดูแลตามปกติร่วมกับโปรแกรมการป้องกันการเกิดโรคหลอดเลือดสมองซ้ำ ประกอบด้วย 1) การให้ความรู้เกี่ยวกับการรับประทานอาหารที่เหมาะสม การจำกัดการรับประทานอาหารรสเค็ม การเพิ่มกิจกรรมทางกาย การเลิกสูบบุหรี่ และการหลีกเลี่ยงการสัมผัสควันบุหรี่ และการรับประทานยาตามคำสั่งแพทย์ 2) การออกกำลังกายอย่างต่อเนื่อง 12 สัปดาห์ ประกอบด้วย การเดินเร็ว 40 นาที และการการออกกำลังกายแบบแรงต้าน 20 นาที 3 ครั้งต่อสัปดาห์ และ 3) การติดตามทางโทรศัพท์ในสัปดาห์ที่ 8 และ 12 ในขณะที่ผู้ป่วยกลุ่มควบคุมได้รับการดูแลตามปกติเพียงอย่างเดียว การวิเคราะห์ข้อมูลใช้สถิติบรรยาย และการวิเคราะห์ความแปรปรวนพหุคูณแบบวัดซ้ำ

ผลการศึกษาพบว่า กลุ่มทดลองและกลุ่มควบคุมมีค่าเฉลี่ยความดันซิสโตลิค ความดันไดแอสโตลิค ไขมันในเลือดชนิดความหนาแน่นต่ำ และน้ำตาลในเลือดแตกต่างกันอย่างมีนัยสำคัญทางสถิติที่ระดับ .05 ใน 4 ช่วงเวลาที่แตกต่างกัน นอกจากนี้ พบว่าในกลุ่มทดลองมีค่าเฉลี่ยความดันโลหิต ไขมันในเลือดชนิดความหนาแน่นต่ำ และระดับน้ำตาลในเลือดลดลงอย่างมีนัยสำคัญทางสถิติที่ระดับ .01 ในสัปดาห์ที่ 4, 8, และ 12.

สาขาวิชา พยาบาลศาสตร์ ลายมือชื่อนิสิต .....
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Orapin Jullmusi : THE EFFECTS OF A RECURRENT STROKE PREVENTION PROGRAM ON BLOOD PRESSURE, LOW DENSITY LIPOPROTEIN CHOLESTEROL, AND BLOOD GLUCOSE AMONG PATIENTS WITH FIRST ISCHEMIC STROKE. Advisor: Assoc. Prof. JINTANA YUNIBHAND, Ph.D., Dip.APPMHN. Co-advisor: Assoc. Prof. CHANOKPORN JITPANYA, Ph.D., RN.

This cluster randomized control trial research with control group and repeated measure. The objectives of this study were to explore the effect of a recurrent stroke prevention program on blood pressure, low density lipoprotein cholesterol, and blood glucose among patients with first ischemic stroke. The participants were the patients who have been diagnosed with first ischemic stroke. They were recruited from two stroke units from two tertiary hospitals in public health region 2, Thailand. Sixty participants were randomly recruited and divided into experimental group (n=30) and control group (n=30). The participants in the experimental group received the recurrent stroke prevention program including 1) providing knowledge about eating healthy diet, limiting salt intake, increasing physical activities, quit smoking and avoiding secondhand smoke, and taking medication regularly, 2) performing continuous exercise for 12 weeks including fast walking for 40 minutes/ 3 times a week and doing resistance exercise for 20 minutes/ 3 times a week, and 3) ensuring adherence to behavior changes using telephone follow-up for 20 minutes for each participant at week 8 and 12. Data were analyzed using descriptive statistics and repeated measure MANOVA.

Major findings revealed that the combined mean scores of systolic blood pressure, diastolic blood pressure, low density lipoprotein cholesterol, and blood glucose of experimental group after receiving the recurrent stroke prevention program were significantly different from the control group at .05 level in four different points of time. In addition, the mean scores of systolic blood pressure, diastolic blood pressure, and blood glucose of experimental groups were statistically decreased over time at .01 level in week 4, week 8, and week 12.

Field of Study:	Nursing Science	Student's Signature .....
Academic Year:	2021	Advisor's Signature .....
		Co-advisor's Signature .....

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CHAPTER I
INTRODUCTION

Background and significance of the study

Stroke remains a complex and severely debilitating disease, it is the second cause of death worldwide and a leading cause of long-term disability (Johnson, Onuma, Owolabi, & Sachdev, 2016; Katan & Luft, 2018). The prevalence of stroke is highest in developing countries (Kuriakose & Xiao, 2020) including in Thailand. There are more than 250,000 new stroke cases in each year in Thailand (Suwanwela, 2014). Data from division of non-communicable disease, Ministry of Public Health presented that the hospital admission rate by stroke in Thailand increased from 467.46 to 506.20 per 100,000 persons in 2017 and 2019. Especially in health area 2, the incidence of stroke increased from 457.77 to 466.60 per 100,000 persons and mortality from stroke increased from 55.36 to 57.73 per 100,000 persons in 2018 and 2019 and had increasing trend. Data showed that Phitsanulok province had the highest number of stroke patients and mortality from stroke in health area 2 (Division of Non Communicable Disease, 2019).

Ischemic stroke is the most common type of all stroke patients (Hackam & Spence, 2007; Kuriakose & Xiao, 2020), it most occurred 61%-87.8%, follow by subarachnoid hemorrhage at 22% and intracerebral hemorrhage 12.2%-17% (Pennlert, Eriksson, Carlberg, & Wiklund, 2014; Smajlović, Salihović, Ibrahimagić, & Sinanović, 2013). Ischemic strokes are led to blockage as cause of reduce systemic perfusion, stenosis, or occlusion of blood vessels. Decreasing efficient blood and oxygen supply

to the brain as cause of brain infarction (Barker-Collo & Feigin, 2006; Kuriakose & Xiao, 2020).

Ischemic stroke was associated with increase morbidity and mortality, increase stroke recurrence, decease quality of life, and increase healthcare cost (Kelly, Hoskins, & Holloway, 2012; Youman, Wilson, Harraf, & Kalra, 2003; Zhang, Chapman, Plested, Jackson, & Purroy, 2012). Especially, recurrent stroke is a serious impact after ischemic stroke. The mortality rate following recurrent stroke is significantly increasing double times (Hardie, Hankey, Jamrozik, Broadhurst, & Anderson, 2004; Salehi et al., 2018), increasing disability rates and cognitive decline (Lennon, Blake, Booth, Pollock, & Lawrence, 2018).

The patients with first time ischemic stroke refer to persons who has been first time diagnosed with ischemic stroke by neurologist, when ischemic stroke symptoms were presented at the time of hospital arrival, lasting <24 hours but with cranial computed tomography (CT) scanning or magnetic resonance imaging (MRI) present ischemic stroke, or those with symptoms lasting >24 hours (Sacco et al., 2013; Tian et al., 2021). Ischemic stroke patients were high risk of recurrent stroke related to the initial ischemic lesions (Fu, Chang, & Huang, 2010). Therefore, the patients with first ischemic stroke were the target population for preventing recurrent stroke in this study.

In each year, approximately 25% of all strokes is recurrent stroke (Benjamin et al., 2017). The cumulative rate of recurrent stroke is highest report during first three months at 3.9 to18.5% (Chen et al., 2012; Kang et al., 2016). In Thailand, the incidence of recurrent strokes was 29% within one year and 46% within five years (Tiamkao, 2013). Therefore, ischemic stroke patients have opportunity to face recurrent stroke during long period.

Risk factors for recurrent stroke could be classified as modifiable and nonmodifiable. The nonmodifiable risk factors for stroke included age, and severity of stroke (Zhuo et al., 2020), while the modifiable risk factors included diabetes mellitus, hypertension, hyperlipidemia, atrial fibrillation, obstructive sleep apnea, tobacco use, alcohol use, and physical inactivity (Oza, Rundell, & Garcellano, 2017). Vascular risk factors are important risk factors for recurrent stroke (Arboix, 2015).

Meta-analysis results suggested that hypertension associate with increasing risk of recurrent stroke (Odds Ratio=1.67, $P < 0.00001$) (Zheng & Yao, 2019). The prevalence of hypertension in patients with recurrent stroke is 88% (Kocaman, DÜRÜYen, KoÇEr, & AsİL, 2015). One vascular risk factor for recurrent stroke is diabetes mellitus stroke (Odds Ratio=1.50, $P < 0.00001$) (Fu et al., 2015; Zheng & Yao, 2019). There was high prevalence of diabetes mellitus in patients with recurrent stroke at 43% (Kocaman et al., 2015). Moreover, hyperlipidemias occur in patients with recurrent stroke at 30% to 65.5% (Kocaman et al., 2015). Previous studies stated that vascular risks as predictors of recurrence stroke were hypertension, hyperglycemia, and hyperlipidemia (Elkind, 2009; Vickrey et al., 2002). Therefore, three potential vascular risk factors were related to recurrent stroke. Blood pressure, low-density lipoprotein cholesterol, and blood glucose were biological risk markers and there were dependent variables in this study.

Stroke service in Thailand, clinical practice guideline for ischemic stroke (2019) by the Neurological Institute of Thailand as a standard guideline stated that patients after ischemic stroke who are taken to the emergency room in an ambulance may get diagnosed and treated more quickly. At emergency room, patients receive the quickest investigate and start reperfusion therapy include rt-PA and endovascular treatment if

patients get to the hospital within 4.5 hours after stroke onset. After clinical improvement, the neurologists treat the underlying causes of stroke and prevent a new event. They received rehabilitation to help recover and were assessed to determine the need for home visit by physicians. Before patients discharged from the hospital, the physicians may provide antiplatelet, anticoagulant agents, and antilipidemic drugs to prevent recurrent stroke (Prasat Nerological Institute, 2019). Nurses provided general and briefly information covered vascular risk and lifestyle modification in discharge plan. At time of follow-up (14 days, first month, and every three months), the participants receive medication, take blood exam, and advice from neurologists at neurological outpatient clinic (Prasat Nerological Institute, 2015).

In Thailand, nurses provide nursing care to manage serious complications for patients with ischemic stroke who had high severity of ischemic stroke, as well as anxiety, confusion, depression, emotionalism, falls, fatigue, infection, malnutrition, pain, pressure sore, shoulder pain, shoulder subluxation, spasticity, and venous thromboembolism (Butsing, 2019; Sribundit, Riewpaiboon, Stewart, Tantirittisak, & Hanchaipiboolkul, 2017). Moreover, stroke nurses work with physical therapists to encourage and train ischemic stroke patients to perform activities of daily living (ADLs), such as eating, bathing, dressing, toileting, and transferring, which require the caregiver's assistance the most (Cawood, Visagie, & Mji, 2016).

For ischemic stroke patients who had minor stroke, they were common received education cover appropriate dietary after ischemic stroke, medication adherence, and follow up on physicians' appointment as discharge plan from nurses. According to the minor stroke stayed short time in hospital. The average length of stay was 4 days for ischemic stroke (Ellis, 2010) as same as the average length of stay was 5.7 in Thailand

(Sribundit et al., 2017). It led Thai stroke patients require knowledge about risk factors of recurrent stroke to modify their factors associated recurrent stroke from healthcare providers (Saengsuwan & Suangpho, 2019; Saengsuwan, Suangpho, & Tiamkao, 2017). However, there was no specific recurrent stroke prevention in healthcare system of Thailand and ischemic stroke patients stayed short time in hospital. They need specific recurrent stroke prevention for first ischemic stroke as the gap of this study.

Although there is the improvement of healthcare system in Thailand, but the mortality rate and incidence rate are still increasing (Suwanwela, 2014). There were multiple barriers exist that can hinder optimal recurrent stroke prevention. Knowledge of stroke in patients after ischemic stroke was low (Riechel et al., 2016). Limited knowledge may lead patients do not change their unhealthy pre-stroke lifestyle to reduce their risk of recurrent stoke (Ellis, Barley, & Grubaugh, 2013) and may not be able to recognize stroke warning signs if it happens a second time (Diez-Ascaso et al., 2015).

In Thailand, thirty-one percent of patients could not name any factors associated recurrent stroke (Saengsuwan et al., 2017). Approximately 43.6% of patients underestimated their future risk of recurrent stroke which may affect to changes in behavior and to successful recurrent stroke prevention. That means stroke patients in Thailand need knowledge about risk factors of recurrent stroke and to modify their factors associated recurrent stroke from healthcare providers (Saengsuwan & Suangpho, 2019).

Next barrier is medication adherence, it is one important key recurrent stroke prevention’s barriers because disabilities after stroke, such as swallowing difficulties, motor weakness, and cognitive impairment, and inadequate finances are a potential

barrier to medication adherence may interfere with medication management and dealing with the burden of treatment (Jamison, Sutton, Mant, & De Simoni, 2017; Lennon, Doody, Choisdealbh, & Blake, 2013). Another barrier of recurrent stroke prevention is lack of motivation, motivation effect to target stroke care (Van Schaik, Van den Berg-Vos, Weinstein, & Bosboom, 2015), depression; poor self-efficacy; cognitive decline; and lack of social support (Lennon, Doody, Choisdealbh, & Blake, 2013; Thilarajah et al., 2018). In addition, environmental barriers to exercise relate to ground surfaces and link to balance deficits and fear of falling. (Nicholson et al., 2013). Environmental factors strongly influenced quit smoking and healthy eating (Lennon et al., 2013).

Previous studies indicated that there are various interventions for preventing recurrent stroke. Education intervention is most frequency use to reduce risk factors for preventing recurrent stroke (Deijle et al., 2017; Van Schaik, Van den Berg-Vos, Weinstein, & Bosboom, 2015), following by behavior change intervention (Heron et al., 2017; Lawrence et al., 2015; Lennon et al., 2018) and exercise intervention (Moore et al., 2015; Zou, Wang, Qu, & Wang, 2015). Education intervention was used as a key method in recurrent stroke prevention programs (Boden-Albala et al., 2019; Evans-Hudnall et al., 2014; Wan et al., 2016). However, education intervention alone is inadequate to promote and sustain behaviors change after a stroke (Arlinghaus & Johnston, 2017; Boden-Albala & Quarles, 2013). Behavior change was affected to reduce blood pressure, low-density lipoprotein cholesterol, and blood glucose (Deijle et al., 2017; Lennon et al., 2018). Therefore, preventing recurrent stroke require combined education and behavior change intervention.

In addition, there are various strategies use in recurrent stroke prevention (Kim et al., 2013) consist of telephone follow-up (Holzemer, Thanavaro, Malmstrom, & Cruz-Flores, 2011; Wan et al., 2016), goal-setting activities (Evans-Hudnall et al., 2014; Flemming et al., 2013), lifestyle counseling (Hornnes et al., 2011; Irewall et al., 2019), skill training (Liu et al., 2015; Peng et al., 2014), group support (Hill et al., 2017; Wattradul et al., 2010), and motivation (Leistner et al., 2013).

Intensive medical management is main recurrent stroke prevention (Kleindorfer et al., 2021). Moreover, management of vascular risk factors remains extremely important in recurrent stroke prevention, including diabetes, smoking, hyperlipidemia, and hypertension (Diener & Hankey, 2020). Behavior factors, including eat healthy diet and increase physical activities, are important for preventing a recurrent stroke (Bailey, 2018). Low-salt and Mediterranean diets are recommended for ischemic stroke risk reduction (Spence, 2018). Patients with stroke are especially at risk for sedentary and prolonged sitting behaviors should be encouraged to perform physical activity in a supervised and safe manner (Kleindorfer et al., 2021).

A meta-analysis indicated that exercise interventions resulted in significant reductions in both systolic blood pressure (−4.30 mmHg) and diastolic blood pressure (−2.58 mmHg), in stroke patients when combine with health education (Deijle et al., 2017; Wan et al., 2016). Smoking cessation has been a significant decline in low-density lipoprotein cholesterol ($p < 0.001$) and in systolic blood pressure ($p = 0.010$) from baseline to 3 months after the beginning smoking cessation therapy (Komiyama et al., 2018). Nutritional behavior generally improves 3 months: mean difference 4.30, $p = 0.035$; 6 months: mean difference 6.77, $p = 0.001$; and 12 months: mean difference 10.84, $p = 0.030$ (Oikarinen, Engblom, Kääriäinen, & Kyngäs, 2017). In addition,

stroke patients are lack of knowledge about exercise, diet, and motivation (Mosca et al., 2006).

In Thailand, less studies focused on blood pressure, low-density lipoprotein cholesterol, and blood glucose in ischemic stroke patients. Most common outcomes successfully change is stroke knowledge (Sanghuachang, 2013). Few evidence-based programs address behavior change in ischemic stroke (Siritham & Tiemkoa, 2010). Patients who received the program based on process improvement theory, has been significantly different stroke risk behaviors, blood pressure and low-density lipoprotein cholesterol from the control group ($p<.05$) in adults after transient ischemic attack (Songwatthanayuth, 2015), not ischemic stroke. The program based on health belief model showed significantly higher than control group ($p<.05$) in perceived susceptibility, perceived benefits, and behaviors to prevent recurrent stroke. The risk of recurrent stroke after receiving program was significantly lower than at before receiving program ($p<.05$) (Tepsuwan, Leelathakul, & Toskulkaew, 2018). One quasi-experimental study explored the effect of health promotion program, the results showed that successful in behavioral change include exercise and self-care (Wattradul et al., 2010). However, population focus on previous studies were not first ischemic stroke patients. There is insufficient data regarding effective behavior change after first ischemic stroke, specifically all dependent variables of this study as well as blood pressure, low-density lipoprotein cholesterol, and blood glucose. Also, further study requires new complex program focusing on education and behaviors change for recurrent stroke that effect to reduce blood pressure, low-density lipoprotein cholesterol, and blood glucose.

The adult learning theory was used to guide the intervention program in this study. The adult learning principles by Knowles (1980) was explained how adults learn and their attitude towards. They tend to be independent and self-directed. They have accumulated a great deal of experience, which is a rich resource for learning. They value learning that integrates with the demands of their everyday life (Knowles, 1980). The recurrent stroke prevention program was focus on risk behaviors change included eating diet and sodium intake, exercise, smoking, and medication adherence for controlling blood pressure, low-density lipoprotein cholesterol, and blood glucose as vascular risk factors for recurrent stroke. Three components of this program were grained patients' knowledge and understanding related behaviors change, gain skill by training exercise, and grain positive attitude to performed behaviors change. Patients understand and drive them to maintain behaviors. The effect of these behaviors was controlling blood pressure, low-density lipoprotein cholesterol, and blood glucose as major risk factors of recurrent stroke that patients should prevent.

Previous studies focused on recurrent stroke prevention had length of intervention 4 week to 24 months, a twelve-week intervention with multi-modal and complex intervention were used (Liljehult et al., 2020). In Thailand, the result study showed that the combined education, individual counselling, self-regulation training, home visit and telephone follow up intervention was significant to increase blood pressure (Chanruengvanich, Kasemkitwattana, Charoenyooth, Towanabut, & Pongurgsorn, 2006). Twelve weeks intervention was used in the combined patient education, individual counselling, training, and telephone follow up intervention as the randomized control trial was significant improvement of change behaviors included exercise (p=.007) and eat healthy food (p=.033) (Gillham & Endacott, 2010). In

addition, web-based education and feedback intervention was significant to performed regular exercise (p=.005), fruit and vegetable consumption (p=.037). This study was a combined education, exercise, telephone monitoring intervention same as the previous studies. Therefore, this study was conducted the recurrent stroke prevention program in 12 weeks.

According to the cumulative risk of recurrence was highest within first three months after stroke onset and follow-up time (14 days, first month, and every three months), it is important to identify factors associated with early recurrence in order to establish effect treatments for recurrent prevention (Elnady, Mohammed, Elhewag, Mohamed, & Borai, 2020). Therefore, this study was repeated measures dependent variables at week 4, week 8, and week 12 as a critical time of recurrent stroke which need to prevent.

Although there is the improvement of healthcare system in Thailand, but the mortality rate and incidence rate are still increasing (Suwanwela, 2014). Based on existing literature shown that education and behaviors change are important to prevent recurrent stroke in patients with ischemic stroke. However, there are less studies focus on education and behaviors change to prevent recurrent stroke in first ischemic stroke and focus on blood pressure, low-density lipoprotein cholesterol, and blood glucose. Therefore, this study aims to evaluate the effects of a recurrent stroke prevention program on blood pressure, low-density lipoprotein cholesterol, and blood glucose among patients with first ischemic stroke in Thailand.

Research questions

1. What are the effects of a recurrent stroke prevention program on blood pressure, low-density lipoprotein cholesterol, and blood glucose between the experimental group and the control group?

2. What are the effects of the recurrent stroke prevention program on blood pressure, low-density lipoprotein cholesterol, and blood glucose within the experimental group?

Objectives of the study

1. To compare the different of blood pressure, low-density lipoprotein cholesterol, and blood glucose between the experimental group and the control group.

2. To compare the different of blood pressure, low-density lipoprotein cholesterol, and blood glucose within the experimental group.

Conceptual framework of the study

Risk factors for recurrent stroke could be classified as modifiable and nonmodifiable. The nonmodifiable risk factors for stroke included age, gender, and severity of stroke (Zhuo et al., 2020), while the modifiable risk factors included diabetes mellitus, hypertension, hyperlipidemia, atrial fibrillation, obstructive sleep apnea, tobacco use, alcohol use, physical inactivity (Oza et al., 2017). The guideline from the American Heart Association/ American Stroke Association was recommended the vascular risk factors as well as hypertension, hyperlipidemia, and diabetes mellitus should be managed for preventing recurrent stroke after ischemic stroke (Benjamin et al., 2019; Kleindorfer et al., 2021).

The intervention program of the current study aimed to modify some risk factors for stroke based on the statement by the American Heart Association/ American Stroke

Association (AHA/ASA) (Benjamin et al., 2019). To prevent recurrent stroke the current study highlighted interventions to reduce the vascular risk factors, such as hypertension, hyperlipidemia, and diabetes.

This study program consisted of three components: 1) education aligning with behavioral changes, 2) exercise program and 3) telephone monitoring. These three components were organized based on literature review. Highest effect size studies were selected (Chiu et al., 2008; Kono et al., 2013; Moore et al., 2015; Z. Wang, Wang, Fan, Lu, & Wang, 2014).

The recurrent stroke prevention program focused on risk behaviors change included eating diet and sodium intake, exercise, smoking, and medication adherence for controlling blood pressure, low-density lipoprotein cholesterol, and blood glucose as vascular risk factors for recurrent stroke. Three components of this program were improving patients' knowledge and understanding related behaviors change, increasing skill by training exercise, and instilling positive attitude to performed behaviors change to prevent recurrent stroke. Also, patients should understand and drive them to maintain behaviors. In addition, most ischemic stroke patients were adults which they are independent and self-direction (Knowles, 1980).

The adult learning principles was explained how adults learn and their attitude towards. They tend to be independent and self-directed. They have accumulated a great deal of experience, which is a rich resource for learning. They value learning that integrates with the demands of their everyday life (Knowles, 1980). To gained knowledge, skills, and positive attitude in patients as learning process of the intervention, the researcher provided direct four education sessions and training

exercise. They current knowledge and experience are critical in new learning situations as recurrent stroke prevention and need to take in daily life (Kaufman, 2018).

Improving patients' knowledge, based on component 1 education aligning with behavioral changes, each patient and family were educated so that they could use at home. Education intensity of the recurrent stroke prevention program was described as follows: Duration 4 weeks, 1 session per week. In session 1: the researcher provided knowledge about eating healthy diet for first ischemic stroke patient (40 minutes at week 1st), session 2: knowledge about restriction sodium intake for first ischemic stroke patient (40 minutes at week 2nd), session 3: knowledge about increasing physical activities and quit smoking for first ischemic stroke patient (40 minutes at week 3rd), and session 4: knowledge about ischemic stroke and medication adherence (40 minutes at week 4th).

The researcher provided direct teaching cover eating healthy diet, restriction sodium intake, increasing physical activities, quit smoking, and medication adherence. Moreover, the researcher provided booklets related topics in education sessions to repeat their understand at home. This component aimed to improve knowledge and understanding of the patients to change risk behaviors. Patients as adult who received education should optimizing their engagement in learning experiences and helping them master program content (Merriam & Bierema, 2014).

Patients' skills training, in component 2 twelve-week exercise, each patient was trained exercise before starts the program. After that they performed exercised 12 weeks at home. The exercise consists of 1) walking exercise 3 times/week, 40-minute/session and 2) resistance exercise 2 times/week, 20-minute/session. They exercised such direction as part of everyday life. Patients feel responsible for their own

lives and decisions and need to direct their own learning as self-direction (Knowles, 1980). This component increase experience of ischemic stroke patients. Moreover, they were trained to measure blood pressure before exercise. The patients were increased knowledge and empowerment about blood pressure control and avoiding further strokes (Ovaisi et al., 2011). Exercise and skills of self-blood pressure monitoring gained their skill and enhance their attitude and drive them to maintain behaviors and avoid a further stroke.

Instilling positive attitude, based on component 3 follow-up via telephone for 20 minutes (2 times) as strategies to empower and consultation via telephone and improve adherence to intervention (Flemming, Allison, Covalt, Herzig, & Brown, 2013). The researcher telephoned follow up 2 times. These components supported behavior modification for stroke patients. A follow-up call was initiated by the researcher. The goal was to bridge the gap between hospitalization and return of the patient to home by providing educational support for the patient after discharge (Flemming et al., 2013). The researcher asked each patient if they had any questions about their behavior modification, and if they experienced any difficulties. Questions were answered by the researcher either at that time or in a follow-up call. The details of telephone calling related health behaviors about eating, physical activity and exercise, smoking, and intake medication in self-monitor form. It was the process of attending to one's actions and recording the presence or absence of target behaviors (McBain, Shipley, & Newman, 2015).

The recurrent stroke prevention program improved knowledge, skills, and positive attitude of patients. This led patients to perform eating diet and sodium intake, exercise, smoking, and medication adherence for 12 weeks intervention. Those target

behaviors were affected to physiological change of patients for 12 weeks to control blood pressure, low-density lipoprotein cholesterol, and blood glucose.

Lower sodium diet help reduce retention of sodium and water in the body and inhibit sodium chloride reabsorption in the distal convoluted tubule leads to a decrease in extracellular fluid that decrease peripheral resistance for reducing blood pressure (Larsson, Wallin, & Wolk, 2016). Moreover, reducing saturated and trans fats and statin help to decrease cholesterol (Lim & Choue, 2013). Avoid sweetened foods and diabetes drug reduce blood glucose (Lakkur & Judd, 2015).

Quit smoking reduce atrial stiffness and improve endothelial cell function to reduce blood pressure. Smoking causes inflammation, oxidative stress, and associated with an abdominal obesity as risk factor for diabetes because it encourages the production of cortisol a hormone that increase blood sugar (Chen et al., 2019; Epstein et al., 2017). Acrolein inhibit the protective enzyme responsible for keeping the LDL cholesterol intact lead to increase oxidized LDL cholesterol in blood stream, increase high risk of stroke (Chadwick et al., 2015).

Medication adherence as anticoagulant drug, antihypertensive drug, diabetic drug and antihyperlipidemic drug, are dedication treatment to control stroke patients' health condition related blood pressure, low density lipoprotein cholesterol, and blood glucose after ischemic stroke (Kleindorfer et al., 2021).

Exercise with an intensity of 12-weeks duration 3 time/week 40-60 minutes/time, low to moderate intensity exercise may benefit plasma lipid, glucose and inflammatory markers, and ambulatory capacity (Tang et al., 2014). Exercise that includes cardiorespiratory exercise using walking as the exercise mode improves the speed and tolerance of walking at the end of intervention. Exercise involving walking

with resistance exercise improves walking speed and indices of balance (Saunders, Greig, & Mead, 2014).

Regular exercise made patients' hearts stronger. A stronger heart could pump more blood with less effort. As a result, the force on patients' arteries decreased, lowering patients' blood pressure (Billinger, Coughenour, MacKay-Lyons, & Ivey, 2012). The effect of exercise on stroke patients was described as follows.

First, patients' muscles needed energy to work. The patients' body burned sugar as an energy source, lowering the glucose levels in patients' blood. Second, when patients' exercise regularly, it helped the body use insulin more efficiently (Abou Elmagd, 2016). This could lower blood sugar levels. Clinical studies proved that walking helped a stroke victim regained strength, stamina, and balance. The National Institute of Health (NIH) maintained that walking was one of the most important parts of a stroke rehabilitation program (Gittler & Davis, 2018). The brain needed stimulation to relearn motions that were lost. Resistance exercises also prevented joint contractures, muscle shortening, decrease spasticity, reduce joint stiffness, and improve a post-stroke patient's overall function (Gittler & Davis, 2018; Moore et al., 2015).

Active exercise helps to reduce stimulation of the sympathetic nervous system and strengthen the blood vessels for reducing blood pressure (Abou Elmagd, 2016), increase in metabolism of the muscle fat and reduce fat in adipose tissue help to decrease cholesterol (Lira et al., 2010), and exercise can reduce the glucose in blood by increase muscles use glucose without insulin to promote plaque stability and favorable changes in vascular wall function, increase in metabolism of the muscle fat and reduce

fat in adipose tissue help to decrease cholesterol, and reduce the glucose in blood by increase muscles use glucose (Ivey, Hafer-Macko, & Macko, 2008).

Therefore, the researcher stated the hypothesis as follows.

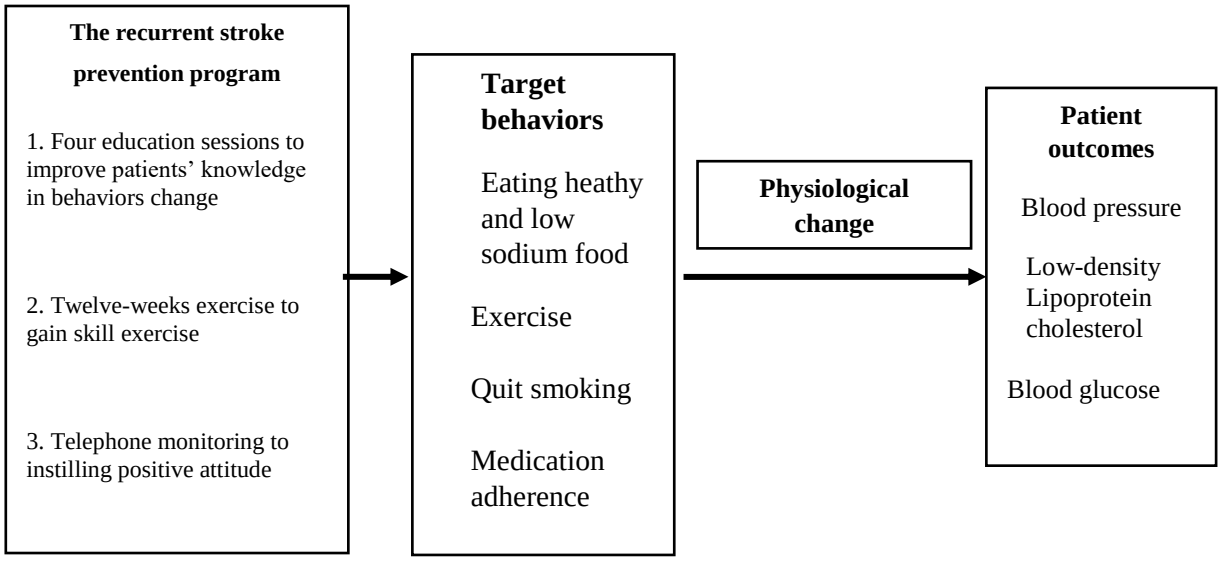

Figure 1.1 Framework of the study

Hypothesizes with rationales

1. Patients with first ischemic stroke who receiving a recurrent stroke prevention program have lower mean of systolic blood pressure, diastolic blood pressure, low-density lipoprotein cholesterol, and blood glucose than those received the usual care across time.

2. Patients with first ischemic stroke who receiving a recurrent stroke prevention program have lower mean systolic blood pressure, diastolic blood pressure, low-density lipoprotein cholesterol, and blood glucose at baseline, week 4, week 8, and week 12.

Scope of the study

1. The randomized controlled trial was conducted to explore the effects of a recurrent stroke prevention program on blood pressure, low-density lipoprotein cholesterol, and blood glucose in patients with first ischemic stroke.

2. The study was conducted among patients with first ischemic stroke who aged 45 years old and older, there were admitted in stroke unit at the tertiary hospitals, Thailand.

3. The dependent variables were systolic blood pressure, diastolic blood pressure, low density lipoprotein cholesterol, and fasting plasma glucose.

4. The independent variable was the recurrent stroke prevention program.

5. There was 12 weeks intervention. Data were collected from May 2021 to October 2021.

Operational definition

The recurrent stroke prevention program is a nursing intervention to reduce blood pressure, low-density lipoprotein cholesterol, and blood glucose among patients with first ischemic stroke. The recurrent stroke prevention program consists of three components intervention as 1) four education sessions (40 minutes/session) cover diet and restrict salt intake, increasing physical activities, quit smoking and avoid secondhand smoke, and ischemic stroke and medication adherence after ischemic stroke; 2) twelve-weeks exercise (40-60 minutes); and 3) telephone monitoring for 20 minutes/time as strategies to improve adherence to interventions

Usual care is defined as the nursing care provide by register nurses in stroke unit to prevent recurrent stroke. Nurses monitor and maintenance homeostasis, prevent complications, and work together with other health care providers in rehabilitation.

They received general and briefly information covered vascular risk and lifestyle modification in discharge plan. Patients followed up at neurological outpatient clinic, they received medication, test blood exam, and advice from neurologists.

Recurrent stroke is defined as a new focal neurological deficit with no apparent cause other than that of vascular origin occurring at any time after index stroke, or with clinical evidence of the sudden onset of an exacerbation of the previous focal neurological deficit with no apparent cause other than that vascular origin > 21 days after the index stroke (Xu, Liu, Wu, Zhang, & Yin, 2007).

Blood pressure is defined as the pressure of blood pushing against the walls of arteries. The blood pressure value consists of systolic blood pressure and diastolic blood pressure. In patients who experience first ischemic stroke, should control an office blood pressure goal of <130/80 mmHg (Kleindorfer et al., 2021).

Low-density lipoprotein cholesterol is defined as one type of cholesterol, called the bad cholesterol which it collects in the walls of vessels. In patients who experience first ischemic stroke, should control low-density lipoprotein cholesterol goal <70 mg/dL (Kleindorfer et al., 2021).

Blood glucose as fasting plasma glucose (FPG) is defined as the plasma glucose level was measured while the patient is in a fasting for at least 8 hours. In patients who experience first ischemic stroke, should control fasting plasma glucose goal 70-100 mg/dL (Kleindorfer et al., 2021).

Patients with first ischemic stroke is defined as patients who have been first time diagnosed with ischemic stroke by neurologist, when ischemic stroke symptoms were presented at the time of hospital arrival, lasting <24 hours but with cranial

computed tomography (CT) scanning or magnetic resonance imaging (MRI) present ischemic stroke, or those with symptoms lasting >24 hours.

Expected benefits

Finding from this study will contribute to the effective intervention on blood pressure, low density lipoprotein cholesterol, and blood glucose. The results of this study will inspire practitioners to improve patients' knowledge about recurrent stroke prevention; enhance the patients to exercise and monitoring behaviors regularly; and instilling positive attitude to change patients' behaviors.

CHEPTER II
LITERATURE REVIEW

This chapter presents an integrative review of theoretical and empirical literature describing interesting concepts related to recurrent stroke prevention on blood pressure, low-density lipoprotein cholesterol, and blood glucose among patients with first ischemic stroke. The review covers the following topics:

1. Recurrent stroke
    1.1 Definition of recurrent stroke
    1.2 Incidence of recurrent stroke
    1.3 Outcomes after recurrent stroke
    1.4 Factors related recurrent stroke
    1.5 Thai stroke guideline for recurrent stroke prevention
2. Ischemic stroke
    2.1 Definition of ischemic stroke
    2.2 Pathophysiology of ischemic stroke
    2.3 Signs and symptoms of ischemic stroke
    2.4 Complications after ischemic stroke
3. Patient with first ischemic stroke
    3.1 Definition of patients with first ischemic stroke
    3.2 Prevalence of patients with first ischemic stroke
4. Stroke prevention
5. Usual care for ischemic stroke patients
6. Outcomes of the study
    6.1 Blood pressure

6.2 Low-density lipoprotein cholesterol

6.3 Blood glucose

7. Interventions for recurrent stroke prevention strategies on controlling blood pressure, low-density lipoprotein cholesterol, and blood glucose

8. Adult learning theory

9. Development of a recurrent stroke prevention program

Stroke was classified into two major types as well as ischemic and hemorrhagic strokes. Ischemic strokes as results from insufficient blood flow to the brain led to brain damage and cell death (Stack & Cole, 2017), was classified into five subtypes included 1) large-artery atherosclerosis, 2) cardio embolism, 3) small-vessel occlusion, 4) other determined causes and 5) undetermined causes, by using the Trial of Org. 10172 in Acute Stroke Treatment (TOAST). On the other hand, hemorrhagic strokes as result from blood vessel rupture led to bleeding into the brain tissue, it was divided into intracerebral hemorrhage (ICH) and subarachnoid hemorrhages (SAH) (Stack & Cole, 2017), but this study was not focused on.

Most common type of stroke in adult patients was ischemic stroke (Cabral et al., 2017; Katsnelson, Della-Morte, & Rundek, 2012), it most occurred 61%-87.8%, follow by subarachnoid hemorrhage at 22% and intracerebral hemorrhage 12.2%-17% (Pennlert, Eriksson, Carlberg, & Wiklund, 2014; Smajlović, Salihović, Ibrahimagić, & Sinanović, 2013). In Thailand, patients were ischemic stroke 63.9%, intracerebral hemorrhage 28.5%, and transient ischemic attract 7.6% (Kongbunkiat, Kasemsap, Thepsuthammarat, Tiamkao, & Sawanyawisuth, 2015). Therefore, this study focuses on ischemic stroke patients because it found a lot and patients reported of adverse outcomes.

1. Recurrent stroke

A recurrent stroke was an important health problem following ischemic stroke.

1.1 Definition of recurrent stroke

Recurrent stroke was one of poor outcomes after patients experienced both ischemic and hemorrhagic strokes (Pennlert et al., 2014). Previous studies defined term of recurrent stroke in similar way, therefore, recurrent stroke referred to a new onset of focal neurological deficit with no apparent cause other than that of vascular origin occurring at any time after the initial stroke. Physicians diagnosed recurrent stroke by using computerized tomography (CT).

Recurrent stroke referred to a stroke with clinical evidence of the sudden onset of a new focal neurological deficit with no apparent cause other than that of vascular origin (the deficit could not be ascribed to a concurrent acute illness, epileptic seizure, or toxic effect) occurring at any time after the index stroke (Chen, 1997).

Recurrent stroke is defined as a stroke with clinical evidence of the sudden onset of an exacerbation of a previous focal neurological deficit with no apparent cause other than that of vascular origin occurring > 21 days after the index stroke (Xu, Liu, Wu, Zhang, & Yin, 2007).

Recurrent stroke is defined as a cerebrovascular event subsequent to the initial stroke and occurring in an anatomic site or vascular territory different from that of the initial stroke (de la Cámara, Arche, & Ferrando, 2013).

Recurrent stroke is defined as a new onset of focal or neurologic deficits that could not be attributed to the presenting lesion and were consistent with World Health Organization definition of stroke (Bovim, Askim, Lydersen, Fjærtoft, & Indredavik, 2016).

Recurrent stroke is defined as a stroke with clinical evidence of the sudden onset of a new focal neurological deficit with no apparent cause other than that of vascular origin occurring at any time after the index stroke, or with clinical evidence of the sudden onset of an exacerbation of a previous focal neurological deficit with no apparent cause other than that of vascular origin occurring > 21 days after the index stroke (Xu, Liu, Wu, Zhang, & Yin, 2007).

Based on definition of recurrent stroke, previous studies had mostly used a minimum period of 21 days between initial event and recurrence. Because infarction within 21 days after the initial cerebral insult was categorized as a recurrence only if a different region of the brain is affected (Stahmeyer, Stubenrauch, Geyer, Weissenborn, & Eberhard, 2019).

In summary, this study defined recurrent strokes as a new focal neurological deficit with no apparent cause other than that of vascular origin occurring at any time after index stroke, or with clinical evidence of the sudden onset of an exacerbation of the previous focal neurological deficit with no apparent cause other than that vascular origin > 21 days after the index stroke.

1.2 Incidence of recurrent stroke

Previous studies showed that recurrent stroke occurred in 30 days after initial stroke to long term. The stroke recurrent in patients had been occurred within 1 week at 10%, within 1 month at 15%, (Coull, Lovett, & Rothwell, 2004), within 3 months at 3.2% to 18% (Maier, Bauerle, Kermer, Helms, & Buettner, 2013; Wang et al., 2016; Wu et al., 2015), within 1 year at 3% to 25.4% (Kuwashiro et al., 2012; Minelli et al., 2007; Nedeltchev et al., 2005; Pennlert et al., 2014), within 3 years at 18% (Kocaman,

DÜRÜYen, KoÇEr, & AsİL, 2015), and within 5 years at 8.9% to16% (Pennlert et al., 2014; Putaala et al., 2010).

In Thailand, the incidence rate of recurrent strokes was 29% within 1 year and 46% within 5 years (Tiamkao, 2013). According to the recurrent stroke was high within first three months after stroke onset, it was important to identify factors associated with early recurrence in order to establish effect treatments for recurrent prevention (Elnady, Mohammed, Elhewag, Mohamed, & Borai, 2020). Therefore, this study focused to conducts in first three months after ischemic stroke onset and repeated measures dependent variables at week 4, week 8, and week 12 which related to and follow-up time (14 days, first month, and every three months) as a critical time of recurrent stroke which need to prevent.

1.3 Outcomes after recurrent stroke

Recurrent stroke was more likely to be fatal and disabling than first-even stroke. There were adverse outcomes after recurrent stroke as followed.

Mortality: The rate of death was increased double times in patients after stroke (Salehi et al., 2018). Case fatality at one month after first recurrent stroke was 41%, which was significantly greater than the case fatality at one month after first stroke was 22% (Hardie et al., 2004). Odds Ratio of mortality from recurrent stroke was 1.43 (95% CI: 1.03-1.99) (Lekoubou, Nkoke, Dzudie, & Kengne, 2017).

Disability and cognitive decline: Stroke patient with recurrent event had increased risk of poor functional outcome at three months (Odds Ratio, 6.72; 95% CI, 5.36–8.42) (Wan et al., 2016). The risk of new disability following a recurrent stroke had range from 39% to 53% (Bailey, 2018).

Prolonged hospitalization and high healthcare cost: The costs of recurrent events and rehospitalization were high, 18.4 percent of ischemic stroke patients presented re-hospitalization due to stroke recurrence in five years (Sun et al., 2013; Tseng & Lin, 2009) and had a longer length of stay. The recurrent stroke group had higher total cost than the first-ever stroke group (Kwon et al., 2014).

Therefore, the recurrent stroke led to adverse outcomes for ischemic stroke patients. Heath care providers should concern and prevent recurrent stroke as the aims of this study.

1.4 Factors related recurrent stroke

Risk factors for recurrent stroke was classified as modifiable and nonmodifiable. The nonmodifiable risk factors for stroke included age, gender, and severity of stroke (Zhuo et al., 2020), while the modifiable risk factors included diabetes mellitus, hypertension, hyperlipidemia, atrial fibrillation, obstructive sleep apnea, smoking, alcohol use, physical inactivity (Oza et al., 2017).

Hypertension: Hypertension was a major risk factor of recurrent stroke. The prevalence of hypertension in patients with recurrent stroke was 75-88% (Kocaman et al., 2015; Yeo et al., 2016). High blood pressure in non-hypertension and hypertension were associated with recurrent stroke. Meta-analysis suggested that hypertension had an influence on recurrent stroke (Odds Ratio 1.67, $P < 0.00001$) (Zheng & Yao, 2019).

Hyperlipidemia: The prevalence of hyperlipidemia in patients with recurrent stroke was 30-65% (Kocaman et al., 2015; Yeo et al., 2016). The result of previous study showed that patients with hyperlipidemia related to recurrent stroke (Hazard Ratio 2.9; P=0.01). Low-density lipoprotein cholesterol was the primary serum lipid target for recurrent stroke reduction. While triglycerides or high-density lipoprotein

cholesterol itself was not significantly associate with recurrent stroke (Jong Park, Lee, & Ovbiagele, 2014).

Diabetes mellitus: The prevalence of diabetes mellitus in patients in recurrent stroke was 43% (Kocaman et al., 2015). Diabetes was an independent risk factor for stroke recurrence (Shou, Zhou, Zhu, & Zhang, 2015) ($P < 0.00001$) (Zheng & Yao, 2019). Similarly, the study found that diabetes mellitus was a predictive independent risk factor of recurrent stroke (Odds Ratio, 1.986) (Fu et al., 2015).

Coronary heart disease and atrial fibrillation: The prevalence of atrial fibrillation in patients with recurrent stroke was 11% (Kocaman et al., 2015). The result of meta-analysis suggested that atrial fibrillation was risk factors that cause recurrent stroke (Odds Ratio 1.88, $P < 0.00001$) (Zheng & Yao, 2019). Most ischemic stroke patients with atrial fibrillation, and they needed closely monitoring treatment than others.

Prior stroke and stroke severity: Ischemic stroke was a predictive independent risk factor of recurrent stroke (Odds Ratio, 2.496; 95% CI, [1.567-3.976]) and stroke severity were important factor related recurrent stroke (Kang et al., 2016; Wang et al., 2017; Zhang et al., 2015).

Smoking: The prevalence of smoking in patients in recurrent stroke was 14% (Kocaman et al., 2015). Smoking was a risk factor that differs from other for being an easy modifiable risk, and many patients should be stop smoking after the prior stroke. The meta-analysis in the present study showed that smoking was not a main risk factor that impacts the recurrence of stroke (Zheng & Yao, 2019).

Discontinuous medication treatment: Discontinuous of antiplatelet after ischemic stroke related to recurrent stroke (Hazard Ratio 2.92) (Pezzini et al., 2014).

Although, antiplatelets slightly decreased recurrence risk (Hazard Ratio 1.41) (Xu et al., 2007), but patients with ischemic stroke should be prescribed antiplatelet therapy for recurrent stroke prevention. In Thailand, the data showed that recurrent stroke related discontinuous medication treatment after stroke (Tiamkao, 2013).

Age: Age was a non-modifiable factor associate with recurrent stroke (Kuwashiro et al., 2012). Advancing age was risk factors for recurrent stroke among patients with first ischemic stroke (Hazard Ratio 1.03) (Lee, Somerford, & Yau, 2004).

Gender: Gender was a significant predictor of recurrent stroke (Hazard Ratio 1.95; P = 0.008) (Chen, Weng, Wu, & Huang, 2019). Risk factors for recurrent stroke of female and male were different (Chramnanpho & Opasrattanakorn, 2021). Male had recurrent rate higher than female (Zhao et al., 2019).

Hypertension, diabetes mellitus, and hyperlipidemia were major risk factors of stroke in the Thai population (Suwanwela, 2014). The American Heart Association/ American Stroke Association was recommended the vascular risk factors as well as hypertension, hyperlipidemia, and diabetes mellitus should be managed for preventing recurrent stroke after ischemic stroke (Benjamin et al., 2019; Kleindorfer et al., 2021).

However, previous studies showed that most patients with high blood pressure were not treated with antihypertensive agents. Surprisingly, only 49.1% of 558 stroke patients had good control of their blood pressure at 120 days after stroke (Nidhinandana, Ratanakorn, Charnnarong, Muengtaweepongsa, & Towanabut, 2014). Diabetes was found in 26% and hyperlipidemia found 30% of stroke patients and need for strategies to improve (Plengvidhya et al., 2006). Therefore, more effort was still needed to increase the awareness of hypertension, hyperlipidemia and diabetes mellitus among healthcare providers and patients in order to achieve a better control these risk

factors in the Thai population. Therefore, this study focused on high blood pressure, high level of low-density lipoprotein cholesterol, and high blood glucose as physiological and biological factors that high relative risk to recurrent stroke.

1.5 Thai stroke guideline for recurrent stroke prevention

In Thailand, the clinical practice guidelines for ischemic stroke by Prasat neurological institute (2019) as a standard guideline stated that patients after ischemic stroke who were taken to the emergency room in an ambulance may get diagnosed and treated more quickly. At emergency room, patients receive the quickest investigate and start reperfusion therapy include rt-PA and endovascular treatment if patients got to the hospital within 4.5 hours after stroke onset. After clinical improvement, the neurologists treated the underlying causes of stroke and prevent a recurrent stroke. They received rehabilitation to help recover and were assessed to determine the need for home visit by physicians. Before patients discharged from the hospital, the physicians provided antiplatelet, anticoagulant agents, and antilipidemic drugs to prevent recurrent stroke (Prasat Neurological Institute, 2019). Nurses provided general and briefly information covered vascular risk and lifestyle modification in discharge plan. At time of follow-up (14 days, first month, and every three months), the participants received medication, took blood exam, and advised from neurologists at neurological outpatient clinic (Prasat Neurological Institute, 2015).

In addition, the guideline from the American Heart Association/American Stroke Association (2021) was followed in stroke care in Thailand. It recommended the recurrent stroke prevention guideline included 1) management of vascular risk factors remain extremely important in recurrent stroke prevention, including diabetes, smoking cessation, lipids, and especially hypertension; 2) lifestyle factors, including healthy diet

and physical activity. Low salt and Mediterranean diets were recommended for stroke risk reduction. The ischemic stroke patients should be encouraged to perform physical activity; 3) changing patients behaviors such as diet, exercise, and medication compliance required more than just simple advised from their physician; 4) antithrombotic therapy, including antiplatelet or anticoagulant agents was provided for recurrent stroke prevention; 5) heart rhythm monitoring for atrial fibrillation was usually recommended if other cause of stroke is discovered; 6) carotid endarterectomy and carotid artery stenting should be driven by specific patient comorbidities and features of their vascular anatomy; 7) patients with severe intracranial stenosis in the vascular territory of ischemic stroke should receive aggressive medical management of risk factors and short-term dual antiplatelet therapy were preferred; 8) patients with embolic stroke of uncertain source should not be treated empirically with anticoagulants or ticagrelor because it was found to be of no benefit (Kleindorfer et al., 2021).

At the present, the healthcare system of Thailand is improved, high standard, and same direction of stroke care. However, the incidence and mortality from stroke were still increasing in Thailand (Suwanwela, 2014).

2. Ischemic stroke

Ischemic strokes find about 80 percent of all strokes. Ischemic strokes were led to a blockage or decrease of blood flow (Virani et al., 2020). This blockage can be due to reduce systemic perfusion, stenosis, or occlusion of blood vessels. The major cause of ischemia are embolization, thrombosis, and lacunar infarction from small vessel disease. It was the important cause of dead and long-term disability (Flemming, Allison, Covalt, Herzig, & Brown, 2013).

2.1 Definition of ischemic stroke

Ischemic stroke was defined as patients who have symptoms that were present at the time of hospital arrival, lasting <24 hours but with cranial computed tomography (CT) scanning or magnetic resonance imaging (MRI) present ischemic stroke, or those with symptoms lasting >24 hours (Bangalore et al., 2014). A first ischemic stroke was defined as first ischemic stroke event occurring (Sposato et al., 2020).

2.2 Pathophysiology of ischemic stroke

The major cause of ischemic stroke was divided into embolic and thrombotic infarctions. Embolic infarction was caused by embolism referred to blood clot or plaque fragment forms embolus somewhere in the body and moves to the brain. When the clot moved to a blood vessel small enough to block its passage, blocking the blood vessel and causing a stroke. The heart was a common source of this material, although other arteries may also be source of this embolic material. In heart, clots may form on valves or chambers (Ntaios & Hart, 2017).

A thrombotic infarction was caused by a blood clot that forms as thrombus inside one of the arteries supplying blood to brain (Barker-Collo & Feigin, 2006). Thrombosis referred to obstruction of blood vessel due to a localized occlusive process within a blood vessel. Atherosclerosis was cause narrowing of the diseased vessel. This led to restriction of blood flow. Atherosclerosis usually affects larger extracranial and intracranial vessels (Caplan, 2016).

2.3 Signs and symptoms of ischemic stroke

Ischemic stroke signs were sudden numbness or weakness on one side of the body as in the face, arm, or leg. Sudden confusion, trouble speaking, or difficulty

understanding speech. Sudden trouble seeing in one or both eyes. Sudden trouble walking, dizziness, loss of balance, or lack of coordination, and sudden severe headache with no known cause (CDC, 2021).

2.4 Complications after ischemic stroke

Stroke was a major health problem (Lapchak & Zhang, 2017). Previous studies reported that stroke was associated with increase mortality rate, increase morbidity, decease quality of life, increase stroke recurrent and increase healthcare cost. (Kelly, Hoskins, & Holloway, 2012; Youman, Wilson, Harraf, & Kalra, 2003; Y. Zhang, Chapman, Plested, Jackson, & Purroy, 2012).

2.4.1 Increasing mortality rate was serious complication in stroke patients. Although, the trend in stroke mortality was decreasing, however it still important indicated that the treatment and rehabilitation of stroke patients had improved consistently. Person dies from stroke in every 4 minutes (Virani et al., 2020). In Germany decreased from 52.4 deaths per 100 000 in 2000 to 32.3 deaths per 100 000 in 2008 in both males and females combined (Zhang et al., 2012). In Thailand, stroke mortality in adult patients was increasing from 33.4 per 100,000 in 2012 to 45.3 per 100,000 in 2016 (Bureau of Non-communicable Diseases, 2017).

2.4.2 Increasing morbidity and impairments, after surviving from stroke, 15% of patient faced with die in short time, 10% of patient had recover almost completely, 25% recover with minor impairment, 40% had moderate to severe impairments and 10% require nursing home or long-term care (Smith, 2010). Patients experienced with various impairments as clarified below:

Physiological impairments as common experience in stroke were weakness, numbness, and stiffness. After stroke, about 65% of survivors had reduced

ambulatory capacity and after 6 months, 50% still had impaired muscle function (Danielsson, Willén, & Sunnerhagen, 2012). Every stroke was different, and the effects depended on which part of brain was damaged. Physiological impairment affects activities of daily living (ADLs), such as eating, bathing, dressing, toileting, and transferring, which require the caregiver's assistance the most (Cawood, Visagie, & Mji, 2016).

Cognitive impairment, patients in the acute phase normally presented a general decline in cognitive efficiency in all studied cognitive domains. Cognitive impairment was common 3 months after stroke (Patel, Coshall, Rudd, & Wolfe, 2002). Cognitive impairment was associated with a higher mortality rate and a poorer functional outcome, which was often more disabling than the physical disability itself (Ignjatovic, Semnic, Bukurov, & Kozic, 2015). Impairment in visuospatial construction and memory within one month after stroke could be an independent prognostic factor of functional outcome. (Jihong Park, Lee, Lee, & Jung, 2016). Similarly, to patients in the long-term phase of ischemic stroke showed a general decline in cognitive efficiency.

Psychological impairment, this impairment comprises cognitive, communication, behavioral changes, and emotional problems. Up to 80 of stroke survivors were at risk of psychological impairment (Barker-Collo, 2007; Schepers et al., 2009). Psychological impairment was common after stroke and common present as depression and anxiety. In addition, serious psychological problems and strain were common in careers of stroke survivors 30%-68% (Qiu & Li, 2008; Wilz & Kalytta, 2008). Stroke patients experienced with various forms of emotional changes, including depression (17.7%-72.5%) (Kootker et al., 2016; Mitchell et al., 2017; Nidhinandana et al., 2010; Sathirapanya, Sathirapanya, & Trichan, 2014), anxiety (9.8%-20.0%)

(Knapp et al., 2017; Kootker et al., 2016; Menlove et al., 2015; Mitchell et al., 2017), apathy (Yang et al., 2013), anger (Huang et al., 2014), uncertainty, frustration, impatience, irritation, poor interpersonal perception, emotional dis-control , indifference , helplessness , inertia , and euphoria (Huang et al., 2014). According to various form of psychological distress, particularly in form of depression, has a high adverse effect in stroke patients. Psychological distress outcomes were serious and common occur after stroke.

2.4.3 Increase stroke recurrent, previous studies showed that recurrent stroke in adults occurred in first three months after initial stroke (Wang et al., 2016; Wu et al., 2015). The frequency recurrent time was one year after previous stroke at 3% to 25.4% (Kuwashiro et al., 2012; Minelli, Fu Fen, & Camara Minelli, 2007; Nedeltchev et al., 2005; Pennlert et al., 2014).

2.4.4 Quality of life, current stroke outcome assessments were often limited to the resulting neurological impairment and functional disability, neglecting to evaluate the total influence of the event on a patient's well-being (Nichols-Larsen, Clark, Zeringue, Greenspan, & Blanton, 2005). Health-related quality of life directly after stroke was low and it related the severity of neurological deficits. Suffering a stroke generates many effects in the lives of patients. It seems that rehabilitation and recovery help to increasing the independence of post-stroke patients, decreasing isolation, treating depression, and strengthening social support can contribute to improving health related quality of life (Klocek, 2013).

2.4.5 Increase healthcare costs, the burden of stroke was further compounded by substantial economic costs; in the United State, the total cost of stroke for 2008 was estimated to exceed US$65 billion, while, across the European Union

countries, the total annual cost of stroke was estimated to be €27 billion (Di Carlo, 2009). In Thailand, the hospital had to pay approximately 24,000 Bath for each additional disability-avoided patient when switching from hospital care to a home rehabilitation program (Sritipsukho, Riewpaiboon, Chaiyawat, & Kulkantrakorn, 2010). That related to the study results of Kuptniratsaikul, Kovindha, Massakulpan, Permsirivanich, and Kuptniratsaikul (2009) presented that the mean total cost for all treatments during rehabilitation was 28,399 (standard deviation 22,511) baht (approximately USD 789).

3. Patient with first ischemic stroke

3.1 Definition of patients with first ischemic stroke

According to ischemic stroke was defined as patients who have symptoms that were present at the time of hospital arrival, lasting <24 hours but with cranial computed tomography (CT) scanning or magnetic resonance imaging (MRI) present ischemic stroke, or those with symptoms lasting >24 hours (Bangalore et al., 2014). Fist ischemic stroke referred to first time of ischemic stroke event occurring ischemic stroke patients (Civelek, Atalay, & Turhan, 2016; Sposato et al., 2020).

Therefore, patients with first ischemic stroke as population in this study referred to persons who had been first time diagnosed with ischemic stroke by neurologist, when ischemic stroke symptoms were presented at the time of hospital arrival, lasting <24 hours but with cranial computed tomography (CT) scanning or magnetic resonance imaging (MRI) present ischemic stroke, or those with symptoms lasting >24 hours.

3.2 Prevalence of patients with first ischemic stroke in Thailand

Most reported of prevalence rate of stroke patients in Thailand, were presented in overall type of strokes. However, the ischemic stroke was the major type occurred in Thailand. The first-time hospitalized stroke in Thai people aged 15-59 years increased from 63,683 cases in 2016 to 68,046 cases in 2017, the highest prevalence of stroke in adult patients aged 50 to 59 years (42,245 cases), followed by 40 to 50 years (17,001 cases) and 15 to 39 years (8,800 cases) (Ministry of public health, 2017).

In addition, patients who met frequently recurrent strokes, showed higher rates of long-term disability with more severe physical and cognitive impairments compare with patients with first ischemic stroke (Ng, Tan, Chen, Senolos, & Koh, 2016). For direct exploration the effects of the recurrent stroke prevention program on blood pressure, low-density lipoprotein cholesterol, and blood glucose. The researcher was selected patients with first ischemic stroke as a target population in this study.

4. Stroke prevention

Stroke was a leading cause of long-term disability. Primary prevention of first stroke and secondary prevention of recurrent stroke were a high priority. Primary prevention of ischemic stroke includes lifestyle modification, treatment of risk factors including hypertension, diabetes mellitus and lipid disorders, antiplatelet therapy for high vascular risk patients, and anticoagulation in atrial fibrillation (Diener & Hankey, 2020). The secondary prevention strategies of ischemic stroke include.

1. Recommendations for the diagnostic workup after ischemic stroke, to define ischemic stroke etiology, and to identify targets for treatment in order to reduce the risk of recurrent ischemic stroke (Kleindorfer et al., 2021).

2. Management of vascular risk factors remains extremely important in secondary stroke prevention, including diabetes, quit smoking, lipids, and especially hypertension. Intensive medical management, often performed by multidisciplinary teams, was usually best, with goals of therapy tailored to the individual patient (van den Berg et al., 2019). Patients with stroke who continue to smoke tobacco should be advised to stop smoking (and, if unable, to reduce their daily smoking) to lower the risk of recurrent stroke (Chen et al., 2019) and avoidance of environmental (passive) tobacco smoke was recommended to reduce risk of recurrent stroke (Lee, Thornton, Forey, & Hamling, 2017). Antihypertensive therapy reduces the risk of ischemic stroke. Most likely all antihypertensive drugs are equally effective in secondary stroke prevention. The optimal blood pressure target for secondary stroke prevention was <130/80 mm Hg (Kleindorfer et al., 2021).

Lowering of LDL cholesterol concentration by about 1 mmol/l with statins reduced the risk of recurrent stroke by at least 12%. The target range for the LDL concentration is 70 to 100 mg/dl. Patients with ischemic stroke or due to atherosclerosis without coronary heart disease and LDL cholesterol levels between 100 and 190 mg/dl should be treated with 80 mg atorvastatin (Diener & Hankey, 2020).

Diabetes mellitus. In patients with an ischemic stroke, the goal for glycemic control should be individualized based on the risk for adverse events. Each of the principal disorders of glucose metabolism is diagnosed from measures of plasma glucose, HbA1c, and symptoms of hyperglycemia. Achieving a goal of HbA1c <7% or fasting plasma glucose 70-100 mg/dL is recommended to reduce risk for microvascular complications, including stroke (Kleindorfer et al., 2021; Tun, Arunagirinathan, Munshi, & Pappachan, 2017).

3. Lifestyle factors, including healthy diet and physical activity, was important for preventing a second stroke (Kleindorfer et al., 2021). Low sodium (Chiavaroli et al., 2019; Nagata, Takatsuka, Shimizu, & Shimizu, 2004) and Mediterranean diets (Rees et al., 2019) were recommended for stroke risk reduction. Patients with stroke were especially at risk for sedentary and prolonged sitting behaviors (Biswas et al., 2015), and they should be encouraged to perform physical activity in a supervised and safe manner.

4. Changing patient behaviors such as diet, exercise (D'Isabella, Shkredova, Richardson, & Tang, 2017; Deijle et al., 2017), and medication compliance require more than just simple advice or a brochure from their physician. In patients with stroke, it was reasonable to counsel individuals to follow a Mediterranean-type diet, typically with emphasis on monounsaturated fat, plant-based foods, and fish consumption, with either high extra virgin olive oil or nut supplementation, in preference to a low-fat diet, to reduce risk of recurrent stroke (Rees et al., 2019).

5. Antithrombotic therapy, including antiplatelet or anticoagulant agents, was recommended for nearly all patients without contraindications. With very few exceptions, the combination of antiplatelets and anticoagulation was typically not indicated for secondary stroke prevention. Dual antiplatelet therapy was not recommended long term, and short term, dual antiplatelet therapy was recommended only in very specific patients, including those with early arriving minor stroke and high-risk transient ischemic attack or severe symptomatic intracranial stenosis.

6. Atrial fibrillation remains a common and high-risk condition for second ischemic stroke. Anticoagulation was usually recommended if the patient has no

contraindications. Heart rhythm monitoring for occult atrial fibrillation is usually recommended if no other cause of stroke is discovered (Kleindorfer et al., 2021).

7. Extracranial carotid artery disease was an important and treatable cause of stroke. Patients with severe stenosis ipsilateral to a nondisabling stroke or transient ischemic attack who were candidates for intervention should have the stenosis fixed, likely relatively early after their ischemic stroke. The choice between carotid endarterectomy and carotid artery stenting should be driven by specific patient comorbidities and features of their vascular anatomy (Kleindorfer et al., 2021).

8. Patients with severe intracranial stenosis in the vascular territory of ischemic stroke or transient ischemic attack should not receive angioplasty and stenting as a first-line therapy for preventing recurrence. Aggressive medical management of risk factors and short-term dual antiplatelet therapy were preferred (Kleindorfer et al., 2021).

Therefore, the recurrent stroke prevention as a second prevention in this study, focused to changing behaviors to manage of blood pressure, low-density lipoprotein cholesterol, and blood glucose.

5. Usual care for ischemic stroke patients

In Thailand, ischemic stroke patients who were taken to the hospital in an ambulance may get diagnosed and treated more quickly. The emergency staffs may take them to a specialized stroke center to ensure that patients receive the quickest possible diagnosis and treatment. Ischemic stroke patients may get a type of medicine called a thrombolytic as a clot-busting drug to break up blood clots. Tissue plasminogen activator (rtPA) was thrombolytic if patients got to the hospital within 4.5 hours of the first symptoms of an ischemic stroke (Prasat Neurological Institute, 2019).

To prevent recurrent stroke, the neurologists would treat the underlying causes of stroke, including heart disease, high blood pressure, atrial fibrillation, high cholesterol, and diabetes. In addition, the ischemic stroke patients received rehabilitation to help recover. Before patients discharged from the hospital, social workers can help patients find care services and caregiver support to continue long-term recovery. It is important to work in steps to prevent recurrent stroke.

Nurses provide nursing care to manage serious complications for patients with ischemic stroke who had high severity of ischemic stroke, as well as anxiety, confusion, depression, emotionalism, falls, fatigue, infection, malnutrition, pain, pressure sore, shoulder pain, shoulder subluxation, spasticity, and venous thromboembolism (Butsing, 2019; Sribundit, Riewpaiboon, Stewart, Tantirittisak, & Hanchaipiboolkul, 2017). Moreover, stroke nurses work with physical therapists to encourage and train ischemic stroke patients to perform activities of daily living (ADLs), such as eating, bathing, dressing, toileting, and transferring, which require the caregiver's assistance the most (Cawood, Visagie, & Mji, 2016).

For ischemic stroke patients who had minor stroke, they were common received education cover appropriate dietary after ischemic stroke, medication adherence, and follow up on physicians' appointment as discharge plan from nurses. According to the minor stroke stayed short time in hospital. The average length of stay was 4 days for ischemic stroke (Ellis, 2010) as same as the average length of stay was 5.7 in Thailand (Sribundit et al., 2017). It led Thai stroke patients require knowledge about risk factors of recurrent stroke to modify their factors associated recurrent stroke from healthcare providers (Saengsuwan & Suangpho, 2019; Saengsuwan, Suangpho, & Tiamkao,

2017). Therefore, it needed new nursing intervention to solve unclear nursing care for preventing recurrent as the gap of this study.

6. Outcomes of the study

6.1 Blood pressure

6.1.1 Definition of blood pressure

Blood pressure was referred to the force of blood pushing against the walls of arteries vessels as it was pumped by the heart to the body. There were two readings to reflect the working of arterial wall and heart. Systolic blood pressure indicated pressure in blood was exerting against artery walls when the heart beats, while diastolic blood pressure indicated pressure in blood was exerting against your artery walls when the heart was resting between beats (Chobanian et al., 2003). The blood pushed against the walls of arteries for long time. When the higher pressure in blood vessels, the harder the heart must work in order to pump blood to supply body organ. Blood vessels may develop aneurysms and weak spots due to high pressure, making them more likely to clog and burst as cause of stroke. The pressure in the blood vessels led blood to leak out into the brain. It was cause of a recurrent stroke (Mendis, 2017).

6.1.2 Blood pressure goal after ischemic stroke

The guideline for the prevention of stroke 2021 by the American Heart Association/American Stroke Association suggested that in patients with hypertension who experience stroke, an office BP goal of <130/80 mmHg was recommended for most patients to reduce the risk of recurrent stroke and vascular events. Antihypertensive medication treatment can be beneficial to reduce the risk of recurrent stroke in patients with no history of hypertension who experience a stroke and have an average office BP of ≥130/80 mmHg (Kleindorfer et al., 2021).

6.1.3 Instrument measure blood pressure

The sphygmomanometer OMRON HBP-1300 as the professional blood pressor monitoring was used to measure participants' blood pressure in this study. It was a fully automated blood pressure measurement device by records blood pressure. Oscillations of the arterial wall were detected by the upper-arm cuff. The cuff pressure at the time of the initial increase in arterial oscillations corresponds to maximum systolic blood pressure, and the lowest cuff pressure just prior to the time that oscillations stop decreasing in amplitude corresponds to the diastolic blood pressure (Saugel, Dueck, & Wagner, 2014).

6.1.4 Calibration and maintenance of blood pressure devices

The sphygmomanometer OMRON HBP-1300 made as a high-quality blood pressure measurement as a calibrated aneroid sphygmomanometer that Buddhachinaraj Hospital used and calibration in once a year by hospital's technicians. The accuracy of measurements was pressure ± 3-5 mmHg and pulse ±5% of the display reading. The OMRON HBP-1300 met the standards set by the Thai Industrial Standard Institute Measurement. The standard adult cuffs for arm circumference ranging 220-320 mm were provided. The same machine was used blood pressure all participants in this study.

6.2 Low density lipoprotein cholesterol

6.2.1 Definition of low-density lipoprotein cholesterol

Low-density lipoprotein cholesterol was referred to the deposits fat in blood vessels and was known as bad cholesterol (Mendis, 2017). High level of low-density lipoprotein cholesterol in the blood was important cause of fatty deposits in wall of arteries, leading to atherosclerosis. It was one of the important risk factors that

contribute to the formation of atherosclerotic plaques. A major contributor to the increased risk of atherosclerotic lesion formation was high levels of low-density lipoprotein in the blood. High prevalence of hyperlipidemia in recurrent stroke was 30% to 61.1% (Kocaman et al., 2015; Yeo et al., 2016). Modification of a primary serum lipid biomarker such as low-density lipoprotein cholesterol was an important component in the recurrent stroke risk reduction strategy. This greatly increased the risk of recurrent strokes.

6.2.2 Low density lipoprotein cholesterol goal after ischemic stroke

In patients with ischemic stroke with no known coronary heart disease, should take atorvastatin 80 mg daily was indicated to reduce risk of stroke recurrence if they no major cardiac sources of embolism, and low-density lipoprotein cholesterol >100 mg/dL. In patients with ischemic stroke and atherosclerotic disease need lipid-lowering therapy with a statin. The goal of low-density lipoprotein cholesterol level at <70 mg/dL was recommended to reduce the risk of major cardiovascular events (Kleindorfer et al., 2021).

6.2.3 Instrument measure low-density lipoprotein cholesterol

Low-density lipoprotein cholesterol was laboratory tested for lipids in the blood. It was important to become familiar with the method of lipid profile measurement used by the laboratory that the clinician uses regularly (Lee, 2017). Low density lipoprotein cholesterol was ideally measured while the patient was in a fasting state the Cobas 6000 analyzer series module c311 met the standards set by the Thai Industrial Standard Institute. The process for measurement of low-density lipoprotein cholesterol was controlled by Quality Laboratory Accreditation Thailand Medical

Technology Council in 2012. Medical technicians calibrated every six months. The cost of measured was paid by the researcher.

6.3 Blood glucose

6.3.1 Definition of blood glucose

Blood glucose in this study referred to fasting plasma glucose. Fasting plasma glucose level are determined by taking a blood sample from participants who have fasted for at least 8 hours (Mendis, 2017). High fasting plasma glucose was a predictor for stroke recurrence. After stroke, brain damage may be more severe and widespread if blood sugar was high when a stroke happens, controlling blood glucose level recommence to reduce risk of recurrent stroke. In normal condition, insulin helps body cells to use sugar from the blood to produce energy. When the body did not produce enough insulin or cannot use it properly glucose. The high blood sugar levels expedited the development of atherosclerosis as the narrowing and hardening of the arteries. Risk for recurrent stroke associated with the present of diabetes (Kang et al., 2016; Xu et al., 2007).

6.3.2 Fasting plasma glucose goal after ischemic stroke

In patients with an ischemic stroke who also had diabetes, the goal for glycemic control should be individualized based on the risk for adverse events, for most patients achieving a goal of fasting plasma glucose 70-100 mg/dL was recommended to reduce risk for vascular complications and recurrent stroke (Kleindorfer et al., 2021).

6.3.3 Instrument measure fasting plasma glucose

The fasting plasma glucose level was laboratory tests to assess glucose control, the most frequency methods use for evaluating glucose homeostasis were fasting plasma glucose (Lee, 2017). The fasting plasma glucose was measured while

the patient was in a fasting for at least 12 hours. The Cobas 6000 analyzer series module c311 met the standards set by the Thai Industrial Standard Institute. The process for measurement of fasting plasma glucose was controlled by Quality Laboratory Accreditation Thailand Medical Technology Council in 2012. Medical technicians calibrate every six months. The cost of measured was paid by the researcher.

7. Interventions for recurrent stroke prevention strategies on controlling blood pressure, low-density lipoprotein cholesterol, and blood glucose

Recurrent stroke prevention aimed to prevent recurrent event by improving risk factors control. National stroke guidelines identify vascular risk factors (hypertension, hyperlipidemia, diabetes mellitus) and lifestyle factors (smoking, unhealthy diet, physical inactivity) as significant modifiable risk factors that should be targeted for recurrent stroke prevention (Kernan et al., 2014; Kleindorfer et al., 2021). This study focused on blood pressure, low-density lipoprotein, and blood glucose in ischemic stroke patients. These risk factors are often not effectively following stroke (Bridgwood et al., 2018). It was important to identify healthcare interventions that can help prevent recurrent stroke by improving these risk factors. From literature reviewed, previous studies to manage blood pressure, low-density lipoprotein cholesterol, and blood glucose in ischemic stroke patients, were followed.

Previous studies indicated that there were various interventions for preventing recurrent stroke. Education intervention was most frequency used to reduce risk factors for preventing recurrent stroke (Deijle et al., 2017; Van Schaik, Van den Berg-Vos, Weinstein, & Bosboom, 2015), following by behavior change intervention (Heron et al., 2017; Lawrence et al., 2015; Lennon et al., 2018) and exercise intervention (Moore et al., 2015; Zou, Wang, Qu, & Wang, 2015). Education intervention was used as a key

method in recurrent stroke prevention programs (Boden-Albala et al., 2019; Evans-Hudnall et al., 2014; Wan et al., 2016). However, education intervention alone was inadequate to promote and sustain behaviors change after a stroke (Arlinghaus & Johnston, 2017; Boden-Albala & Quarles, 2013). Behavior change was affected to reduce blood pressure, low-density lipoprotein cholesterol, and blood glucose (Deijle et al., 2017; Lennon et al., 2018). In addition, stroke patients were lack of knowledge about exercise, diet, and motivation (Mosca et al., 2006). Therefore, preventing recurrent stroke require combined educational and behavioral intervention.

In addition, there were various strategies use in recurrent stroke prevention (Kim et al., 2013) consist of telephone follow-up (Holzemer, Thanavaro, Malmstrom, & Cruz-Flores, 2011; Wan et al., 2016), goal-setting activities (Evans-Hudnall et al., 2014; Flemming et al., 2013), lifestyle counseling (Hornnes et al., 2011; Irewall et al., 2019), skill training (Liu et al., 2015; Peng et al., 2014), group support (Hill et al., 2017; Wattradul et al., 2010), and motivation (Leistner et al., 2013).

Previous studies were conducted in various timing following before hospital discharge (Eames, Hoffmann, Worrall, Read, & Wong, 2013; Hedegaard, Kjeldsen, Pottegård, Bak, & Hallas, 2014; Joubert et al., 2009; Mackenzie et al., 2013), within one week post discharge (Allen et al., 2009; Allen et al., 2002), within one month post discharge (Adie & James, 2010), within 3 months post discharge (Boysen et al., 2009; Chanruengvanich, Kasemkitwattana, Charoenyooth, Towanabut, & Pongurgsorn, 2006; Ellis, Rodger, McAlpine, & Langhorne, 2005; Flemming, Allison, Covalt, Herzig, & Brown, 2013; O'Carroll, Chambers, Dennis, Sudlow, & Johnston, 2014; Welin, Bjälkefur, & Roland, 2010), within 12 months post discharge (Damush et al., 2015), within 3 months in outpatients (Hanley et al., 2015; Kono et al., 2013; Peng et

al., 2014), within 6 months (Pergola et al., 2014), within 9 months (Kerry et al., 2013), within 12 months (Kim, Lee, & Kim, 2013; McAlister et al., 2014).

According to the timing of previous studies which related this study, the recurrent stroke was high within first three months after stroke onset (Elnady, Mohammed, Elhewag, Mohamed, & Borai, 2020). Therefore, this study focused to conducts in first three months after ischemic stroke onset and repeated measures dependent variables at week 4, week 8, and week 12 which related to and follow-up time (14 days, first month, and every three months) as a critical time of recurrent stroke which need to prevent.

In Thailand, few studies focused on blood pressure, low-density lipoprotein cholesterol, and blood glucose in ischemic stroke patients. Most common outcomes successfully change was stroke knowledge (Sanghuachang, 2013). Few evidence-based programs addressed behavior change in ischemic stroke (Siritham & Tiemkoa, 2010). Patients who received the program based on process improvement theory, has been significantly different stroke risk behaviors, blood pressure and low-density lipoprotein cholesterol from the control group ($p<.05$) in adults after transient ischemic attack (Songwatthanayuth, 2015), not ischemic stroke. The program based on health belief model showed significantly higher than control group ($p<.05$) in perceived susceptibility, perceived benefits, and behaviors to prevent recurrent stroke. The risk of recurrent stroke after receiving program was significantly lower than at before receiving program ($p<.05$) (Tepsuwan, Leelathakul, & Toskulkaew, 2018). One quasi-experimental study explored the effect of health promotion program, the results showed that successful in behavioral change include exercise and self-care (Wattradul et al., 2010). However, population focus on previous studies were not first ischemic stroke

patients. There was insufficient data regarding effective behavior change after first ischemic stroke, specifically all dependent variables of this study as well as blood pressure, low-density lipoprotein cholesterol, and blood glucose.

Interventions for blood pressure reduction. Chiu (2008) reported outcome data only for a subgroup of participants with hypertension, so baseline blood pressure levels were higher and therefore easier to improve upon. Kono (2013) found that an educational and behavioral intervention was associated with a significant reduction in both systolic and diastolic blood pressure within home and clinic readings. A meta-analysis indicated that exercise interventions resulted in significant reductions in both systolic blood pressure (−4.30 mmHg) and diastolic blood pressure (−2.58mmHg), in stroke patients when combine with health education (Deijle et al., 2017; Wan et al., 2016).

Interventions for low-density lipoprotein cholesterol reduction. Previous studies results indicated that educational and behavioral interventions for patients were not associated with changes in mean LDL levels (Kono et al., 2013; Maasland, Koudstaal, Habbema, & Dippel, 2007). Smoking cessation has been a significant decline in low-density lipoprotein cholesterol ($p < 0.001$) and in systolic blood pressure ($p = 0.010$) from baseline to 3 months after the beginning smoking cessation therapy (Komiyama et al., 2018).

Interventions for blood glucose reduction Chiu 2008 reported an outcome relating to HbA1c or fasting plasma glucose target achievement (HbA1c < 7% or fasting plasma glucose 70-100 mg/dL) and no significant differences between the intervention and control groups were observed (OR 1.53, 95% CI 0.57 to 4.08). Kono (2013)

reported mean HbA1c; however, no significant difference was identified between the control and intervention groups, despite individual lifestyle education.

Previous studies presented factors relate behaviors change in ischemic stroke patients include personal barriers as well as physical disability related stroke (weak, balance problems, and fear to the consequences of exercise); lack of motivation; lack of knowledge; depression; poor self-efficacy; cognitive decline; and lack of social support (Lennon, Doody, Choisdealbh, & Blake, 2013; Thilarajah et al., 2018). In addition, environmental barriers to exercise relate to ground surfaces and link to balance deficits and fear of falling. (Nicholson et al., 2013). Environmental factors strongly influenced smoking cessation and healthy eating. Family members/friends smoking around the stroke survivor played a pivotal role (Lennon et al., 2013).

In Thailand, few evidence-based programs address behavior change in ischemic stroke (Siritham & Tiemkoa, 2010). Thai Health Promotion Foundation focus on promote healthy life in general population and other non-communicable diseases as hypertension and diabetes. Similarly, the Thai Ministry of Public Health project on prevent stroke in patients with high risk as well as hypertension and/or diabetes patients through screening, education and behavior change interventions. A current project was reducing consumption salt diet. Because Thai people consume salt diet average 4,351 mg/day which its higher than World Health Organization index double times. Base on their lifestyle change affect to eating behaviors, 43.05% of Thai people buy food that increase risk to consume high salt diet (Bureau of Non-communicable Diseases Ministry of Public Health, 2018). As a result, behavior change interventions focusing on encouraging healthy behavior are needed to enhance patients'clinical outcomes and reduce risks of recurrent strokes.

Previous studies were conducted in various timing following before hospital discharge (Eames, Hoffmann, Worrall, Read, & Wong, 2013; Hedegaard, Kjeldsen, Pottegård, Bak, & Hallas, 2014; Joubert et al., 2009; Mackenzie et al., 2013), within one week post discharge (K. Allen et al., 2009; K. R. Allen et al., 2002), within one month post discharge (Adie & James, 2010), within 3 months post discharge (Boysen et al., 2009; Chanruengvanich, Kasemkitwattana, Charoenyooth, Towanabut, & Pongurgsorn, 2006; Ellis, Rodger, McAlpine, & Langhorne, 2005; Flemming, Allison, Covalt, Herzig, & Brown, 2013; O'Carroll, Chambers, Dennis, Sudlow, & Johnston, 2014; Welin, Bjälkefur, & Roland, 2010), within 12 months post discharge (Damush et al., 2015), within 3 months in outpatients (Hanley et al., 2015; Kono et al., 2013; Peng et al., 2014), 6 months (Pergola et al., 2014), 9 months (Kerry et al., 2013), 12 months (Kim, Lee, & Kim, 2013; McAlister et al., 2014).

Reducing blood pressure, low density lipoprotein cholesterol, and blood glucose was essential to prevent recurrent stroke in patients with ischemic stroke. Modifiable risk factors also require behavioral change intervention to reduce blood pressure, low density lipoprotein cholesterol, and blood glucose (Deijle et al., 2017; Kono et al., 2013; Lennon et al., 2018). Behaviors related to high blood pressure, high level of low-density lipoprotein cholesterol, and high blood glucose.

Increase physical activities/ active exercise

Most stroke patients presented inactive physical activity after stroke because stroke was diminished exercise capacity. The amount of oxygen consumed during routine activity in people with stroke was double time of adults without stroke; and performance of self-care activities after stroke require individuals to exert 66% to 75% or more of their total exercise capacity (Ivey, Macko, Ryan, & Hafer-Macko, 2005).

Important considerations for increasing physical activity after stroke requires assessing for high-risk individuals and supervision by therapists because these professionals have the necessary training and experience to teach people with stroke how to safely increase physical activity levels (Ivey, Hafer-Macko, & Macko, 2008). Moderate physical activity for stroke prevention, led to decreased blood pressure, low-density lipoprotein cholesterol, and increased weight loss (Eckel et al., 2014; Kernan et al., 2014). It also resulted in increased glucose uptake and insulin sensitivity in people with diabetes.

Protocols of exercise for first ischemic stroke by Canadian stroke best practice recommendations to secondary prevention of stroke (Wein et al., 2018).

1. Start moderate activities in 6 weeks after ischemic stroke.

2. Counsel and educate individuals with ischemic stroke to reduce sedentary behaviors and to work towards increased activity goals

3. Counsel and educate individuals with ischemic stroke to participate in dynamic exercise of moderate intensity (such as brisk walking, jogging, swimming, cycling) 4 to 7 days per week, to accumulate at least 150 minutes in episodes of 10 minutes or more, in addition to routine activities of daily living.

4. Most people who had a stroke or transient ischemic attack should be encouraged to start a regular exercise program.

5. Supervision by a health care professional at exercise initiation should be considered in individuals with stroke at risk of falls or injury, or in individuals with other comorbid disease, which may place them at higher risk of medical complications.

6. Patients have systolic blood pressure and diastolic blood pressure while resting at 180-200 mmHg and 110 mmHg, respectively, they should not do exercise

until their blood pressure is controlled. In addition, they should avoid exercising with push-resistant objects.

7. Observing abnormal signs and symptoms that would stop exercise, for instance cardiac arrhythmia, angina, dizziness, light-headedness, vomit-nausea, constant pain or chronic tiredness and sleeplessness.

8. Patients should drink enough water for substituting sweat. If they do physical activity over 30 minutes and feel thirsty, dehydration has occurred.

Eating healthy dietary

Consuming a healthy diet was important for stroke prevention. The dietary recommendations were consistent with Mediterranean-style (Lakkur & Judd, 2015) dietary patterns, which were effective in reducing the risk of stroke (Estruch et al., 2013; Tsivgoulis et al., 2015). The recommendations encourage the intake of fruits, vegetables, whole grains, low fat dairy products, poultry, fish, legumes, vegetable oils, and nuts; limited consumption of sweets, sweetened beverages, and red meats; and reduced sodium intake. Blood pressure and low-density lipoprotein (LDL) cholesterol can be reduced by these dietary behaviors (Eckel et al., 2014; Kernan et al., 2014). Another important dietary consideration was calorie intake. Reduction of daily caloric intake by 20% to 25% for 3 months result in improve blood pressure, LDL cholesterol, insulin resistance, and glycemic control (Ravussin et al., 2015; Weiss et al., 2015).

Protocols of eating behavior for first ischemic stroke by Canadian stroke best practice recommendations to secondary prevention of stroke (Wein et al., 2018).

1. Counsel and educate individuals with ischemic stroke to eat a healthy balanced diet that includes:

1.1 A variety of natural and whole foods at each meal.

1.2 A diet high in vegetables and fruit; encourage patients to choose fresh or frozen unsweetened fruit, or fruit canned in water without added/free sugars or artificial/noncaloric sweeteners; fresh or frozen vegetables without added sauce, or canned vegetables with no added salt.

1.3 Lean meats, whole grains and protein from plant sources which were low in saturated and trans fats, low in cholesterol (<200 mg daily for patients at increased vascular risk) and low in sodium.

2. Counsel and educate individuals with transient ischemic attack or stroke to follow a Mediterranean-type diet, which was high in vegetables, fruit, whole grains, fish, nuts, and olive oil and low in red meat.

3. Counsel and educate individuals with transient ischemic attack or stroke had a total intake of free sugars that does not exceed 10% of total daily calorie intake.

4. Counsel and educate individuals with transient ischemic attack or stroke had a daily sodium intake from all sources to no more than 2000 mg per day.

Quitting smoke and avoid secondhand smoke

Smoking affected to increase in heart rate, blood pressure, and arterial stiffness (Kim et al., 2005; Rhee, Na, Kim, Lee, & Kim, 2007), which were especially dangerous for individuals with hypertension. Moreover, smoking was associated with insulin resistance and dyslipidemia. Quitting smoke was lessen the risk for stroke. Smokers who quit reduced their risk for ischemic stroke at 50%, and smokers with hypertension who quit experienced a greater benefit compare with smokers without hypertension. Chronic smokers who quit smoking experience decreased blood pressure, heart rate, and arterial stiffness (Yu-Jie, Hui-Liang, Bing, Lu, & Zhi-Geng, 2013).

Protocols of quitting smoke for first ischemic stroke by the United States Public Health Service, Clinical Practice Guidelines on Treating Tobacco Use and Dependence (Fiore et al., 2008; Preechawong et al., 2011) and guidelines by the American Heart Association/American Stroke Association. (Powers et al., 2018) recommence process include:

1. In all health care settings along the stroke continuum (inpatient, ambulatory, and community), patient smoking status should be identified, assessed, and documented.

2. Following the '5 As' approach consists of 1) asking about tobacco use at every opportunity; 2) advising all smokers to quit, 3) assessing the tobacco user's willingness to quit; 4) assisting the tobacco user with a specific cessation plan; and 5) arranging follow-up contacts.

3. Healthcare providers should strongly advise every patient with ischemic stroke who had smoked in the past year to quit.

4. Recommendation telephone quit line counseling 1600.

5. For smokers with an ischemic stroke, in-hospital initiation of interventions that incorporate both pharmacotherapy and behavioral support might be considered.

6. People who were not ready to quit should be offered a motivational intervention to help enhance their readiness to quit.

7. Interdisciplinary team members should counsel patients, family members, and caregivers about the harmful effects of exposure to second-hand smoke.

Medication adherence

Stroke patients did not comply with their prescribed medication (Levine et al., 2007). Discontinuous of antiplatelet after ischemic stroke related to recurrent stroke

(Pezzini et al., 2014). Medication adherence was one important key recurrent stroke prevention's barriers because disabilities after stroke, such as swallowing difficulties, motor weakness, and cognitive impairment, may interfere with medication management (Jamison et al., 2017).

Protocols of medication adherence for first ischemic stroke

Ischemic stroke patients would know normal side effects of treatments and understand why treatment was prescribed. Stroke patient's medication-taking behavior corresponds with correct type, timing, and dosage (Levine et al., 2007).

Antecedents on behavioral risk factors in ischemic stroke patients

Behavioral risk factors were increased incidence of recurrent stroke include physical inactivity, unhealthy diet, smoking, and medication non-adherence (Kuptniratsaikul et al., 2013; Siritham & Tiemkoa, 2010). Previous studies presented factors relate behaviors change in ischemic stroke patients include personal barriers as well as physical disability related stroke (weak, balance problems, and fear to the consequences of exercise); lack of motivation; lack of knowledge; depression; poor self-efficacy; cognitive decline; and lack of social support (Lennon et al., 2013; Thilarajah et al., 2018).

In addition, Environmental barriers include physical, and transportation accessed to services and economic costs of taking part in physical activity (Nicholson et al., 2013). Environmental barriers to exercise relate to ground surfaces and link to balance deficits and fear of falling. The influence of others on healthy eating emerged as a strong environmental factor as food type and portion size. Environmental factors influence smoking cessation. Family members/friends smoking around the stroke survivor played a pivotal role (Lennon et al., 2013).

For successful intervention, ischemic stroke patients required manipulating factors associated with risk behaviors (physical inactivity, unhealthy diet, smoking, and medication non-adherence) as 1) encouraging patients to change risk behaviors; 2) providing education involve recurrent stroke, appropriate behavioral risk factors changing and benefit, safety methods to change behaviors, and preparing appropriate environments to facilitates behavior change; 3) healthcare providers and families motivate patients to change their risk behaviors; and 4) enhancing social support to change risk behaviors.

Behavioral risk factors were linked to activities that ischemic stroke patients perform. Behavioral risk factors relate to physical risk factors in ischemic stroke. From literature reviews, the important behavioral risk factors were including cigarette smoking, eating behaviors, exercise behaviors and discontinuous taking medications. Those behavioral risk factors was cause physical and biological changes in the body resulting in other risk factors as well as raise blood pressure, blood sugar, and low-density lipoprotein cholesterol. There were key risk factors of recurrent stroke (Mendis, 2017).

Behavior change intervention on blood pressure, low-density lipoprotein cholesterol, and blood glucose for recurrent stroke prevention

A meta-analysis indicated that exercise interventions result in significant reductions in both systolic blood pressure (−4.30 mmHg) and diastolic blood pressure (−2.58mmHg), in stroke patients and when combined along with health education (Wan et al., 2016). Smoking cessation may a significant declined in low-density lipoprotein-cholesterol ($p < 0.001$) and in systolic blood pressure ($p = 0.010$), from baseline to

3 months after the beginning smoking cessation therapy (Komiyama et al., 2018). Nutritional behavior generally improved 3 months: mean difference 4.30, p = 0.035; 6 months: mean difference 6.77, p = 0.001; 12 months: mean difference 10.84, p = 0.030 (Oikarinen et al., 2017).

The previous interventions presented that behavioral change reduce risk factor for preventing recurrent stroke, were various intervention duration. Intervention duration ranged from 4 to 12 months. The outcome showed improvements in health behaviors over time by start during the early period after discharge (3 months) (Wan et al., 2016). Moreover, recurrent stroke is highest report during first three months at (Chen et al., 2012; Kang et al., 2016). Also, this program was delivered to the participants and measured all outcomes at during 12 weeks after discharge.

Most recurrent stroke preventive intervention using was education interventions (Evans-Hudnall et al., 2014; Irewall et al., 2019), follow by behavior change interventions (Allen et al., 2009; Deijle et al., 2017; Hill et al., 2017; Kono et al., 2013; Peng et al., 2014). Two studies combined education and telephone follow-up (Wan et al., 2016), education and lifestyle counseling (Evans-Hudnall et al., 2014), and lifestyle counseling and pharmacological treatment (Irewall et al., 2015). Previous programs were based on health belief model (Wan et al., 2016), process improvement theory (Songwatthanayuth, 2015), the self-determination theory (Holzemer et al., 2011), and self-management (Sakakibara et al., 2018). However, the results of recent behavior change interventions were different and unclear.

8. Adult learning theory

The learning theory could inform practice, because it was described an individual’s acquisition of knowledge, skills, and attitudes to achieve changes in

behavior, performance, or potential (Aliakbari, Parvin, Heidari, & Haghani, 2015; Mukhalalati & Taylor, 2019). Andragogy as an adult learning theory by Malcolm Knowles (1980). This enhanced the development of knowledge, skills, and positive attitudes in learners. It was based on assumptions: self-concept, adult learner experience, readiness to learn, orientation to learning, and motivation to learn. The goal of education was to acquire knowledge and skills that were able in novel problems at the later time. Learning was the ability to transfer formal knowledge to new situations (Kaufman, 2003). Knowledge was one's capacity to acquire, retain and use information. Attitude referred to inclinations to react in a certain way to given situation, to see and interpret events.

The mechanism of brain was needed to be known. The role of the hemispheres, the neuron, and neurotransmitters that help regulate certain cognitive function and affect. For the hemispheres, the left hemisphere was associated with logic and methodical approaches while the right hemisphere is associated with more creative and intuitive approaches. The right hemisphere task referred to face processing. Some neurons were specialized for processing certain types of input and some neurons support connections. The transmission of information that occurs in these patterns of activation involves the exchange of neurotransmitter. Neurotransmitters are implicated in the formation of memories and associated with motivation to learn (Nielsen, Zielinski, Ferguson, Lainhart, & Anderson, 2013). Attention was an end result of multiple cognitive processes being directed at objects or people that were relevant for a current task goal. Learning was enhanced when it was relevant, particularly to the solution and understanding of real-life problem and practice (de Bruin, Sibbald, & Monteiro, 2018).

Adult learning theory was relevant to practice. Malcolm Knowles (1980) defined andragogy was the art and science of helping adults learn. Andragogy was based on five assumptions includes

1. As a person matures, their self - concept moves from that of a dependent personality towards one of a self - directing human being. Adults were capable of determining their own learning needs, and of finding the means to meet them.

2. An adult accumulated a growing reservoir of experience, which was a rich resource for learning. This experience could be brought to bear on new learning and enhance the new learning significantly. It could also provide an effective context for the acquisition of new knowledge and skills.

3. The readiness of an adult to learn was closely related to the developmental tasks of their social role. Adults value learning that integrates with the demands placed on them in their everyday life.

4. There was a change in time perspective as people mature, from future application of knowledge to immediacy of application. Thus, an adult is more problem centered than subject centered in learning. Generally, adults value learning that can be applied to authentic problems that they encounter in everyday life.

5. Adults were more motivated to learn by internal factors rather than external ones. The internal desire to succeed, the satisfaction of learning and the presence of personal goals had a greater effect on maintaining motivation than external incentives and rewards. Knowles' model of assumptions had given adult education a badge of identity that distinguishes the field from other areas of education.

The adult learning theory was derived to several implications for practice. These was difference three areas include context, learner and learning process between

children and adult. This study focused on adult patients also in context, adults generally learn and function in settings where situation specific skills were required to resolve relevant problems. In learner, the need of adults to be self - directing, their large reservoir of experience, the relationship of their readiness to learn to their social role, their desire for knowledge that could be immediately applied to current relevant problems and their internal motivation to learn. Adults tended to perform poorly on learning tasks that were not meaningful, or which did not fall within their domain of interest. Also, three non-cognitive factors have been shown to affect adult learning as pacing, meaningfulness, and motivation. Lippitt and Knowles (1984) drew seven principles from the assumptions of andragogy.

1. An effective learning climate should be established. Learners should be comfortable, both physically and emotionally. They should feel safe and free to express themselves without judgement or ridicule.

2. Learners should be involved in mutual planning of methods and curricular directions. Involvement would help assure that collaboration occurs in the content and learning process. It would also increase the relevance to the learners' needs.

3. Learners should be involved in diagnosing their own learning needs. Once again, this would help to ensure meaningfulness and will trigger learners' internal motivation. It would also promote self-assessment and reflection, and effective integration of learning.

4. Learners should be encouraged to formulate their own learning objectives. The rationale for this was the same as for 3, above. Learners were thus encouraged to take control of their learning.

5. Learners should be encouraged to identify resources and to devise strategies for using them to accomplish their objectives. This principle connects adult learning needs to practical resources for meeting their objectives, and also provides motivation for using such resources for a specific and focused purpose.

6. Learners should be helped to carry out their learning plans. One of the key elements of motivation was expectancy of success. Learners would become discouraged and lose their motivation if a learning task is too difficult. Also, too much pressure without support can lead to a decrement in learning.

7. Learners should be involved in evaluating their own learning. This was an essential step in a self - directed learning process that requires critical reflection on experience, a specific example of which is discussed later in this paper.

Teaching and learning based on education theory in practice, was proposed by Kaufman (2003) The educational theory can apply in practice and help to solve gap between academic and practitioners. The gap between educational theory and practice can be bridged. This would enhance the development of knowledge, skills, and positive attitudes in learners. Ultimately, this should result in better trained health educator who provide an even higher level of patient care and improved outcomes (Figure 2.1).

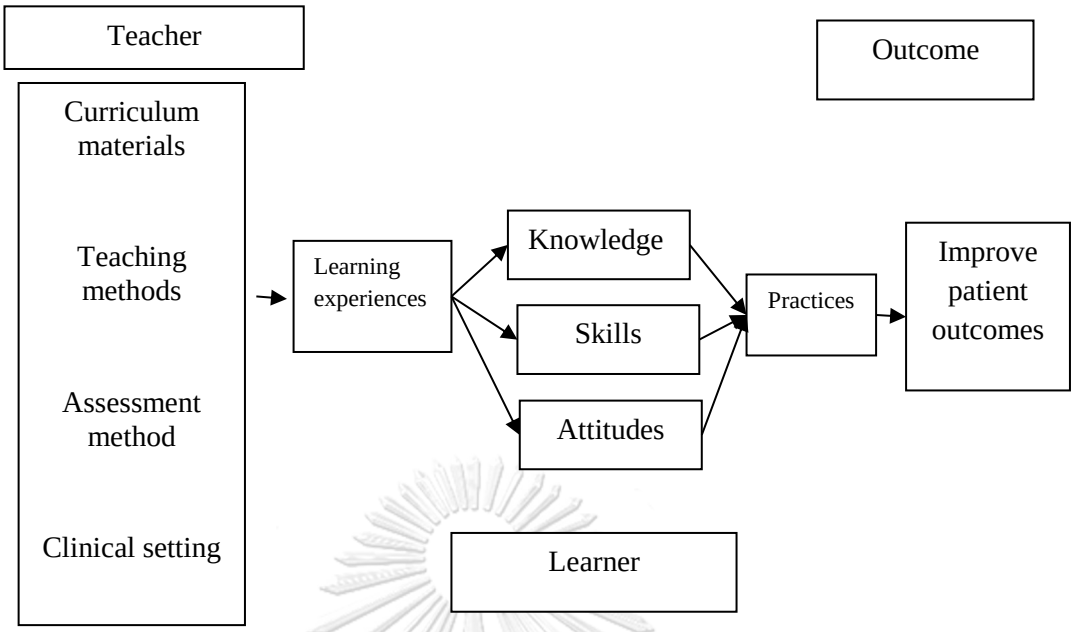

Figure 2.1 Applying theory to practice by Kaufman (2003)

In nursing care, the recurrent stroke prevention was one importance practices from nurses to provide management of vascular risk factors remains extremely important in recurrent stroke prevention, including diabetes, smoking cessation, lipids, and especially hypertension. Moreover, there was multiple barriers exist that can hinder optimal recurrent stroke prevention, knowledge of stroke in patients after ischemic stroke was low (Riechel et al., 2016). Limited knowledge may lead patients do not change their unhealthy pre-stroke lifestyle to reduce their risk of recurrent stoke (Ellis et al., 2013).

The adult learning theory was used to guide the intervention program in this study. The researcher provided education sessions to grain knowledge, skill, and attitude of the participants to change their risk behaviors for recurrent stroke in patients with first ischemic stroke. Education and perform exercise with telephone monitoring were motivated the participants to eating healthy diet, restrict sodium intake, increase

physical activities, quit smoking, and medication adherence. The effect of these behaviors was controlling blood pressure, low-density lipoprotein cholesterol, and blood glucose as major risk factors of recurrent stroke that patients should prevent.

9. Development of a recurrent stroke prevention program

The recurrent stroke prevention program aimed to improve blood pressure, low-density lipoprotein cholesterol, and blood glucose after first ischemic stroke. This component of program was organized based on literature review and highest effect size studies were selected (Chiu et al., 2008; Kono et al., 2013; Moore et al., 2015; Z. Wang, Wang, Fan, Lu, & Wang, 2014), and the adult learning theory was used to guide the intervention program in this study.

Four studies that presented highest effect sizes are selected for identify a new intervention development including the combine education and exercise by Kono et al. (2013), the exercise intervention by Moore et al. (2015) and Wang et al. (2014), and the education intervention by Chiu et al. (2008). Based on 4 studies that the researcher selected and modified the components or mode and dose of a new intervention.

Intervention components and activities of new intervention compose the specific active ingredients include 1) education to gain knowledge and attitudes, 2) 12-week exercise, and 3) Telephone monitoring for encourage patients continue to perform health behaviors.

Three components of this program were improved patients' knowledge and understanding related behaviors change, gain skill by training exercise, and instilled positive attitude to performed behaviors change to prevent recurrent stroke. Most patients should understand and drive them to maintain behaviors. In addition, most ischemic stroke patients were adults which they are independent and self-direction

(Knowles, 1980). The processes of intervention to gain patients' knowledge, skill, and attitude were described.

Improving patients' knowledge, each patient and family were educated so that they could use at home. Education intensity of the recurrent stroke prevention program was described as follows: Duration 4 weeks, 1 session per week. In session 1: the researcher provided knowledge about eating healthy diet for first ischemic stroke patient (40 minutes at week 1st), session 2: knowledge about restriction sodium intake for first ischemic stroke patient (40 minutes at week 2nd), session 3: knowledge about increasing physical activities and quit smoking for first ischemic stroke patient (40 minutes at week 3rd), and session 4: knowledge about medication adherence (40 minutes at week 4th). The researcher provided booklets related topics in education sessions to repeat their understand at home. This component was grained knowledge and understanding of the patients to change risk behaviors. Patients as adult who received education should optimizing their engagement in learning experiences and helping them master program content (Merriam & Bierema, 2014).

Patients' skills training, each patient was trained exercise before starts the program. After that they performed exercised 12 weeks at home. The exercise consists of 1) walking exercise 3 times/week, 40-minute/session and 2) resistance exercise 2 times/week, 20-minute/session. Exercise and skills of self-blood pressure monitoring gained their skill and enhance their attitude and drive them to maintain behaviors and avoid a further stroke.

Instilling positive attitude as strategies to empower and consultation via telephone and improve adherence to intervention (Flemming, Allison, Covalt, Herzig, & Brown, 2013). These components supported behavior modification for stroke

patients. A follow-up call was initiated by the researcher. The goal was to bridge the gap between hospitalization and return of the patient to home by providing educational support for the patient after discharge (Flemming et al., 2013). The researcher asked each patient if they had any questions about their behavior modification, and if they experienced any difficulties. Questions were answered by the researcher either at that time or in a follow-up call. The details of telephone calling related health behaviors about eating, physical activity and exercise, smoking, and intake medication in self-monitor form. It was the process of attending to one's actions and recording the presence or absence of target behaviors (McBain, Shipley, & Newman, 2015).

The recurrent stroke prevention program gained knowledge, skills, and positive attitude of patients. This led patients to perform eating diet and sodium intake, exercise, smoking, and medication adherence for 12 weeks intervention. Those target behaviors were affected to physiological change of patients for 12 weeks to control blood pressure, low-density lipoprotein cholesterol, and blood glucose.

The recurrent stroke prevention program was validated for content by 5 experts and tried out on five patients with first ischemic stroke that had similar characteristics to the population in the study. The suggestions from the experts and the result from tryout were indicated that the researcher should modify and make the contents more concise. The detail of the recurrent stroke prevention program was presented as followed.

The recurrent stroke prevention program

The first component of the program

The plan of the first component of the program was to provide knowledge in appropriate behavior after first ischemic stroke. The knowledge components included

1) Eating healthy diet for first ischemic stroke patient, 2) limited salt intake for first ischemic stroke patient, 3) increasing physical activities for first ischemic stroke patient, 4) quit smoking and avoid secondhand smoke for first ischemic stroke patient, and 5) medication adherence for first ischemic stroke patient. The first component was divided into 4 sessions. Each session was set in small groups. The participants were received knowledge one session per week, total 4 weeks including.

Session 1: Providing knowledge about eating healthy diet for first ischemic stroke patient (40 minutes at week 1st) covered the importance of eating behaviors after first ischemic stroke, food and eating behavior guide for first ischemic stroke patients, proper proportions for first ischemic stroke patients' eating, food exchange, and understand and use the nutrition facts label. In addition, the participants were practiced selecting food in proper proportion and selecting food by using the nutrition facts label. Then, they were trained to self-monitoring to record food and eating behaviors in daily in self-monitoring form and continued to monitor until 12 weeks.

Session 2: Providing knowledge about limited salt intake for first ischemic stroke patient (40 minutes at week 2nd) covered the importance of limit salt intake after first ischemic stroke, source of high sodium food, physical change related high sodium level, guide for limiting sodium intake, and understand and use the nutrition facts label to limit salt intake. The participants practiced selecting low sodium food by using the nutrition facts label. They were trained self-monitoring sodium intake in daily and continued to monitor until 12 weeks.

Session 3: Providing knowledge about increasing physical activities and quit smoking and avoid secondhand smoke for first ischemic stroke patient (40 minutes at week 3rd). This session covered the importance of increasing physical activities after

first ischemic stroke, benefits of increasing physical activities in first ischemic stroke patients, guide for increasing physical activities after first ischemic stroke, the importance of quit smoking and avoid secondhand smoking for first ischemic stroke patient, guide for quit smoking and avoid secondhand smoking for first ischemic stroke patient. The participants were trained self-monitoring about increasing physical activity and quit smoking and avoid secondhand smoking in daily and continued to monitor until 12 weeks.

Session 4: Providing knowledge about medication adherence for first ischemic stroke patient (40 minutes at week 4th) covered ischemic stroke disease, the importance of continuous medication intake in first ischemic stroke patients, drug for prevent recurrent stroke, drug for prevent vascular factors, guide for medication intake for ischemic stroke patients, and technique for continuous medication intake. The participants were trained self-monitoring about medication intake in daily and continued to monitor until 12 weeks.

The second component of the program

The second component of the program was 12-weeks exercise. The exercise component consists of 1) walking exercise 3 times/week, 40-minute/session and 2) resistance exercise 2 times/week, 20-minute/session. The process of exercise in this program were explained as following:

Week 0: After physician or physical therapist determined exercise was safe for participants to engage in the program. Then, the researcher trained exercise 3 times or until the participants performed correct both walking exercise and resistance exercise. During exercise, the family member or caregiver observed and walked together with the participants for prevention injury and encourage them to exercise.

Week1-12: Continued exercise 12 weeks, during exercise, the family member or caregiver observed or walked together with the participants.

1. The participants were measured blood pressure before start exercise. If systolic blood pressure was 180 mmHg or higher and diastolic blood pressure was 110 mmHg or higher, the participants did not exercise until their blood pressure is controlled. The participants rested and repeated to measure blood pressure. They should report the researcher and considered referring to hospital if blood pressure did not decrease.

2. Warm-up 5 minutes with four stretching exercises included

2.1 Single leg standing for help restore balance. Place both feet flat on the floor. Slowly lift one leg until you are balanced on the other leg and slowly lower it back down. Then switch legs and repeat 20 times per side.

2.2 Single leg standing with swing arms for help restore balance. Place both feet flat on the floor. Slowly lift one leg with swing arms until balanced on the other leg and slowly lower it back down. Then switch legs and swing arm, repeat 20 times per side.

2.3 Heel raises (Hold on or not holding on) for help restore balance. Hold on to the chair or counter, and raise yourself up onto your tiptoes, keeping your knees straight and holding your upper body tall. Lower yourself back to the floor slowly, and repeat 10-12 times per set, 3 sets.

2.4 Ankle rotation This exercise was beneficial for tight ankles, tight calves, improve mobility and flexibility. Sit in a chair keeping your back straight and your breathing normal. Extend one leg in front and rotate your foot slowly clockwise 10 rounds and counterclockwise 10 rounds. Do this for a series of repetitions.

3. Waking exercise 30 minutes/time, 3 times /week, start from walk slowly 5 minutes. Then, increasing to walk fast until slightly breathless, sweating more but still talk followed rating of perceived exertion scale (moderate intensity), in 20 minutes. Then walk slowly 5 minutes.

4. Five-Resistance exercise, 20 minutes /times, 2 times/week included

4.1 Single leg standing for intermediate standing and balance exercises. Place both feet flat on the floor. Slowly lift one leg until you are balanced on the other leg. Hold for a count of 10, and slowly lower it back down. Alternate legs and repeat. Repeat, then switch legs 20 times per side.

4.2 Knee rotations to improves core, back strength, coordination, and balance. Participants lie on your back and rest your hands by your sides. Bend your knees with your feet flat on the floor. Keeping your knees together, drop them, slowly, to the left then, bring them back to the center. Then drop them to the right and back to the center. Repeated 10-20 times per side.

4.3 Hip thrusts: It boosts the strength of the core, glutes, lower back muscles, and muscles that support the spine. Lie on your back with your feet flat on the ground and knees bent. Place your arms by your sides, palms down. Gently contract your abs and squeeze your glutes (backside muscles) to lift your hips and make a bridge. Hold on this position for a few seconds and lower to the starting stance. You can make it easier by straightening your legs and placing a rolled-up towel under your knees, then squeezing and lifting your hips. You could also make it more intense by lifting one foot at a time while holding the bridge. Repeated 10-12 times.

4.4 Bilateral leg cycling for regain a strong, healthy core. It boosts the strength of thigh muscles and abdominal muscle. Lie on the floor and lift the legs off

of the ground, holding them in a cycling position. Then, cycle as if you were riding a bicycle in the air. Repeated 10-12 times.

4.5 Sit to stands for Strengthens core and upper thigh muscles, improves weight shifting and balance. Sit up tall in your chair with your knees bent (90 degrees). Place your feet firmly on the floor shoulder-width apart. Slowly rise to a standing position while ensuring that your knees never cross the tips of your toes. Sit back down slowly and in a controlled manner. To make it less intense, use your arms for support, and to make it more difficult, cross your arms on your chest. Repeated 10-12 times.

5. Cool down 5 minutes with 4 stretching exercises included

5.1 Single leg standing for help restore balance. Place both feet flat on the floor. Slowly lift one leg until you are balanced on the other leg and slowly lower it back down. Then switch legs and repeat 20 times per side.

5.2 Single leg standing with swing arms f for help restore balance. Place both feet flat on the floor. Slowly lift one leg with swing arms until you are balanced on the other leg and slowly lower it back down. Then switch legs and swing arm, repeat 20 times per side.

5.3 Heel raises (Hold on or not holding on) for help restore balance. Hold on to the chair or counter, and raise yourself up onto your tiptoes, keeping your knees straight and holding your upper body tall. Lower yourself back to the floor slowly, and repeat 10-12 times per set, 3 sets.

5.4 Ankle rotation This exercise was beneficial for tight ankles, tight calves, improve mobility and flexibility. Sit in a chair keeping your back straight and your breathing normal. Extend one leg in front and rotate your foot slowly clockwise 10 rounds and counterclockwise 10 rounds. Do this for a series of repetitions.

6. The first time of week, the participants exercised mix walking and resistance exercises in 60 minutes, the second time of week they performed only resistance exercise in 30 minutes, and the third time of week exercised mix walking and resistance exercises in 60 minutes.

7. Observing abnormal signs and symptoms of overtraining during exercise that would stop exercise, for instance cardiac arrhythmia, angina, dizziness, light-headedness, vomit-nausea, constant pain or chronic tiredness and sleeplessness. If the participants had abnormal signs and symptoms, they should follow:

7.1 Stop to exercise and observe signs and symptoms.

7.2 Call the researcher for observing participants.

7.3 After participants rest, if their abnormal signs and symptoms did not improve, the researcher should manage the participants to be rushed to the hospital immediately. All costs of treatment are paid by the researcher.

7.4 If their signs and symptoms improved, the researcher should manage the participants to be check their condition again at health promoting hospital.

8. After exercise, participants should rest a moment and drink water.

9. The participants were record exercise data in self-monitoring form for first ischemic stroke and send exercise picture at line application one time per week.

The third component of the program

The third component of the program was follow-up via telephone for 20 minutes/time as strategies to improve adherence to interventions. Patients might record health behaviors about eating, physical activity and exercise, smoking, and intake medication in self-monitor form in every week. The researcher discussed and suggested

when follow-up each time. The researcher was telephone follow up at week 8th, and week 12th.

Summary

The recurrent stroke found high incidence and had adverse impacts such as increased double time of mortality, physical impairment, and cognitive impairment. Ischemic stroke patients were high risk of recurrent stroke related to the initial ischemic lesions and highest report in recurrent event during first three months. Hypertension, hyperglycemia, and hyperlipidemia were major vascular risk factors for recurrent stroke. However, there was no specific recurrent stroke prevention in healthcare system of Thailand and ischemic stroke patients stayed short time in hospital. Therefore, they need an effectiveness recurrent stroke prevention program which manage blood pressure, low-density lipoprotein cholesterol, and blood glucose in first ischemic stroke patients as the gap of this study.

CHAPTER III
RESEARCH METHODOLOGY

This chapter describes the research methodology of the study. It consisted of research design, population and sample, research intervention, research instruments, protection of the rights of human subjects, and data analyses. The objectives of study were to 1) compare the different of blood pressure, low-density lipoprotein cholesterol, and blood glucose between the experimental group and the control group, and 2) compare the different of blood pressure, low density lipoprotein cholesterol, and blood glucose within the experimental group.

Research design

This study was a cluster randomized controlled trial two-groups repeated measure research design. A cluster randomized controlled trial was randomized controlled trial in which naturally occurring group of individuals are assigned to intervention rather than individual patients (Harris, 2021). This study was registered to the Thai Clinical Trials Registry (TCTR) No.20210318001. By randomizing and administering the intervention at the cluster hospital, avoided contamination. In this design, two hospitals were cluster sampling to randomly assigned the hospital for the experimental group and the hospital for the control group. Then, the participants in each hospital were systematic sampling to include in this study. The recurrent stroke prevention program (X) was given only to those in the experimental group, and the repeated measured first time (O1), second time (O3), third time (O5), and fourth time (O7) were those measurements of dependent variables that were made after the experimental intervention was introduced. The study design was shown below.

	O1	X	O3	O5	O7	Experimental group
Cluster randomization						
	O2	Usual care	O4	O6	O8	Control group

Figure 3.1 Research design

R = Cluster randomization

X = The recurrent stroke prevention program

O1= Baseline measurement of blood pressure, low-density lipoprotein (LDL, cholesterol, and blood glucose of the experimental group (week 0)

O2 = Baseline measurement of blood pressure, low-density lipoprotein (LDL, cholesterol, and blood glucose of the control group (week 0)

O3 = Measurement of blood pressure, low-density lipoprotein (LDL, cholesterol, and blood glucose of the experimental group (week 4^{th})

O4 = Measurement of blood pressure, low-density lipoprotein (LDL, cholesterol, and blood glucose of the control group (week 4^{th})

O5 = Measurement of blood pressure, low-density lipoprotein (LDL, cholesterol, and blood glucose of the experimental group (week 8^{th})

O6 = Measurement of blood pressure, low-density lipoprotein (LDL, cholesterol, and blood glucose of the control group (week 8^{th})

O7 = Measurement of blood pressure, low-density lipoprotein (LDL, cholesterol, and blood glucose of the experimental group (week 12^{th})

O8 = Measurement of blood pressure, low-density lipoprotein (LDL, cholesterol, and blood glucose of the control group (week 12^{th})

Population and sample

The population of the study

The population in this study was all adults and older with first diagnosed ischemic stroke by neurologist via computed tomography and/or magnetic resonance imaging, in Thailand who were registered at stroke unit. Since it was impossible to recruit all patients with first ischemic stroke from across Thailand. Therefore, the population in this study was patients with first ischemic stroke who aged 45 years old and older, there were admitted in stroke unit at the tertiary hospitals.

The target population of this study was the patients who have been diagnosed with first ischemic stroke and highly in the risk of recurrent stroke. The target population was randomized from the 2nd public health region in Thailand. There were five provinces remained in the 2nd public health region. A simple random sampling was applied to select only one province. Therefore, Phitsanulok province was selected. Then, researcher randomized the hospitals that had the participants using a cluster randomization. As the results, 2 tertiary hospitals in Phitsanulok province were Buddhachinaraj Hospital and Naresuan University Hospital.

These two tertiary hospitals had stroke unit, operated stroke care follow clinical practice guidelines for ischemic stroke 2019 by Neurological Institute of Thailand, had specialists such as neurologist, physical therapist, occupation therapist, nutritionist, and stroke nurse, and provided service care cover same area and same characteristic of population. Therefore, two tertiary hospitals in Phitsanulok province provided samples in this study.

Samples of the study

The sample in this study was draw from patients with first ischemic stroke. The participants were registered at stroke unit at Buddhachinaraj Hospital and Naresuan University Hospital who met the inclusion criteria.

1. Inclusion criteria

1.1 Had age range from 45 years and over.

1.2 Had no depression when completing the Thai version Patient Health Questionnaire (Thai version PHQ-9).

1.3 Had mild to moderate severity of stroke when completing the National Institute of Health Stroke Scale-Thai version (NIHSS-T) by physicians.

1.4 Were alert, oriented, and cooperative in the program.

1.5 Had ability to perform activities of daily living by themselves (BI>75).

1.6 Had no history of more serious medical disease other than ischemic stroke such as cancer, renal failure, severe heart disease and Parkinson's disease.

1.7 Had a caregiver who would support them during exercise.

1.8 Had telephone and line application.

1.9 Had the ability to communicate in Thai.

1.10 Willing to participate in all activities throughout the study.

2. Exclusion criteria

2.1 Had active severe complications of ischemic stroke, hypertension, diabetes mellites, or alteration of conscious.

2.2 Cannot complete all phases of the study.

Sample size

The sample size estimation was determined from previous intervention studies with repeated measure design like this study and calculated by G*power program (Faul, Erdfelder, Lang, & Buchner, 2007). The effect size was estimate from the similar studies to get mean and standard deviation. The effect size was 0.24 of Kirk et al. (2014). The power of test was 0.95. The significance level was 0.05. The study outcomes were measured at four points of time. The total sample size was 54. To prevent the dropout of the participants, 10 percent of the total sample size was considered. Therefore, the final sample size was 30 in each group.

Sampling procedure

Step 1: A cluster randomization technique was utilized to select the study setting in the 2nd public health regions of Thailand. Simple random sampling was used to select one province among five provinces in the 2nd public health regions of Thailand. Thus, Phitsanulok province was randomly selected. There were two tertiary hospitals in Phitsanulok province. These two tertiary hospitals were allocated in this study due to the availability of specialists such as neurologist, physical therapist, occupation therapist, nutritionist, and stroke nurse. As the result, Buddhachinaraj Hospital was allocated for the intervention group. Naresuan University Hospital was allocated for the control group.

Step 2: A systematic randomization technique was utilized to assign the participants into experimental and control group. The first five participants who met inclusion criteria was recruited into the experimental group. After that, the another first five participants were recruited into the control group. This systemic randomized was performed until reached 30 participants in each group.

The sampling procedures was shown in Figure 3.2

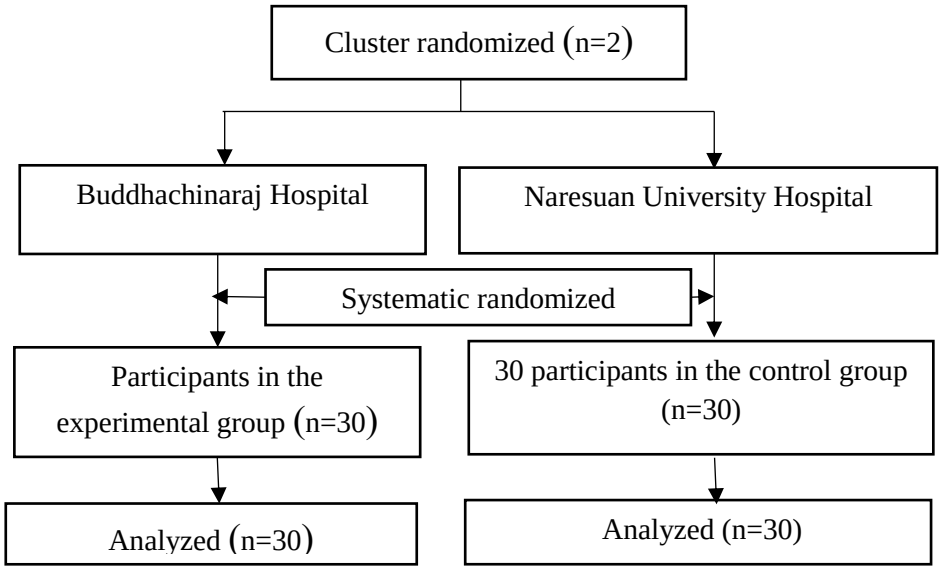

Figure 3.2 The sampling procedures

Sample approach methods

The stroke nurses approached the participants who met the study criteria. Then, they contacted researcher. After that the researcher presented information regarding the intervention, benefits of the intervention, and protection of human rights to seek their approval to participate in the study. once the prospective participants agree to participate in this study, they were asked to sign the consent form (Appendix E). The participants of the control group received the usual care, while the experimental group received the usual care and the recurrent stroke prevention program. The experimental group received five booklets which provided knowledge for first ischemic stroke, and self-monitoring form. The control group receives the five booklets after finishing the program.

Setting

This study was conducted at the stroke unit of two tertiary hospitals including Buddhachinaraj Hospital and Naresuan University Hospital. Both tertiary hospitals had specific unit for ischemic stroke care, operated stroke care follow clinical practice guidelines for ischemic stroke 2019 by Neurological Institute of Thailand, had specialists such as neurologists, physical therapists, occupation therapists, nutritionists, stroke nurses and other health care providers, and provided service care cover same area and same characteristic of population.

When patients have confirmed as having first ischemic stroke, they were admitted at stroke unit with a multidisciplinary team including physician, stroke nurse, rehabilitation medicine, nutrition therapy, social worker, and psychiatry. Generally, these patients showed median length of stay was 5 (range 3 to 7) days (Kasemsap et al., 2018). They were received acute medication or surgical management. Then, they were received early, active rehabilitation by a stroke care team and used to coordinate services and assist in discharge planning. Before hospital discharge, they were assessed to determine the need for home visit. They were received information covered ischemic stroke disease, treatment, warning signs, complication prevention, and medication, treatment, nutrition, exercise, sleep, hygiene, and appointment before discharge from hospital.

Nurses had important roles and responsibilities when caring for ischemic stroke patients. At stroke unit, nurse played roles in physiological monitoring and maintenance of homeostasis, prevent, and detect lesion extension, and prevent complications. In addition, before ischemic stroke patients discharge from hospital, nurses work together with other health care providers in rehabilitation. Nurses provided general and briefly

information covered vascular risk and lifestyle modification in discharge plan. At neurological outpatient clinic in Thailand, the participants received medication, took blood exam, and advice from neurologists. They less focused on recurrent stroke prevention. Therefore, no specific intervention in health care system to prevent recurrent stroke in Thailand.

Research instruments

The instruments in this study consisted of data collection instruments, intervention instruments, and the instruments for monitoring experimental. Details of each instrument are described as follows:

1. Instruments for data collection

1.1 The demographics and clinical characteristics data collection form

The demographics and clinical characteristics data collection form was developed by the researcher to collect baseline demographics and clinical characteristics of participants including age, gender, marital status, educational level, employment status, Income, pattern of diet consumption, smoking, alcohol drinking, exercise, duration of stroke illness, comorbid disease, medications taking, and alternative medicine (Appendix A1).

1.2 The National Institute of Health Stroke Scale Thai version (NIHSS-T)

The NIHSS-Thai version was developed by Nilanont et al. (2010). The instrument measures 15 neurological items Each item uses a 3- or 4- point scale resulted in a total score of 0-42 (Nilanont et al., 2010) (Appendix A2). It consists of assessing in consciousness, motor, perception and cognitive in stroke patients. Inter-observer reliability of the total NIHSS-T score with an intraclass correlation coefficient (ICC)

was 0.99 (0.98, 0.99). The construct validity of the NIHSS-T by the Spearman rank correlation coefficient correlation coefficient was 0.53.

1.3 The Modified Rankin Scale (mRS)

The Modified Rankin Scale was used for measuring the degree of disability or dependence in the daily activities of patients who have suffered a stroke or other causes of neurological disability was developed by Van Swieten, Koudstaal, Visser, Schouten, and Van Gijn (1988) (Appendix A3). The mRS has been used in clinical research for over 30 years and is a common standard for assessing functional outcomes in patients with stroke. The mRS defines 6 different grades of disability. The interpretation of disability are follows: score 0 mean no symptoms at all, score 1 mean no significant disability despite symptoms; able to carry out all usual duties and activities, score 2 mean slight disability; unable to carry out all previous activities, but able to look after own affairs without assistance, score 3 mean moderate disability; requiring some help, but able to walk without assistance, score 4 mean moderately severe disability; unable to walk and attend to bodily needs without assistance, score 5 mean severe disability; bedridden, incontinent and requiring constant nursing care and attention, and score 6 mean dead. Inter-rater reliability with the mRS is moderate and improves with structured interviews (Cohen's kappa coefficient 0.56 versus 0.78); strong test-re-test reliability (Cohen's kappa coefficient 0.81 to 0.95) has been reported (Banks & Marotta, 2007).

1.4 The Thai version Patient Health Questionnaire 9 (PHQ-9)

The Thai version Patient Health Questionnaire 9 was a screening tool for major depression in primary care patients. The English language version of the PHQ-9 was translated into Thai by Lotrakul, Sumrithe, and Saipanish (2008) (Appendix A4).

The PHQ-9 is a self-report measure, consisting of 9 questions. It refers to symptoms experienced by the patients during the two weeks prior to answering the questionnaires. The total scores range from 0 to 27. The PHQ-9 can be used as a screening tool with recommended cut-off scores ≥ 10 for the diagnosis of major depression. The Thai version of the PHQ-9 had satisfactory internal consistency (Cronbach's alpha = .79) (Lotrakul et al., 2008).

1.5 The Barthel Index (Thai version)

The Barthel Index Thai version was developed by Dajpratam et al. (2006) to assess stroke patients with disability (Appendix A5). Ten activities of daily living including feeding, bathing, grooming, dressing, bowel control, bladder control, toileting, chair transfer, ambulation and stair climbing. Items are rated in terms of whether individuals can perform activities independently (scored as 10, with some assistance (scored as 5), or are dependent (scored as 0). Total score was out of 100. The interpretation of mobility and self-care are follows, score of 0-19 suggests total dependence, 20-39 severe dependence, 40-59 moderate dependence, 60-79 slight dependence and 80-100 independent. Barthel Index (Thai version) had a high inter-rater agreement between the therapists and could be used by the therapists to assess stroke patients with disability. High inter-rater reliability was found for mobility subscale (ICC=0.85) and self-care subscale (ICC=0.86).

1.6 Thai Mini-Mental State Examination (TMSE)

Thai Mini-Mental State Examination was developed from Mini-Mental State Examination of Folstein, Folstein, and McHugh (1975) by Train the Brain Forum Thailand (Poungvarin, 1993) to evaluate dementia condition of Thai (Appendix A6). The TMSE was more convenient and accurate. This instrument was used in stroke

patients. The sensitive of TMSE at 80% (Tachapaitoon. A, Kumthornthip W, & Tosayanonda. O, 2000). Total score was out of 30. The TMSE consists of orientation, registration, attention, calculation, language, and recall. The cut off score at 23/30 for dementia.

1.7 The automatic sphygmomanometer OMRON HBP-1300

The automatic sphygmomanometer OMRON HBP-1300 was used to measure participants blood pressure in this study. It is a fully automatic blood pressure measurement device by records brachial blood pressure. It makes as a high-quality blood pressure measurement as a calibrated aneroid sphygmomanometer that Buddhachinaraj Hospital used and calibration in once a year by hospital's technicians. The accuracy of measurements is pressure ± 3-5 mmHg and pulse ±5% of the display reading. The OMRON HBP-1300 meets the standards set by the Thai Industrial Standard Institute Measurement. The standard adult cuffs for arm circumference ranging 220-320 mm were provided. The same machine was used all four points of times as baseline, week4, week 8, week12. The measurement based on the JNC VII guideline for the management of hypertension (Chobanian et al., 2003). The steps of measuring were followed:

1.7.1 Participants should be seated quietly for five minutes in a chair, relaxed and quiet, arm supported at heart level, and feet flat on the floor. They have empty bladder and void caffeine, exercise and smoking for 30 minutes.

1.7.2 Remove clothing from arm. Use properly validated, calibrated BP measurement device. Support participant's arm and position cuff on bare arm at level of the right atrium. An appropriate-sized cuff should be encircling at least 80% of arm. Cuff size 27-34 cm for adult, 22-26 cm for small adult, and 35-44 cm for large adult.

1.7.3 Press the switch “on”. Wait for inflate the cuff and read BP level.

1.7.4 In the first visit, record BP in both arms. The higher reading was used.

1.7.5 Record systolic blood pressure and diastolic blood pressure.

1.7.6 Use an average of 2 readings which obtained on 2 occasions to estimate the individual’s level’s level of BP. Measure BP 1st and 2nd spaced by 1-2 minutes and additional measurements if the first two are different (pressure less or more than 5 mmHg of the display reading).

1.8 The analyzer for LDL cholesterol

The Cobas 6000 analyzer series module c311 for LDL cholesterol met the standards set by the Thai Industrial Standard Institute. The process for measurement of LDL cholesterol was controlled by Quality Laboratory Accreditation Thailand Medical Technology Council in 2012. Medical technicians calibrate every six months. The serum specimens refer to lipid profile was collected after 12-hour fast. The process for measurement LDL cholesterol was controlled by Quality Laboratory Accreditation Thailand Medical Technology Council. The cost of measuring LDL-cholesterol was paid by the researcher.

1.9 The analyzer for fasting plasma glucose (FPG)

The Cobas 6000 analyzer series module c311 for fasting plasma glucose (FPG) met the standards set by the Thai Industrial Standard Institute. The process for measurement of fasting plasma glucose was controlled by Quality Laboratory Accreditation Thailand Medical Technology Council in 2012. Medical technicians calibrate every six months. FPG level are determined by taking a blood sample from participants who have fasted for at least 8 hours. The process for measurement of fasting plasma glucose is controlled by Quality Laboratory Accreditation Thailand Medical

Technology Council. The cost of measuring fasting plasma glucose was paid by the researcher.

2. Instruments for intervention

The intervention of this study was the recurrent stroke prevention program to improve blood pressure, low-density lipoprotein cholesterol, and blood glucose after first ischemic stroke.

2.1 The program development

This component of program was organized based on literature review and highest effect size studies were selected (Chiu et al., 2008; Kono et al., 2013; Moore et al., 2015; Z. Wang, Wang, Fan, Lu, & Wang, 2014), and the adult learning theory was used to guide the intervention program in this study. Four studies that presented highest effect sizes are selected for identify a new intervention development including the combine education and exercise by Kono et al. (2013), the exercise intervention by Moore et al. (2015) and Wang et al. (2014), and the education intervention by Chiu et al. (2008). Intervention components and activities of new intervention compose the specific active ingredients include.

The 1st component of the program

The plan of the first component of the program was to improve patients' knowledge in appropriate behavior after first ischemic stroke. The knowledge components included 1) Eating healthy diet for first ischemic stroke patient, 2) limited salt intake for first ischemic stroke patient, 3) increasing physical activities for first ischemic stroke patient, 4) quit smoking and avoid secondhand smoke for first ischemic stroke patient, and 5) medication adherence for first ischemic stroke patient. The first

component was divided into 4 sessions. Each session was set in small groups. The participants were received knowledge one session per week, total 4 weeks including.

Session 1: Providing knowledge about eating healthy diet for first ischemic stroke patient (40 minutes at week 1st) covered the importance of eating behaviors after first ischemic stroke, food and eating behavior guide for first ischemic stroke patients, proper proportions for first ischemic stroke patients' eating, food exchange, and understand and use the nutrition facts label. In addition, the participants were practiced selecting food in proper proportion and selecting food by using the nutrition facts label. Then, they were trained to self-monitoring to record food and eating behaviors in daily in self-monitoring form and continued to monitor until 12 weeks.

Session 2: Providing knowledge about limited salt intake for first ischemic stroke patient (40 minutes at week 2nd) covered the importance of limit salt intake after first ischemic stroke, source of high sodium food, physical change related high sodium level, guide for limiting sodium intake, and understand and use the nutrition facts label to limit salt intake. The participants practiced selecting low sodium food by using the nutrition facts label. They were trained self-monitoring sodium intake in daily and continued to monitor until 12 weeks.

Session 3: Providing knowledge about increasing physical activities and quit smoking and avoid secondhand smoke for first ischemic stroke patient (40 minutes at week 3rd). This session covered the importance of increasing physical activities after first ischemic stroke, benefits of increasing physical activities in first ischemic stroke patients, guide for increasing physical activities after first ischemic stroke, the importance of quit smoking and avoid secondhand smoking for first ischemic stroke patient, guide for quit smoking and avoid secondhand smoking for first ischemic stroke

patient. The participants were trained self-monitoring about increasing physical activity and quit smoking and avoid secondhand smoking in daily and continued to monitor until 12 weeks.

Session 4: Providing knowledge about medication adherence for first ischemic stroke patient (40 minutes at week 4th) covered ischemic stroke disease, the importance of continuous medication intake in first ischemic stroke patients, drug for prevent recurrent stroke, drug for prevent vascular factors, guide for medication intake for ischemic stroke patients, and technique for continuous medication intake. The participants were trained self-monitoring about medication intake in daily and continued to monitor until 12 weeks.

The 2nd component of the program

The second component of the program was patients' skills training as 12-weeks exercise. The exercise component consists of 1) walking exercise 3 times/week, 40-minute/session and 2) resistance exercise 2 times/week, 20-minute/session. The process of exercise in this program followed:

Week 0: After physician or physical therapist determined exercise is safe for participants to engage in the program. Then, the researcher trained exercise 3 times or until the participants performed correct both walking exercise and resistance exercise. During exercise, the family member or caregiver observed and walked together with the participants for prevention injury and encourage them to exercise.

Week1-12: Continued exercise 12 weeks, during exercise, the family member or caregiver observed or walked together with the participants.

1. The participants were measured blood pressure before start exercise. If systolic blood pressure was 180 mmHg or higher and diastolic blood pressure was 110

mmHg or higher, the participants did not exercise until their blood pressure is controlled. The participants rested and repeated to measure blood pressure. They should report the researcher and considered referring to hospital if blood pressure did not decrease.

2. Warm-up 5 minutes with four stretching exercises included

2.1 Single leg standing for help restore balance. Place both feet flat on the floor. Slowly lift one leg until you are balanced on the other leg and slowly lower it back down. Then switch legs and repeat 20 times per side.

2.2 Single leg standing with swing arms for help restore balance. Place both feet flat on the floor. Slowly lift one leg with swing arms until you are balanced on the other leg and slowly lower it back down. Then switch legs and swing arm, repeat 20 times per side.

2.3 Heel raises (Hold on or not holding on) for help restore balance. Hold on to the chair or counter, and raise yourself up onto your tiptoes, keeping your knees straight and holding your upper body tall. Lower yourself back to the floor slowly, and repeat 10-12 times per set, 3 sets.

2.4 Ankle rotation This exercise is beneficial for tight ankles, tight calves, improve mobility and flexibility. Sit in a chair keeping your back straight and your breathing normal. Extend one leg in front and rotate your foot slowly clockwise 10 rounds and counterclockwise 10 rounds. Do this for a series of repetitions.

3. Waking exercise 30 minutes/time, 3 times /week, start from walk slowly 5 minutes. Then, increasing to walk fast until slightly breathless, sweating more but still talk followed rating of perceived exertion scale (moderate intensity), in 20 minutes. Then walk slowly 5 minutes.

4. Five-Resistance exercise, 20 minutes /times, 2 times/week included

4.1 Single leg standing for intermediate standing and balance exercises. Place both feet flat on the floor. Slowly lift one leg until you are balanced on the other leg. Hold for a count of 10, and slowly lower it back down. Alternate legs and repeat. Repeat, then switch legs 20 times per side.

4.2 Knee rotations to improves core, back strength, coordination, and balance. Participants lie on your back and rest your hands by your sides. Bend your knees with your feet flat on the floor. Keeping your knees together, drop them, slowly, to the left then, bring them back to the center. Then drop them to the right and back to the center. Repeated 10-20 times per side.

4.3 Hip thrusts: It boosts the strength of the core, glutes, lower back muscles, and muscles that support the spine. Lie on your back with your feet flat on the ground and knees bent. Place your arms by your sides, palms down. Gently contract your abs and squeeze your glutes (backside muscles) to lift your hips and make a bridge. Hold on this position for a few seconds and lower to the starting stance. You can make it easier by straightening your legs and placing a rolled-up towel under your knees, then squeezing and lifting your hips. You could also make it more intense by lifting one foot at a time while holding the bridge. Repeated 10-12 times.

4.4 Bilateral leg cycling for regain a strong, healthy core. It boosts the strength of thigh muscles and abdominal muscle. Lie on the floor and lift the legs off of the ground, holding them in a cycling position. Then, cycle as if you are riding a bicycle in the air. Repeated 10-12 times.

4.5 Sit to stands for Strengthens core and upper thigh muscles, improves weight shifting and balance. Sit up tall in your chair with your knees bent (90 degrees).

Place your feet firmly on the floor shoulder-width apart. Slowly rise to a standing position while ensuring that your knees never cross the tips of your toes. Sit back down slowly and in a controlled manner. To make it less intense, use your arms for support, and to make it more difficult, cross your arms on your chest. Repeated 10-12 times.

5. Cool down 5 minutes with 4 stretching exercises included

5.1 Single leg standing for help restore balance. Place both feet flat on the floor. Slowly lift one leg until you are balanced on the other leg and slowly lower it back down. Then switch legs and repeat 20 times per side.

5.2 Single leg standing with swing arms f for help restore balance. Place both feet flat on the floor. Slowly lift one leg with swing arms until you are balanced on the other leg and slowly lower it back down. Then switch legs and swing arm, repeat 20 times per side.

5.3 Heel raises (Hold on or not holding on) for help restore balance. Hold on to the chair or counter, and raise yourself up onto your tiptoes, keeping your knees straight and holding your upper body tall. Lower yourself back to the floor slowly, and repeat 10-12 times per set, 3 sets.

5.4 Ankle rotation This exercise is beneficial for tight ankles, tight calves, improve mobility and flexibility. Sit in a chair keeping your back straight and your breathing normal. Extend one leg in front and rotate your foot slowly clockwise 10 rounds and counterclockwise 10 rounds. Do this for a series of repetitions.

6. The first time of week, the participants exercised mix walking and resistance exercises in 60 minutes, the second time of week they performed only resistance exercise in 30 minutes, and the third time of week exercised mix walking and resistance exercises in 60 minutes.

7. Observing abnormal signs and symptoms of overtraining during exercise that would stop exercise, for instance cardiac arrhythmia, angina, dizziness, light-headedness, vomit-nausea, constant pain or chronic tiredness and sleeplessness. If the participants had abnormal signs and symptoms, they should follow:

7.1 Stop to exercise and observe signs and symptoms.

7.2 Call the researcher for observing participants.

7.3 After participants rest, if their abnormal signs and symptoms did not improve, the researcher should manage the participants to be rushed to the hospital immediately. All costs of treatment are paid by the researcher.

7.4 If their signs and symptoms improved, the researcher should manage the participants to be check their condition again at health promoting hospital.

8. After exercise, participants should rest a moment and drink water.

9. The participants were record exercise data in self-monitoring form for first ischemic stroke and send exercise picture at line application one time per week.

The 3rd component of the program

The third component of the program was instilling positive attitude as follow-up via telephone for 20 minutes/time as strategies to improve adherence to interventions. Patients might record health behaviors about eating, physical activity and exercise, smoking, and intake medication in self-monitor form in every week. The researcher discussed and suggested when follow-up each time. The researcher was telephone follow up at week 8th, and week 12th.

2.2 Materials of the recurrent stroke prevention program

It consisted of a recurrent stroke prevention program manual (nurse edition), an exercise for recurrent stroke prevention program manual (nurse edition), lesson plan for

health education for ischemic stroke patients (nurse edition), questions guide for follow up via telephone and the line application (nurse edition), five health education booklets for ischemic stroke patients (patient edition), an exercise for prevention recurrent stroke program booklet (patient edition), a self-monitoring form (patient edition). The details of each instrument were explained as following:

2.2.1 A recurrent stroke prevention program manual (nurse edition).

The recurrent stroke prevention program was developed by researcher, based on four highest effect size intervention from meta-analysis (Chiu et al., 2008; Kono et al., 2013; Moore et al., 2015; Z. Wang, Wang, Fan, Lu, & Wang, 2014). It consists of three components intervention as 1) four health education sessions (40 minutes/session) cover diet and limited salt diet for ischemic stroke, increasing physical activities, quit smoking and avoid secondhand smoke, and ischemic stroke and taking medication as prescribe after ischemic stroke; 2) twelve-weeks exercise program (40-60 minutes); and 3) follow up via telephone (at week 8^{th} and 12^{th}) for 20 minutes/time as strategies to improve adherence to interventions (Appendix A7).

2.2.2 An exercise for recurrent stroke prevention program manual (nurse edition).

The objectives of exercise for recurrent stroke prevention are explained exercise related the program including instruments for exercise, objectives of exercise in first ischemic stroke, exercise for recurrent stroke prevention program, place for exercise, step of exercise in program, rating of perceived exertion scale, abnormal signs and symptoms of overtraining during exercise (Appendix A8).

2.2.3 Lesson plan for health education for ischemic stroke patients (nurse edition).

The objectives of lesson plan are increasing participants' knowledge. The plan consisted of four sessions about 1) eating healthy diet, 2) limited salt intake, 3) increasing physical activities and quit smoking and avoid secondhand smoke, and 4) ischemic stroke and taking medication for first ischemic stroke patients (Appendix A9).

2.2.4 Questions guide for continuous monitoring via phone (nurse edition)

Questions guide for continuous monitoring via phone (nurse edition) as strategies to improve adherence to interventions. The question guide was covered problems to change their behaviors in eating healthy diet, limited salt intake, physical activities and exercise, smoking, and intake medication in each week. The researcher discussed and suggested about problems via phone in 20 minutes per time (Appendix A10).

2.2.5 Five education booklets for ischemic stroke patients (patient edition).

The booklets were provided knowledge for first ischemic stroke including (Appendix A11).

1) Eating healthy diet for ischemic stroke patients

2) Limited salt diet after ischemic stroke

3) Increasing physical activities after ischemic stroke

4) Quite smoking and avoid secondhand smoke after ischemic stroke

5) Ischemic stroke and taking medication for ischemic stroke patient

6) The exercise for prevention recurrent stroke program booklet for first ischemic stroke patient and posters for example the methods of exercise. This booklet was used as a guide to exercise. The exercise for prevention recurrent stroke program booklet consisted of benefits of exercise in ischemic stroke patients, 12-weeks exercise

guide for first ischemic stroke, walking exercise and resistance exercises (Appendix A12).

The recurrent stroke prevention program and education media used in the recurrent stroke prevention program were validated for content by 5 experts. There was physician who is an expert in ischemic stroke, a nurse instructor who is an expert in ischemic stroke and behavior change, a physical therapist who is an expert in ischemic stroke and had experienced in stroke's rehabilitation, a nutritionist who is an expert in diet for ischemic stroke patients, and an advanced practice nurse (APN) who is an expert in nursing care in stroke patients (Appendix C). The comments and suggestions from the experts were small pictures in education booklets, there were to many details in each session, and some contents were to complicate as for understand.

2.3 The recurrent stroke prevention program tryout

The revised program manuals were tried out on five patients with first ischemic stroke that had similar characteristics to the population in the study. The aims of the pilot study were 1) to determine the feasibility of the proposed study, 2) to identify the problems in the experimental intervention, and 3) to examine the validity and reliability of the research instruments. The problems that came from the try out were reported to advisors. The results of the try out indicated that the researcher should some education session need more time to follow the content as well as eating healthy diet, the researcher should brief content, some session needed more time to practice the skills, and dividing each education session per week was appropriated to grain more understand and the researcher could evaluate the previous understand in next sessions.

The suggestions from the experts and the result from tryout were indicated that the researcher should modify and make the contents more concise, increase size of

picture in each education booklets. Extend more time in some session and the self-monitoring form were appropriately modified in their size.

2.4 Research assistants' preparation

Research assistants in this study was two registered nurses in stroke unit of Buddhachinaraj Hospital and Naresuan University Hospital were trained to be the research assistant.

2.4.1 The researcher explained the recurrent stroke prevention program objectives, the study procedures, inclusion criteria, the research instruments, and measured blood pressure as their role to research assistants.

2.4.2 Research assistants were trained with the same set of instruments and methods for collecting data including measured blood pressure. Practical problems were discussed and solved to increase a mutual understanding. To ensure the quality of data collected by the research assistant were determined inter-rater reliability, the research assistants and the researcher demonstrated the correct measured blood pressure process in the same patient, three times. The interrater reliability was computed using a comparation of mean of systolic blood pressure and diastolic blood pressure between two raters, ICC=.97.

2.4.3 The researcher explained the inclusion criteria of the samples. Researcher assigned research assistant to contact researcher if they screened and met eligible participants.

2.4.4 The research assistants measured blood pressure level all participants at based line, week 4, week 8, and week 12.

2.5 Program implementation

The recurrent stroke prevention program aims to improve blood pressure, low-density lipoprotein cholesterol, and blood glucose after first ischemic stroke. This study program consisted of three components: 1) education aligning with behavioral changes, 2) 12-week exercise and 3) telephone monitoring. Health education aimed at the acquisition of skills and attitudes to modify behaviors that leaded to a modification of risk factors. The program consists of 12 weeks as following.

The protocol of the recurrent stoke prevention program

The participants who were assigned to the experimental group. The researcher assistants were asked to respond to demographic, clinical, and first ischemic stroke characteristics data.

Week 0

1. The research assistant measured blood pressure following the guideline and collected blood exam for low density lipoprotein cholesterol and fasting plasma glucose by staff in laboratory. Blinding between the participants and the research assistant that collected the data used for controlling confounding factors, decrease bias, and increase validity of the outcome.

2. The participants received the Five education booklets for ischemic stroke patients and self-monitoring form.

3. Physician or physical therapist determined exercise is safe for participants to engage in the program. Then, the researcher trained exercise 3 times at week 0 for the participants performed correct both walking exercise and resistance exercise. During exercise, the family member or caregiver observed and walked together with the participants for prevention injury and encourage them to exercise.

4. The researcher trained participants and family member to measure blood pressure followed the JNC VII guideline (Chobanian et al., 2003).

Week 1

1. The researcher provided knowledge about eating healthy diet for first ischemic stroke patient (40 minutes at week 1st) covered the importance of eating behaviors after first ischemic stroke, food and eating behavior guide for first ischemic stroke patients, proper proportions for first ischemic stroke patients' eating, food exchange, and understand and use the nutrition facts label. In addition, the participants were practiced selecting food in proper proportion and selecting food by using the nutrition facts label. Then, they were trained to self-monitoring to record food and eating behaviors in daily in self-monitoring form and continued to monitor until 12 weeks.

2. Participants started to exercise, and the family member or caregiver observed or walked together with the participants.

Week 1 (the first time of week)

2.1 The participants measured blood pressure before start exercise. If systolic blood pressure was 180 mmHg or higher and diastolic blood pressure was 110 mmHg or higher, the participants did not exercise until their blood pressure is controlled. The participants rested and repeated to measure blood pressure. They should report the researcher and considered referring to hospital if blood pressure did not decrease.

2.2 Warm-up 5 minutes with four stretching exercises included

2.2.1 Single leg standing for help restore balance. Place both feet flat on the floor. Slowly lift one leg until you are balanced on the other leg and slowly lower it back down. Then switch legs and repeat 20 times per side.

2.2.2 Single leg standing with swing arms f for help restore balance. Place both feet flat on the floor. Slowly lift one leg with swing arms until you are balanced on the other leg and slowly lower it back down. Then switch legs and swing arm, repeat 20 times per side.

2.2.3 Heel raises (Hold on or not holding on) for help restore balance. Hold on to the chair or counter, and raise yourself up onto your tiptoes, keeping your knees straight and holding your upper body tall. Lower yourself back to the floor slowly, and repeat 10-12 times per set, 3 sets.

2.2.4 Ankle rotation This exercise is beneficial for tight ankles, tight calves, improve mobility and flexibility. Sit in a chair keeping your back straight and your breathing normal. Extend one leg in front and rotate your foot slowly clockwise 10 rounds and counterclockwise 10 rounds. Do this for a series of repetitions.

2.3 Waking exercise 30 minutes/time, 3 times /week, start from walk slowly 5 minutes. Then, increasing to walk fast until slightly breathless, sweating more but still talk followed rating of perceived exertion scale (moderate intensity), in 20 minutes. Then walk slowly 5 minutes.

2.4 Five-resistance exercise, 20 minutes /times, 2 times/week included

2.4.1 Single leg standing for intermediate standing and balance exercises. Place both feet flat on the floor. Slowly lift one leg until you are balanced on the other leg. Hold for a count of 10, and slowly lower it back down. Alternate legs and repeat. Repeat, then switch legs 20 times per side.

2.4.2 Knee rotations to improves core, back strength, coordination, and balance. Participants lie on your back and rest your hands by your sides. Bend your knees with your feet flat on the floor. Keeping your knees together, drop them, slowly, to the left then, bring them back to the center. Then drop them to the right and back to the center. Repeated 10-20 times per side.

2.4.3 Hip thrusts: It boosts the strength of the core, glutes, lower back muscles, and muscles that support the spine. Lie on your back with your feet flat on the ground and knees bent. Place your arms by your sides, palms down. Gently contract your abs and squeeze your glutes (backside muscles) to lift your hips and make a bridge. Hold on this position for a few seconds and lower to the starting stance. You can make it easier by straightening your legs and placing a rolled-up towel under your knees, then squeezing and lifting your hips. You could also make it more intense by lifting one foot at a time while holding the bridge. Repeated 10-12 times.

2.4.4 Bilateral leg cycling for regain a strong, healthy core. It boosts the strength of thigh muscles and abdominal muscle. Lie on the floor and lift the legs off of the ground, holding them in a cycling position. Then, cycle as if you are riding a bicycle in the air. Repeated 10-12 times.

2.4.5 Sit to stands for Strengthens core and upper thigh muscles, improves weight shifting and balance. Sit up tall in your chair with your knees bent (90 degrees). Place your feet firmly on the floor shoulder-width apart. Slowly rise to a standing position while ensuring that your knees never cross the tips of your toes. Sit back down slowly and in a controlled manner. To make it less intense, use your arms for support, and to make it more difficult, cross your arms on your chest. Repeated 10-12 times.

2.5 Cool down 5 minutes with 4 stretching exercises included

2.5.1 Single leg standing for help restore balance. Place both feet flat on the floor. Slowly lift one leg until you are balanced on the other leg and slowly lower it back down. Then switch legs and repeat 20 times per side.

2.5.2 Single leg standing with swing arms f for help restore balance. Place both feet flat on the floor. Slowly lift one leg with swing arms until you are balanced on the other leg and slowly lower it back down. Then switch legs and swing arm, repeat 20 times per side.

2.5.3 Heel raises (Hold on or not holding on) for help restore balance. Hold on to the chair or counter, and raise yourself up onto your tiptoes, keeping your knees straight and holding your upper body tall. Lower yourself back to the floor slowly, and repeat 10-12 times per set, 3 sets.

2.5.4 Ankle rotation This exercise is beneficial for tight ankles, tight calves, improve mobility and flexibility. Sit in a chair keeping your back straight and your breathing normal. Extend one leg in front and rotate your foot slowly clockwise 10 rounds and counterclockwise 10 rounds. Do this for a series of repetitions.

2.6 The participants were record exercise data in self-monitoring form for first ischemic stroke.

Week 1 (the second time of week)

1. Participants started to exercise, and the family member or caregiver observed or walked together with the participants.

1.1 The participants measured blood pressure before start exercise. If systolic blood pressure was 180 mmHg or higher and diastolic blood pressure was 110 mmHg or higher, the participants did not exercise until their blood pressure is

controlled. The participants rested and repeated to measure blood pressure. They should report the researcher and considered referring to hospital if blood pressure did not decrease.

1.2 Warm-up 5 minutes with four stretching exercises included

1.2.1 Single leg standing for help restore balance. Place both feet flat on the floor. Slowly lift one leg until you are balanced on the other leg and slowly lower it back down. Then switch legs and repeat 20 times per side.

1.2.2 Single leg standing with swing arms f for help restore balance. Place both feet flat on the floor. Slowly lift one leg with swing arms until you are balanced on the other leg and slowly lower it back down. Then switch legs and swing arm, repeat 20 times per side.

1.2.3 Heel raises (Hold on or not holding on) for help restore balance. Hold on to the chair or counter, and raise yourself up onto your tiptoes, keeping your knees straight and holding your upper body tall. Lower yourself back to the floor slowly, and repeat 10-12 times per set, 3 sets.

1.2.4 Ankle rotation This exercise is beneficial for tight ankles, tight calves, improve mobility and flexibility. Sit in a chair keeping your back straight and your breathing normal. Extend one leg in front and rotate your foot slowly clockwise 10 rounds and counterclockwise 10 rounds. Do this for a series of repetitions.

1.3 Five-Resistance exercise, 20 minutes /times, 2 times/week included

1.3.1 Single leg standing for intermediate standing and balance exercises. Place both feet flat on the floor. Slowly lift one leg until you are balanced on the other leg. Hold for a count of 10, and slowly lower it back down. Alternate legs and repeat. Repeat, then switch legs 20 times per side.

1.3.2 Knee rotations to improves core, back strength, coordination, and balance. Participants lie on your back and rest your hands by your sides. Bend your knees with your feet flat on the floor. Keeping your knees together, drop them, slowly, to the left then, bring them back to the center. Then drop them to the right and back to the center. Repeated 10-20 times per side.

1.3.3 Hip thrusts: It boosts the strength of the core, glutes, lower back muscles, and muscles that support the spine. Lie on your back with your feet flat on the ground and knees bent. Place your arms by your sides, palms down. Gently contract your abs and squeeze your glutes (backside muscles) to lift your hips and make a bridge. Hold on this position for a few seconds and lower to the starting stance. You can make it easier by straightening your legs and placing a rolled-up towel under your knees, then squeezing and lifting your hips. You could also make it more intense by lifting one foot at a time while holding the bridge. Repeated 10-12 times.

1.3.4 Bilateral leg cycling for regain a strong, healthy core. It boosts the strength of thigh muscles and abdominal muscle. Lie on the floor and lift the legs off of the ground, holding them in a cycling position. Then, cycle as if you are riding a bicycle in the air. Repeated 10-12 times.

1.3.5 Sit to stands for Strengthens core and upper thigh muscles, improves weight shifting and balance. Sit up tall in your chair with your knees bent (90 degrees). Place your feet firmly on the floor shoulder-width apart. Slowly rise to a standing position while ensuring that your knees never cross the tips of your toes. Sit back down slowly and in a controlled manner. To make it less intense, use your arms for support, and to make it more difficult, cross your arms on your chest. Repeated 10-12 times.

1.4 Cool down 5 minutes similar to warm up.

1.5 The participants were record exercise data in self-monitoring form for first ischemic stroke.

Week 1 (the third time of week)

1. The participants performed exercise similar to the first time of week.

2. The participants were record exercise data in self-monitoring form for first ischemic stroke.

Week 1 day 7th

1. The participants were record eating healthy food and exercise data in self-monitoring form for first ischemic stroke and sent in line application one time per week.

Week 2

1. The researcher provided knowledge about limited salt intake for first ischemic stroke patient (40 minutes at week 2nd) covered the importance of limit salt intake after first ischemic stroke, source of high sodium food, physical change related high sodium level, guide for limiting sodium intake, and understand and use the nutrition facts label to limit salt intake. The participants practiced selecting low sodium food by using the nutrition facts label. They were trained self-monitoring sodium intake in daily and continued to monitor until 12 weeks.

2. The participants performed exercise followed steps in week 1.

Week 2 (day 7th)

1. The participants were record eating health food, salt intake, and exercise data in self-monitoring form for first ischemic stroke and sent in line application one time per week.

Week 3

1. The researcher provided knowledge about increasing physical activities and quit smoking and avoid secondhand smoke for first ischemic stroke patient (40 minutes at week 3rd). This session covered the importance of increasing physical activities after first ischemic stroke, benefits of increasing physical activities in first ischemic stroke patients, guide for increasing physical activities after first ischemic stroke, the importance of quit smoking and avoid secondhand smoking for first ischemic stroke patient, guide for quit smoking and avoid secondhand smoking for first ischemic stroke patient. The participants were trained self-monitoring about increasing physical activity and quit smoking and avoid secondhand smoking in daily and continued to monitor until 12 weeks.

2. The participants performed exercise followed steps in week 1.

Week 3 (day 7th)

1. The participants were record eating health food, salt intake, increasing physical activities, quit smoking and exercise data in self-monitoring form for first ischemic stroke and sent in line application one time per week.

Week 4

1. The researcher provide knowledge about ischemic stroke and taking medication for first ischemic stroke patient (40 minutes at week 4th) covered ischemic stroke disease, the importance of continuous medication intake in first ischemic stroke patients, drug for prevent recurrent stroke, drug for prevent vascular factors, guide for medication intake for ischemic stroke patients, and technique for continuous medication intake.

2. The participants performed exercise followed steps in week 1.

Week 4 (day 7th)

1. The participants were record eating health food, salt intake, increasing physical activities, quit smoking, medication adherence and exercise data in self-monitoring form for first ischemic stroke and sent in line application one time per week.

2. The participants were measured blood pressure by the research assistants and collected blood exam for low density lipoprotein cholesterol and fasting plasma glucose.

Week5-12

1. The participants performed exercise followed steps in week 1.

2. The participants were record behaviors data in self-monitoring form for first ischemic stroke every day and sent in line application one time per week (day 7th).

3. The participants were measured blood pressure by the research assistants and collected blood exam for low density lipoprotein cholesterol and fasting plasma glucose at week 8 and 12.

4. The researcher telephone called made as follow up, discussed, and suggested when follow-up each time at week 8 and 12.

The steps of program were summarized to be the schedule as illustrate in Table 3.1

Table 3.1 Summarized the steps of program

Week/ place	Time/ Person involved in activities	Objectives	Activities	Instruments
Week 0 / Stroke unit	60 minutes/ Participations and caregiver	1.To establish relationship and inform the overview of the program. 2. To determine exercise is safe for participants to	1. Researcher introduce self and inform the overview of the program. 2. Physician or physical therapist determined exercise is safe for participants to engage in the program. 3. The researcher trained exercise 3 times or until the	1. The exercise for prevention recurrent stroke program booklet 2. Education booklets

Week/ place	Time/ Person involved in activities	Objectives	Activities	Instruments
		engage in the program. 3. To train participants to perform correct 12-week exercise on program.	participants performed correct both walking exercise and resistance exercise. 4. During exercise, the family member or caregiver observed and walked together with the participants for prevention injury and encourage them to exercise. 5. Gave the participants' manuals, education booklets, The exercise for prevention recurrent stroke program booklet, self-monitoring form to participants. 5. The researcher trained participants to record exercise data in self-monitoring form and continued to monitor until 12 weeks. 6. Offer the participants to contact the researcher by telephone if they faced some problems that could not be solved by themselves (during the program period)	3. Self-monitoring form
Week 1st/ Stroke unit or home	40 minutes/ Participations	1.To Provide knowledge about eating healthy diet for first ischemic stroke patient.	1. Provide knowledge about eating healthy diet for first ischemic stroke patient. 2. The researcher trained participants to record food and eating behaviors in daily in self-monitoring form and continued to monitor during the program period.	1. Eating healthy diet for ischemic stroke patient's booklet 2. Self-monitoring form
	1. Walking exercise 3 times/week, 40-minute/time and 2. Resistance exercise 2	1. To perform 12-weeks exercise.	1. The participants measured blood pressure before start exercise. 2. Warm-up 5 minutes with four stretching exercises. 3. Waking exercise 30 minutes/time, 3 times /week.	1. The exercise for prevention recurrent stroke program booklet 2. Self-monitoring form

Week/ place	Time/ Person involved in activities	Objectives	Activities	Instruments
	times/week, 20-minute/time. Participations and caregiver		4. Five-Resistance exercise, 20 minutes /times, 2 times/week. 5. Cool down 5 minutes with 4 stretching exercises. 6. The first time of week, the participants exercised mix walking and resistance exercises in 60 minutes, the second time of week they performed only resistance exercise in 30 minutes, and the third time of week exercised mix walking and resistance exercises in 60 minutes. 7. The participants were record exercise data in self-monitoring form for first ischemic stroke and send exercise picture at line application one time per week.	
Week 2nd / Stroke unit /home	40 minutes/ Participations	1. To provide knowledge about limited salt intake for first ischemic stroke patient.	1. Provide knowledge about limited salt intake for first ischemic stroke patient. 2. The researcher trained participants to record salt intake in daily in self-monitoring form and continued to monitor during the program period.	1. Limited salt intake for ischemic stroke patient's booklet 2. Self-monitoring form
	1. Walking exercise 3 times/ week, 40-minute/ time. 2. Resistance exercise 2 times/ week, 20-minute/ time. Participations and caregiver	1. To perform 12-weeks exercise.	1. The participants measured blood pressure before start exercise. 2. Warm-up 5 minutes with four stretching exercises. 3. Waking exercise 30 minutes/time, 3 times /week. 4. Five-Resistance exercise, 20 minutes /times, 2 times/week. 5. Cool down 5 minutes with 4 stretching exercises. 6. The first time of week, the participants exercised mix walking and resistance exercises in 60 minutes, the second time of week they performed only	1. The exercise for prevention recurrent stroke program booklet 2. Self-monitoring form

Week/ place	Time/ Person involved in activities	Objectives	Activities	Instruments
			resistance exercise in 30 minutes, and the third time of week exercised mix walking and resistance exercises in 60 minutes. 7. The participants were record exercise data in self-monitoring form for first ischemic stroke and send exercise picture at line application one time per week.	
Week 3rd / Stroke unit /home	40 minutes/ Participations	1. To provide knowledge about increasing physical activities and quit smoking and avoid secondhand smoke for first ischemic stroke patient.	1. Provide knowledge about increasing physical activities and quit smoking and avoid secondhand smoke for first ischemic stroke patient for first ischemic stroke patient. 2. The researcher trained participants to record physical activities and exercise, smoking, and secondhand smoking in daily in self-monitoring form and continued to monitor during the program period.	1. Increasing physical activities booklet for first ischemic stroke patients. 2. Quit smoking and avoid secondhand smoke booklet for first ischemic stroke patients. 3. Self-monitoring form
	1. Walking exercise 3 times/ week, 40-minute/ time. 2. Resistance exercise 2 times/ week, 20-minute/ time. Participations and caregiver	1. To perform 12-weeks exercise.	1. The participants measured blood pressure before start exercise. 2. Warm-up 5 minutes with four stretching exercises. 3. Waking exercise 30 minutes/time, 3 times /week. 4. Five-Resistance exercise, 20 minutes /times, 2 times/week. 5. Cool down 5 minutes with 4 stretching exercises. 6. The first time of week, the participants exercised mix walking and resistance exercises in 60 minutes, the second time of week they performed only	1. The exercise for prevention recurrent stroke program booklet 2. Self-monitoring form

Week/ place	Time/ Person involved in activities	Objectives	Activities	Instruments
			resistance exercise in 30 minutes, and the third time of week exercised mix walking and resistance exercises in 60 minutes. 7. The participants were record exercise data in self-monitoring form for first ischemic stroke and send exercise picture at line application one time per week.	
Week 4th / Stroke unit /home	40 minutes/ Participations	1. To provide knowledge about ischemic stroke and taking medication for first ischemic stroke patient.	1. Provide knowledge about ischemic stroke and taking medication for first ischemic stroke patient for first ischemic stroke patient. 2. The researcher trained participants to record medication intake in daily in self-monitoring form and continued to monitor during the program period.	1. Ischemic stroke and taking medication booklet for first ischemic stroke patients. 2. Self-monitoring form
	1. Walking exercise 3 times/ week, 40-minute/ time. 2. Resistance exercise 2 times/ week, 20-minute/ time. Participations and caregiver	1. To perform 12-weeks exercise.	1. The participants measured blood pressure before start exercise. 2. Warm-up 5 minutes with four stretching exercises. 3. Waking exercise 30 minutes/time, 3 times /week. 4. Five-Resistance exercise, 20 minutes /times, 2 times/week. 5. Cool down 5 minutes with 4 stretching exercises. 6. The first time of week, the participants exercised mix walking and resistance exercises in 60 minutes, the second time of week they performed only resistance exercise in 30 minutes, and the third time of week exercised mix walking and resistance exercises in 60 minutes.	1. The exercise for prevention recurrent stroke program booklet 2. Self-monitoring form

Week/ place	Time/ Person involved in activities	Objectives	Activities	Instruments
			7. The participants were record exercise data in self-monitoring form for first ischemic stroke and send exercise picture at line application one time per week.	
Week 5th-7th / home	1. Walking exercise 3 times/ week, 40-minute/ time. 2. Resistance exercise 2 times/ week, 20-minute/ time. Participations and caregiver	1. To perform 12-weeks exercise.	1. The participants measured blood pressure before start exercise. 2. Warm-up 5 minutes with four stretching exercises. 3. Waking exercise 30 minutes/time, 3 times /week. 4. Five-Resistance exercise, 20 minutes /times, 2 times/week. 5. Cool down 5 minutes with 4 stretching exercises. 6. The first time of week, the participants exercised mix walking and resistance exercises in 60 minutes, the second time of week they performed only resistance exercise in 30 minutes, and the third time of week exercised mix walking and resistance exercises in 60 minutes. 7. The participants were record exercise data in self-monitoring form for first ischemic stroke and send exercise picture at line application one time per week.	1. The exercise for prevention recurrent stroke program booklet 2. Self-monitoring form
Week 8th / home	20 minutes/ week Participations	1. To improve adherence to interventions.	1. The researcher contact participants via telephone. 3. The researcher asks them about problems to change behaviors in each week and discussion. 4. Offer the participants to ask their question and choose appropriate approach to improve behaviors by themselves. 5. Offer the participants to contact the researcher by	1. Self-monitoring form 2. Telephone

Week/ place	Time/ Person involved in activities	Objectives	Activities	Instruments
			telephone if they faced some problems that could not be solved by themselves (during the program period)	
	1. Walking exercise 3 times/ week, 40-minute/ time. 2. Resistance exercise 2 times/ week, 20-minute/ time. Participations and caregiver	1. To perform 12-weeks exercise.	1. The participants measured blood pressure before start exercise. 2. Warm-up 5 minutes with four stretching exercises. 3. Waking exercise 30 minutes/time, 3 times /week. 4. Five-Resistance exercise, 20 minutes /times, 2 times/week. 5. Cool down 5 minutes with 4 stretching exercises. 6. The first time of week, the participants exercised mix walking and resistance exercises in 60 minutes, the second time of week they performed only resistance exercise in 30 minutes, and the third time of week exercised mix walking and resistance exercises in 60 minutes. 7. The participants were record exercise data in self-monitoring form for first ischemic stroke and send exercise picture at line application one time per week.	1. The exercise for prevention recurrent stroke program booklet 2. Self-monitoring form
Week 9th-11th / home	1. Walking exercise 3 times/ week, 40-minute/ time. 2. Resistance exercise 2 times/ week, 20-minute/ time.	1. To perform 12-weeks exercise.	1. The participants measured blood pressure before start exercise. 2. Warm-up 5 minutes with four stretching exercises. 3. Waking exercise 30 minutes/time, 3 times /week. 4. Five-Resistance exercise, 20 minutes /times, 2 times/week. 5. Cool down 5 minutes with 4 stretching exercises. 6. The first time of week, the participants exercised mix walking and resistance exercises	1. The exercise for prevention recurrent stroke program booklet 2. Self-monitoring form

Week/ place	Time/ Person involved in activities	Objectives	Activities	Instruments
	Participations and caregiver		in 60 minutes, the second time of week they performed only resistance exercise in 30 minutes, and the third time of week exercised mix walking and resistance exercises in 60 minutes. 7. The participants were record exercise data in self-monitoring form for first ischemic stroke and send exercise picture at line application one time per week.	
Week 12th / home	20 minutes/ week Participations	1. To improve adherence to interventions.	1. The researcher contact participants via telephone. 3. The researcher asks them about problems to change behaviors in each week and discussion. 4. Offer the participants to ask their question and choose appropriate approach to improve behaviors by themselves. 5. Offer the participants to contact the researcher by telephone if they faced some problems that could not be solved by themselves (during the program period).	1. Self-monitoring form 2. Telephone
	1. Walking exercise 3 times/ week, 40-minute/ time. 2. Resistance exercise 2 times/ week, 20-minute/ time. Participations and caregiver	1. To perform 12-weeks exercise.	1. The participants measured blood pressure before start exercise. 2. Warm-up 5 minutes with four stretching exercises. 3. Waking exercise 30 minutes/time, 3 times /week. 4. Five-Resistance exercise, 20 minutes /times, 2 times/week. 5. Cool down 5 minutes with 4 stretching exercises. 6. The first time of week, the participants exercised mix walking and resistance exercises in 60 minutes, the second time	1. The exercise for prevention recurrent stroke program booklet 2. Self-monitoring form

Week/ place	Time/ Person involved in activities	Objectives	Activities	Instruments
			of week they performed only resistance exercise in 30 minutes, and the third time of week exercised mix walking and resistance exercises in 60 minutes. 7. The participants were record exercise data in self-monitoring form for first ischemic stroke and send exercise picture at line application one time per week.	

Usual care for the control group

The steps of usual care as the participants in the control group were received for 12 weeks as followed.

1. The participants in the control group. The researcher was asked to respond to demographic, clinical, and first ischemic stroke characteristics data.

2. The research assistant measured blood pressure. Staff in laboratory collected blood exam for low density lipoprotein cholesterol and fasting plasma glucose. Blinding between the participants and the research assistant that collected the data used for controlling confounding factors, decrease bias, and increase validity of the outcome.

3. The participants received general and briefly information covered vascular risk and lifestyle modification in discharge plan from nurses in stroke unit. Health care providers provided medication and took blood exam at neurological outpatient clinic in follow-up.

4. The researcher made appoints with the participants at week4, week 8, and week12 to measured blood pressure, collected blood exam for low density lipoprotein cholesterol and fasting plasma glucose.

5. The participants were measured blood pressure by the research assistants and were collected blood exam for low density lipoprotein cholesterol and fasting plasma glucose by staff in laboratory at week 4th, week 8th, and week 12th.

2.6 Validity check of the intervention

The intervention of this study was the recurrent stroke prevention program. The effect of the program was checked by the self-monitoring form. This form covered health behaviors about eating, physical activity and exercise, smoking, and intake medication. The self-monitoring was a way to encourage the participants to follow the intervention program. The participants monitored daily eating diet and sodium intake, exercise, daily smoking, and medication adherence (Appendix A13).

This form was validated for content by 5 experts. There was physician who is an expert in ischemic stroke, a nurse instructor who is an expert in ischemic stroke and behavior change, a physical therapist who is an expert in ischemic stroke and had experienced in stroke's rehabilitation, a nutritionist who is an expert in diet for ischemic stroke patients, and an advanced practice nurse (APN) who is an expert in nursing care in stroke patients. The comments and suggestions from the experts were add recording example in each self-monitoring and research should be change from describing to check list in self-monitoring. Then the researcher tried it out with five first ischemic stroke patients and corrected it to make it suitable for the participants in this study.

2.7 Validity check result

The self-monitoring form was used to record health behaviors after received the recurrent program. The recurrent stroke prevention program gained knowledge, skills, and positive attitude of patients. This led patients to perform eating diet and sodium intake, exercise, smoking, and medication adherence for 12 weeks intervention. The result showed that all participants in the experimental group performed to exercise, eating healthy diet, and medication adherence. Fifteen from seventeen participants who currently smoked, stated that they were quitted smoke because they did not want to face the recurrent stroke. Two participants stated that it was difficult to quitted smoke, but he reduced smoking. Participants stated that their family was the important motivators to change their behaviors.

Table 3.2 Number of participants performed behaviors for 12 weeks (n=30)

Week Behavior	1	2	3	4	5	6	7	8	9	10	11	12
Exercise follow program	30	30	30	30	30	30	30	30	30	30	30	30
Eating healthy diet (performed >80%)	30	30	30	30	30	30	30	30	30	30	30	30
Restricted salt intake (performed >80%)	30	30	30	30	30	30	30	30	30	30	30	30
Quit smoking	30	30	30	30	29*	29	28**	28	28	28	28	28
Medication adherence	30	30	30	30	30	30	30	30	30	30	30	30

* One participant came back to work, and friend invited to smoke.

** One participant smoked when he worked at night at farm.

Human rights protection of research participants

Prior to data collection, the proposal for the study and instruments were approved by the Research Ethics Committee of Human Subjects of Chulalongkorn University COA No.046/2021 (Appendix A). The researcher asked for permission and approval for the proposal and instruments from Research Ethics Committee of Human Subjects of Buddhachinaraj Hospital, Phitsanulok province No.027/64 (Appendix A). Data were collected between May 2021 to October 2021. The researcher provided a full explanation and written description including objectives, procedure, subject's participation, potential risk, benefits, and the protection of confidentiality to the first ischemic stroke patients who met the inclusion criteria before recruiting them to the study (Appendix B). All participants were informed of their rights participate, and to withdraw from the study at any time. If they refused to participate the study, their treatments were not affected. They had an opportunity to ask questions about the study before signing the consent form. Written consent was obtained from each participant prior data collection (Appendix E).

The participants in control group received a complete explanation and written description of the study and the protection of confidentiality and anonymity. The researcher informed the control group that they were provided with the usual nursing care by health care providers. After completion of the final data collection, the researcher provided them with the necessary recurrent stroke prevention knowledge, offered them the opportunity to ask questions, and/or gave them the manuals for first ischemic stroke patients.

The researcher concerned about collecting data in the time of Covid -19 pandemic. The researcher was aware to protect participants and their family members

by following announcement of Phitsanulok Provincial Public Health office and taking D-M-H-T-T precautions to prevent the spread of covid-19. D-M-H-T-T consists of social distancing, mask wearing, handwashing, temperature check, and Thai-chana application. In addition, the researcher received completed 2 vaccine covid -19 in the first month of collecting data. The researcher tested ATK 2-3 days before contact participants. During collecting data, no participants and their family members reported positive case covid-19.

Data analysis

The data were analyzed using the Statistical Package for the Social Science (SPSS) version 22.0 for windows (University license). Data were analyzed to answer the research questions.

1. The demographic data, clinical laboratory, and stroke characteristics of participants were analyzed by frequency, percentage, minimum, maximum, range, median, mean, and standard deviation.

2. Chi-square test was used to test the differences between the experimental and control groups in gender, age, marital status, education level, occupation, monthly income, smoking, alcohol consumption, cooking food, co-morbidity related ischemic stroke, medication taking, time from first ischemic stroke onset, location of lesion, and Barthel index score.

3. Fisher's exact test was used to test the differences between the experimental and control groups in exercise, co-morbidity, forget to take medicine, NIHSS-T.

4. Testing assumptions of the repeated measure MANOVA, the researcher should select statistical to test assumption as follows:

4.1 Skewness and kurtosis were used to test the normal distribution.

4.2 Scatter plot was used to test linearity.

4.2 Mahalanobis was used to test multivariate outlier.

4.3 Pearson correlations was used to test multicollinearity.

4.4 Box's M test was used to test homogeneity of variance.

4.5 Levene's Test was used to test the equality of error variances.

5. Repeated measure MANOVA was used to test multivariate analysis of variance between group in difference points of time.

CHAPTER IV
RESULTS

This chapter presents the results of the study. This is a cluster control trial with repeated measure study aimed to explore the effect of a recurrent stroke prevention program on blood pressure, low density lipoprotein cholesterol, and blood glucose among patients with first ischemic stroke. The sample composed of 60 patients with first ischemic stroke recruited by using a systematic sampling technique. For the experimental group, 30 patients received usual care and the recurrent stroke prevention program. The findings of this study are presented in these following topics:

1. Demographic characteristics of the study participants
2. Clinical characteristics of the study participants
3. Stroke characteristics of the study participants
4. Descriptive data of blood pressure, low density lipoprotein cholesterol, and blood glucose
5. The different of blood pressure, low density lipoprotein cholesterol, and blood glucose between the experimental group and control group
6. The different of blood pressure, low density lipoprotein cholesterol, and blood glucose within the experimental group

1. Demographic characteristics of the study participants

Table 4.1 demonstrates the demographic characteristics of the experimental and control groups. It was found that the mean age of the participants was 60.70 years (SD=6.53), ranged from 48 to 70 years. Most of the participants were male (93.30%), married (86.70%), completed primary school (63.30%). Thirty percent of them were

employee and 30% were retired or not working. The median of monthly income was 4,000 Thai Baht, ranged from 600 to 20,000 Thai Baht (1 US dollar = 31.50 Thai Baht). The mean weight of the participants was 66.53 (SD=8.33) and the mean height of the participants was 164.50 (SD=4.09).

In the control group, the mean age of the participants was 62.93 years old (SD=5.18), ranged from 52 to71 years old. Majority of them were male (86.7 %), married (83.30%), completed primary school (73.30%), and retired or not working (40%). The median of monthly income was 3,000 Thai Baht, ranged from 600 to 20,000 Thai Baht (1 US dollar = 31.50 Thai Baht). The mean weight of the participants was 63.13 (SD=9.84) and the mean height of the participants was 165.00 (SD=3.68).

There were no statistically significant differences between the experimental and control groups regarding gender, age, marital status, education level, occupation, monthly income, income sufficiency, weight, and height (Table 4.1).

Table 4.1 Demographic characteristics of the study participants (n=60)

Demographic characteristics	**Experimental Group (n=30)**		**Control group (n=30)**		χ^2	***df***	***p-value***
	n	%	n	%			
Gender					.741[a]	1	.389
Male	28	93.3	26	86.7			
Female	2	6.7	4	13.3			
Age (years)					.544[a]	2	.762
45-59	12	40.00	10	33.30			
60-69	17	56.70	18	60.00			
70-79	1	3.30	2	6.70			
Mean (SD)	60.70 (6.53)		62.93 (5.18)				
Range	48-70		52-71				

Demographic characteristics	Experimental Group (n=30)		Control group (n=30)		χ^2	*df*	*p-value*
	n	%	n	%			
Marital status					2.820[a]	2	.244
Single	3	10.00	1	3.30			
Married	26	86.70	25	83.30			
Divorced/Widow	1	3.30	4	13.30			
Educational level					2.112[a]	3	.550
Primary school	19	63.30	22	73.30			
Secondary school	8	26.70	5	16.70			
Certificate	1	3.30	0	0			
Bachelor	2	6.70	3	10.00			
Occupation					4.762[a]	4	.313
Farmer	4	13.30	8	26.70			
Merchant	6	20.00	4	13.30			
Employee	9	30.00	6	20.00			
Government officer	2	6.70	0	0			
Retired/No career	9	30.00	12	40.00			
Monthly income (Thai Baht)					8.016[a]	5	.155
500-1,500	3	10.00	8	26.70			
1,501-3,000	11	36.70	12	40.00			
3,001-5,000	6	20.00	6	20.00			
5,001-10,000	7	23.30	1	3.30			
10,001-15,000	0	0	1	3.30			
15,001-30,000	3	10.00	2	6.70			
Median	4,000		3,000				
Range	600-20,000		600-20,000				

Demographic characteristics	Experimental Group (n=30)		Control group (n=30)		χ^2	*df*	*p-value*
	n	%	n	%			
Weight (Kg)					20.810[a]	22	.533
Mean (SD)	66.53 (8.33)		65.13 (9.84)				
Range	45-85		45-85				
Height (cm)					17.095[a]	13	.195
Mean (SD)	164.50 (4.09)		165.00 (3.68)				
Range	155-170		158-170				

a =Pearson Chi-Square, b =Fisher's Exact Test

2. Clinical characteristics of the study participants

Table 4.2 shows that clinical characteristics of the study participants. It can be seen that more than half of the participants in the experimental group reported that they currently smoked (56.00%) and consumed alcohol (56.00%). Almost all the participants did not do exercise (96.70%) and family members cooked foods for the participants (86.70%). Concerning co-morbidity, many of them were diagnosed with hypertension (73.30%). All participants (100%) were prescribed using antiplatelet and anti-hyperlipidemic medications. Almost all (90%) were adhered to medication taking.

Nearly half of the participants in the control group were currently smoked and consumed alcohol (40.00%). Almost all the participants reported that they did not do exercise (93.30%). Foods were prepared by family members (76.70%). Concerning co-morbidity, many of them were diagnosed with hypertensive (86.70%). All the participants (100%) were prescribed using antiplatelet and anti-hyperlipidemic medication. Many of them (80%) were adhered to medication taking.

There were no statistically significant differences between the experimental and control groups in term of smoking status, alcohol consumption, co-morbidity, and medication taking.

Table 4.2 Clinical characteristics of participants (n=60)

Clinical characteristics	**Experimental Group (n=30)**		**Control group (n=30)**		χ^2	***df***	***p-value***
	n	%	n	%			
Smoking					2.510[a]	2	.285
Never smoked	3	10.00	7	23.3			
Smoked in the past	10	33.30	11	36.70			
Currently smoked	17	56.70	12	40.00			
Alcohol consumption					4.510[a]	2	.105
Never consumed	2	6.70	8	26.70			
Consumed in the past	11	36.70	10	33.30			
Currently consumed	17	56.70	12	40.00			
Exercise					.351[b]	1	.554
No exercise	29	96.70	28	93.30			
Exercise	1	3.30	2	6.70			
Cooking					1.184[a]	2	.553
By participants	3	10.00	6	20.00			
By family members	26	86.70	23	76.70			
Buy food from outside	1	3.30	1	3.30			
Co-morbidity							
Hypertension					1.667[b]	1	.197
Yes	22	73.30	26	86.70			
No	8	26.70	4	13.30			
Hyperlipidemia					2.500[b]	1	.114
Yes	15	50.00	21	70.00			
No	15	50.00	9	30.00			

Clinical characteristics	Experimental Group (n=30)		Control group (n=30)		χ^2	*df*	*p-value*
	n	%	n	%			
Diabetic mellitus					.089[b]	1	.766
Yes	8	26.70	7	23.30			
No	22	73.30	23	76.70			
Heart disease					.000[b]	1	1.00
Yes	1	3.30	1	3.30			
No	29	96.70	29	96.70			
Gout					.000[b]	1	1.00
Yes	1	3.30	1	3.30			
No	29	96.70	29	96.70			
BPH					1.017[b]	1	.313
Yes	1	3.30	0	0			
No	29	96.70	30	100			
Co-morbidity related ischemic stroke					3.524[a]	5	.620
No	9	30.00	4	13.30			
HT	4	13.30	4	13.30			
HT and DLP	8	26.70	13	43.30			
HT and DM	2	6.70	1	3.30			
HT, DLP, and DM	6	20.00	7	23.30			
HT, DLP, and HD	1	3.30	1	3.30			
Medication taking					8.660[a]	5	.123
Antiplatelet drug	30	100.00	30	100.00			
Antihypertensive drug	20	66.70	26	86.70			
Antihyperlipidemic drug	30	100	30	100			
Diabetic drug	8	26.70	7	23.30			
Anti-hypouricemic drugs	1	3.30	1	3.30			

Clinical characteristics	Experimental Group (n=30)		Control group (n=30)		χ^2	*df*	*p-value*
	n	%	n	%			
Alpha adrenergic blocker	1	3.30	1	3.30			
Forget to take medicine					1.176[b]	1	.278
No	27	90.00	24	80.00			
Yes	3	10.00	6	20.00			

Abbreviations: HT=hypertension, DLP=dyslipidemia, DM=diabetes mellitus, BPH= benign prostate hyperplasia, HD=heart disease, a =Pearson Chi-Square, b =Fisher's Exact Test

3. Stroke characteristics of the study participants

Table 4.3 illustrates that stroke characteristics of the study participants. It was found that more than half of the study participants (53.30%) in the experimental group reported that the duration time from first ischemic stroke onset to participating in the intervention was 3-7 days (Mean =4.57, SD=1.04). For the location of lesion, lacunar infarction was mostly investigated in this group (66.70%). All participants (100%) were categorized as having a minor stroke. Stroke severity was assessed using the National Institute of Health Stroke Scale-Thai version (NIHSS-T) and found that the mean score was 1.27 (SD=0.45). The capability of the participants to perform activity of daily life was assessed using the Barthel index (BI) and found that the mean score was 97.33 (SD=3.88), ranged from 96 to 100. The Modified Rankin Scale (mRS) found that the mean score was 1.10 (SD=.31). Although the mean score of depression was 4.333 (SD=2.14), but all of them (100%) had no major depression.

Less than half of the study participants (43.30%) in the control group reported that the times from first ischemic stroke onset to participate in the study were 3-7 days

(mean = 4.70, SD=1.42). For the location of lesion, lacunar infarction was mostly investigated in this group (76.70%). All participants (100%) were categorized as having minor stroke. Stroke severity was assessed using the NIHSS-T and found that the mean score was 1.33 (SD=0.48). The capability of the participants to perform activity of daily life was assessed using the BI and found that the mean score was 96.33 (SD=4.34), ranged from 96-100. The Modified Rankin Scale (mRS) found that the mean score was 1.17 (SD=.38). Even though the mean score of depression was 4.53 (SD=2.02), but all of them (100%) had no major depression.

There was no significant difference between the experimental and control groups in term of first ischemic stroke characteristics of participants location of lesion, severity of stroke, capability of the participants to perform activity of daily life, and depression.

Table 4.3 Stroke characteristics of the study participants (N=60)

Stroke characteristics	**Experimental Group (n=30)**		**Control group (n=30)**		χ^2	*df*	*p-value*
	n	%	n	%			
Time from first ischemic stroke onset (days)					2.093	2	.351
3-4	16	53.30	11	36.70			
5-6	11	36.70	13	43.30			
≥7	3	10.00	6	20.00			
Mean (SD)	4.57 (1.04)		4.70 (1.42)				
Location of lesion					6.543	7	.478
Lacunar infarction	20	66.70	23	76.70			
Cerebral infarction	3	10.00	2	6.70			
MCA infarction	2	6.70	1	3.30			
Parietal infarction	1	3.30	0	0			

Stroke characteristics	Experimental Group (n=30)		Control group (n=30)		χ^2	*df*	*p-value*
	n	%	n	%			
Basal ganglion infarction	4	13.30	1	3.30			
Cerebellar infarction	0	0	1	3.30			
Frontal infarction	0	0	1	3.30			
PCA infarction	0	0	1	3.30			
NIHSS-T					.317	1	.573
Score 1	22	73.30	20	66.70			
Score 2	8	26.70	10	33.30			
Mean (SD)	1.27 (.45)		1.33 (.48)				
BI score					6.043	3	.110
≤85	0	0.00	2	6.70			
86-90	5	16.70	2	6.70			
91-95	6	20.00	12	40.00			
96-100	19	63.30	14	46.70			
Mean (SD)	97.33 (3.88)		96.33(4.34)				
mRS					.577	1	.448
Score 1	27	90.00	25	83.33			
Score 2	3	10.00	5	16.67			
Mean (SD)	1.10 (.31)		1.17 (.38)				
PHQ-9 score					7.50	4	.112
Mean (SD)	4.33 (2.14)		4.53 (2.02)				
Range	2-8		2-8				

Abbreviations: N = number of participants, NIHSS-T = the National Institute of Health Stroke Scale-Thai version, BI = Barthel index, PHQ-9 = Patient Health Questionnaire, mRS = The Modified Rankin Scale

4. Descriptive data of the dependent variables

Systolic blood pressure

Table 4.4 and Figure 4.1 illustrate the systolic blood pressure of the participants between the experimental and control groups repeating measurement for four times. For the experimental group, it was found that the mean score of systolic blood pressure was decreased from baseline, week 4, week 8, to week 12, respectively. The mean score of systolic blood pressure was changed from hypertension level 1 at baseline (Mean=142.87, SD=10.57) to prehypertension level at week 8 (Mean=135.97, SD=9.56) and week 12 (Mean=131.90., SD=8.59) respectively.

For the control group, it found that the mean score of systolic blood pressure was slightly decreased at week 8 (Mean = 144.10 (SD=10.57) to week 12 (Mean = 142.93 (SD=7.76). During four period of times, mean scores of systolic blood pressure were interpreted as the participants in this group had hypertension level 1.

Table 4.4 Systolic blood pressure (N=60)

SBP	Min (mmHg)	Max (mmHg)	Mean	SD	Level
Experimental group					
SBP baseline	121.00	157.00	142.87	10.57	HT level 1
SBP week4	122.00	159.00	141.33	11.31	HT level 1
SBP week8	120.00	150.00	135.97	9.56	Pre-HT
SBP week12	117.00	145.00	131.90	8.59	Pre-HT
Control group					
SBP baseline	125.00	158.00	141.90	9.98	HT level 1
SBP week4	118.00	168.00	141.40	11.46	HT level 1
SBP week8	125.00	160.00	144.10	8.83	HT level 1

SBP	Min (mmHg)	Max (mmHg)	Mean	SD	Level
SBP week12	130.00	158.00	142.93	7.76	HT level 1

Abbreviations: SBP = Systolic blood pressure HT = Hypertension,

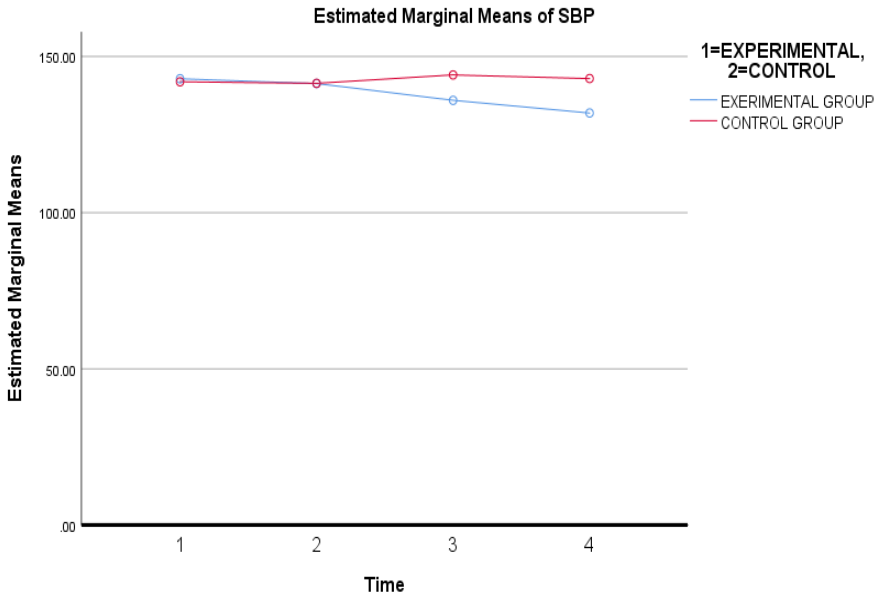

Figure 4.1 Mean of SBP repeated measuring for four times

Diastolic blood pressure

Table 4.5 and Figure 4.2 present the diastolic blood pressure of the participants between the experimental and control groups repeating measurement for four period of times. For the experimental group, mean score of their diastolic blood pressure was slightly decreased from baseline, week 4, week 8, to week 12, respectively. The mean score of diastolic blood pressure were changed from hypertension level 1 at baseline (Mean=89.67, SD=7.16) to prehypertension level at week 8 (Mean=84.60, SD=5.47), and week 12 (Mean=80.53., SD=5.69). For the control group, mean score of their diastolic blood pressure was slightly increased from baseline, week 4, week 8, to week 12, respectively.

Table 4.5 Diastolic blood pressure (N=60)

DBP	Min (mmHg)	Max (mmHg)	Mean	SD	Level
Experimental group					
DBP baseline	74.00	104.00	89.67	7.16	HT level 1
DBP week4	72.00	103.00	88.27	7.41	HT level 1
DBP week8	76.00	95.00	84.60	5.47	Pre-HT
DBP week12	74.00	94.00	80.53	5.69	Pre-HT
Control group					
DBP baseline	75.00	104.00	87.93	7.18	HT level 1
DBP week4	73.00	106.00	88.73	7.63	HT level 1
DBP week8	72.00	100.00	89.53	6.09	HT level 1
DBP week12	78.00	97.00	89.43	5.20	HT level 1

Abbreviations: DBP = Diastolic blood pressure HT = Hypertension,

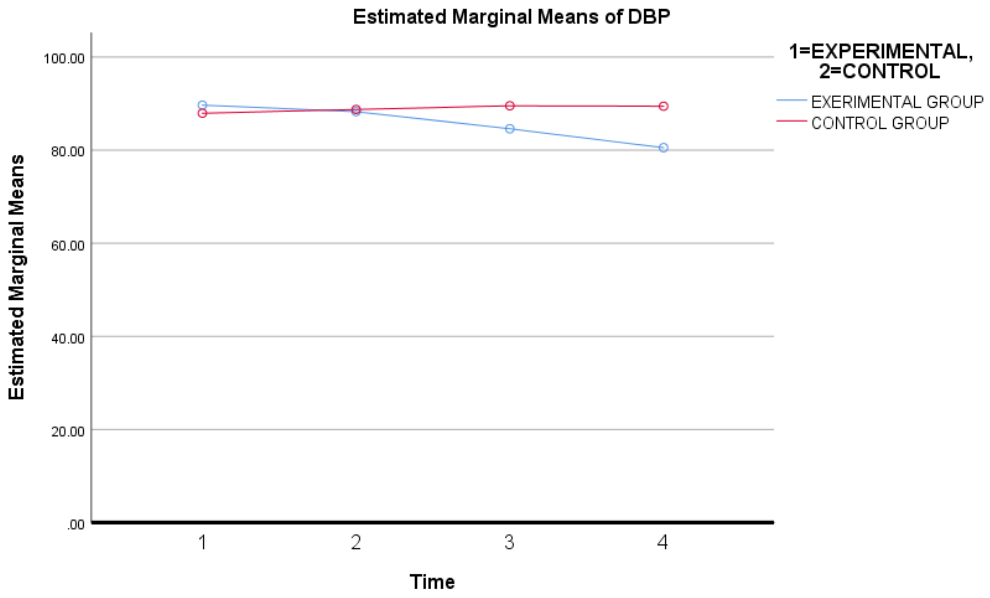

Figure 4.2 Mean score of DBP repeated measuring for four times

Low-density lipoprotein cholesterol

For the experimental group, the mean score of low-density lipoproteins (LDL) cholesterol was decreased from the baseline, week 4, week 8, to week 12, respectively. The mean score of LDL cholesterol were changed from above optimal level at baseline (Mean=112.07, SD=14.19), to optimal level at week 8 (Mean=96.17., SD=11.60) and week 12 (Mean=90.03., SD=10.78). For the control group, the mean score of LDL cholesterol was also slightly decreased from the baseline, week 4, week 8, to week 12, respectively. The levels of LDL cholesterol were categorized as above optimal level at baseline, week 8, and week 12. There was only in week 4 that the level of LDL cholesterol was categorized as optimal level. More details are shown in Table 4.6 and Figure 4.3

Table 4.6 Low-density lipoprotein (LDL) cholesterol (N=60)

	Min (mg/dl)	**Max (mg/dl)**	**Mean**	**SD**	**Level**
Experimental group					
LDL baseline	88.00	138.00	112.07	14.19	Above optimal
LDL week4	71.00	125.00	104.60	13.43	Above optimal
LDL week8	75.00	118.00	96.17	11.60	Optimal
LDL week12	73.00	114.00	90.03	10.78	Optimal
Control group					
LDL baseline	78.00	133.00	103.57	17.07	Above optimal
LDL week4	71.00	138.00	99.03	15.16	Optimal
LDL week8	72.00	138.00	100.47	16.57	Above optimal
LDL week12	80.00	126.00	103.73	13.62	Above optimal

Abbreviations: LDL = Low Density Lipoprotein cholesterol

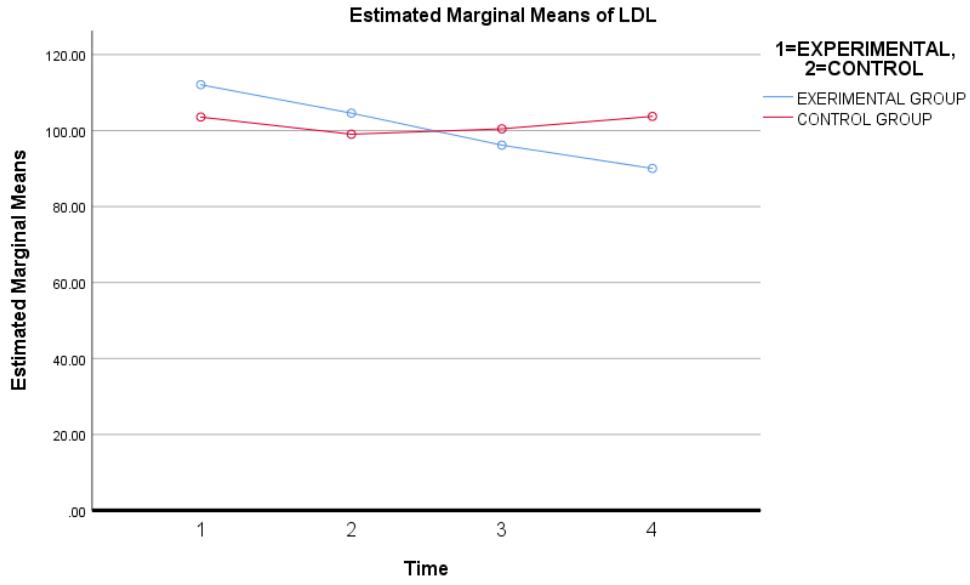

Figure 4.3 Mean score of LDL cholesterol repeated measuring for four times

Fasting plasma glucose

Table 4.7 and Figure 4.4 demonstrate the level of fasting plasma glucose (FPG) among experimental and control groups assessing in four period of times. In experimental group, the mean score of FPG was increased from baseline, week 4, week 8, to week 12, respectively. The mean score of FPG was changed from category of early diabetic level at baseline (Mean=108.50, SD=13.77) to normal level at week 12 (Mean=89.27., SD=9.15). For the control group, the mean score of FPG was slightly increased from 104.53 (SD=12.65) at week 8 to 109.50 (SD=10.43) at week 12.

Table 4.7 Fasting plasma glucose (FPG) (N=60)

	Min (mg/dl)	Max (mg/dl)	Mean	SD	Level
Experimental group					
FPG baseline	86.00	129.00	108.50	13.77	Early diabetic
FPG week4	78.00	125.00	103.90	13.36	Early diabetic
FPG week8	75.00	118.00	94.93	11.77	Early diabetic
FPG week12	71.00	114.00	89.27	9.15	Normal
Control group					
FPG baseline	85.00	126.00	103.90	12.07	Early diabetic
FPG week4	80.00	137.00	104.43	14.60	Early diabetic
FPG week8	84.00	131.00	104.53	12.65	Early diabetic
FPG week12	84.00	128.00	109.50	10.43	Early diabetic

Abbreviations: FPG = Fasting Plasma Glucose

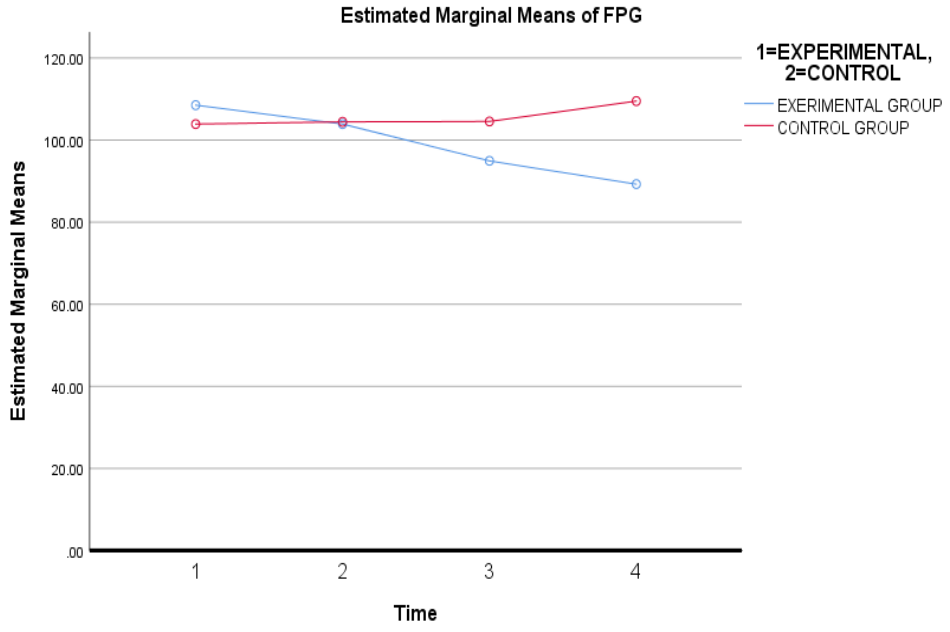

Figure 4.4 Mean of FPG repeated measuring for four times

5. The different of blood pressure, low-density lipoprotein cholesterol, and blood glucose between the experimental group and control group

The results of multivariate test showed that mean of systolic blood pressure, diastolic blood pressure, low-density lipoprotein cholesterol, and fasting plasma glucose between experimental and control group were statistically significant in difference points of time (F (4, 55) = 2.563, p = .048). See Table 4.8. The mean systolic blood pressure, diastolic blood pressure, low-density lipoprotein cholesterol, and fasting plasma glucose were statistically significant differences in difference points of time (F (12, 47) = 10.686, p = .000). The mean systolic blood pressure, diastolic blood pressure, low-density lipoprotein cholesterol, and fasting plasma glucose were statistically significant differences in difference points of time interaction with group (F (12, 47) = 21.698, p = .000). See Table 4.8

Table 4.8 The multivariate test of dependent variables

Effect		**Value (Pillai's Trace)**	**F**	**Hypothesis df**	**Error df**	**Sig.**	**Partial Eta Squared**
Between Subjects	Intercept	.997	4645.685[b]	4.000	55.000	.000	.997
	GROUP	.157	2.563[b]	4.000	55.000	.048	.157
Within Subjects	Time	.732	10.686[b]	12.000	47.000	.000	.732
	Time * GROUP	.847	21.698[b]	12.000	47.000	.000	.847

a. Design: Intercept + GROUP
Within Subjects Design: Time
b. Exact statistic
c. Computed using alpha = .05

Table 4.9 shows that the results of the interaction effect between times and group had a statistically significant (p = .000) when systolic blood pressure, diastolic blood pressure, fasting plasma glucose, and low-density lipoprotein cholesterol

changed in over four points of time. Thus, the effects of time changed mean of systolic blood pressure, diastolic blood pressure, fasting plasma glucose, and low-density lipoprotein cholesterol at least one pair in experimental and control group. Next step, therefore, the analysis of mean different of each pair in each group by using Post Hoc tests comparisons was needed.

Table 4.9 Univariate tests for mean difference of systolic blood pressure (SBP), diastolic blood pressure (DBP), fasting plasma glucose (FPG), and cholesterol low density lipoprotein (LDL) cholesterol over repeated measure four points of time

Source		Measure	Type III Sum of Squares	df	Mean Square	F	Sig.
Time	SBP	Sphericity Assumed	831.767	3	277.256	10.546	.000
		Greenhouse-Geisser	831.767	2.622	317.280	10.546	.000
		Huynh-Feldt	831.767	2.804	296.613	10.546	.000
		Lower-bound	831.767	1.000	831.767	10.546	.002
	DBP	Sphericity Assumed	546.346	3	182.115	13.673	.000
		Greenhouse-Geisser	546.346	2.672	204.478	13.673	.000
		Huynh-Feldt	546.346	2.861	190.938	13.673	.000
		Lower-bound	546.346	1.000	546.346	13.673	.000
	FPG	Sphericity Assumed	2026.146	3	675.382	19.495	.000
		Greenhouse-Geisser	2026.146	2.426	835.243	19.495	.000
		Huynh-Feldt	2026.146	2.583	784.411	19.495	.000
		Lower-bound	2026.146	1.000	2026.146	19.495	.000
	LDL	Sphericity Assumed	4266.450	3	1422.150	37.170	.000
		Greenhouse-Geisser	4266.450	2.146	1988.052	37.170	.000
		Huynh-Feldt	4266.450	2.270	1879.876	37.170	.000
		Lower-bound	4266.450	1.000	4266.450	37.170	.000
Time * GROUP	SBP	Sphericity Assumed	1581.100	3	527.033	20.046	.000
		Greenhouse-Geisser	1581.100	2.622	603.116	20.046	.000
		Huynh-Feldt	1581.100	2.804	563.829	20.046	.000

Source		Measure	Type III Sum of Squares	df	Mean Square	F	Sig.
		Lower-bound	1581.100	1.000	1581.100	20.046	.000
	DBP	Sphericity Assumed	1009.346	3	336.449	25.260	.000
		Greenhouse-Geisser	1009.346	2.672	377.763	25.260	.000
		Huynh-Feldt	1009.346	2.861	352.749	25.260	.000
		Lower-bound	1009.346	1.000	1009.346	25.260	.000
	FPG	Sphericity Assumed	5355.179	3	1785.060	51.527	.000
		Greenhouse-Geisser	5355.179	2.426	2207.578	51.527	.000
		Huynh-Feldt	5355.179	2.583	2073.227	51.527	.000
		Lower-bound	5355.179	1.000	5355.179	51.527	.000
	LDL	Sphericity Assumed	4583.250	3	1527.750	39.930	.000
		Greenhouse-Geisser	4583.250	2.146	2135.673	39.930	.000
		Huynh-Feldt	4583.250	2.270	2019.463	39.930	.000
		Lower-bound	4583.250	1.000	4583.250	39.930	.000
Error (Time)	SBP	Sphericity Assumed	4574.633	174	26.291		
		Greenhouse-Geisser	4574.633	152.050	30.086		
		Huynh-Feldt	4574.633	162.645	28.127		
		Lower-bound	4574.633	58.000	78.873		
	DBP	Sphericity Assumed	2317.558	174	13.319		
		Greenhouse-Geisser	2317.558	154.970	14.955		
		Huynh-Feldt	2317.558	165.960	13.965		
		Lower-bound	2317.558	58.000	39.958		
	FPG	Sphericity Assumed	6027.925	174	34.643		
		Greenhouse-Geisser	6027.925	140.697	42.843		
		Huynh-Feldt	6027.925	149.815	40.236		
		Lower-bound	6027.925	58.000	103.930		
	LDL	Sphericity Assumed	6657.300	174	38.260		
		Greenhouse-Geisser	6657.300	124.471	53.485		
		Huynh-Feldt	6657.300	131.633	50.575		
		Lower-bound	6657.300	58.000	114.781		

6. The different of blood pressure, low-density lipoprotein cholesterol, and blood glucose within the experimental group

A comparison of systolic blood pressure from the first to the last points of time of the experimental group gave the following results: mean score of systolic blood pressure at baseline was higher than week 4, week 8 and week 12, respectively. Systolic blood pressure was statistically decreased over time comparing between baseline, week 8, and week 12 (p = .001, p = .001 p = .001, respectively). The most difference was found in week 12 compared to baseline. Considering the mean difference in each pair over time, the systolic blood pressure was started to decrease statistically significant at week 8 (p = .001). The level of systolic blood pressure tended to decrease tendency from week 8 to week 12. See Table 4.10.

Table 4.10 Pairwise comparison of systolic blood pressure of experimental group across four points of time

Times to measure	**Mean**	**Baseline**	**Week 4**	**Week8**	**Week12**
Baseline	142.867				
Week 4	141.333	1.533			
Week 8	135.967	6.900*	5.367*		
Week 12	131.900	10.967*	9.433*	4.067*	

A comparison of diastolic blood pressure from the first to the last points of time of the experimental group gave the following results: mean score of diastolic blood pressure at baseline was higher than week 4, week 8 and week 12, respectively. Diastolic blood pressure was statistically decreased over time comparing between baseline, week 8, and week 12 (p = .001, p = .001 p = .001, respectively). The most difference was found in week 12 compared to baseline. Considering the mean difference

in each pair over time, the diastolic blood pressure was started to decrease statistically significant at week 8 (p = .001). The level of diastolic blood pressure tended to decrease tendency from week 8 to week 12. In addition, week 12 was significantly lower than week 4 and week 8, and week 8 was significantly lower than week 12. See Table 4.11.

Table 4.11 Pairwise comparison of diastolic blood pressure of experimental group across four points of time

Times to measure	Mean	Baseline	Week 4	Week8	Week12
Baseline	89.667				
Week 4	88.267	1.400			
Week 8	84.600	5.067*	3.667*		
Week 12	80.533	9.133*	7.733*	4.067*	

A comparison of LDL cholesterol from the first to the last points of time of the experimental group gave the following results: mean score of LDL cholesterol at baseline was higher than week 4, week 8 and week 12, respectively. LDL cholesterol was statistically decreased over time comparing between baseline, week 4, week 8, and week 12 (p = .001, p = .001, p = .001 p = .001, respectively). The most difference was found in week 12 compared to baseline. Considering the mean difference in each pair over time, the LDL cholesterol was started to decrease statistically significant at week 4 (p = .001). The level of LDL cholesterol tended to decrease tendency from week 4 to week 12. See Table 4.12

Table 4.12 Pairwise comparison of LDL cholesterol of experimental group across four points of time

Times to measure	Mean	Baseline	Week 4	Week8	Week12
Baseline	112.07				
Week 4	104.60	7.467*			
Week 8	96.17	15.900*	8.433*		
Week 12	90.03	22.033*	14.567*	6.133*	

A comparison of fasting plasma glucose from the first to the last points of time of the experimental group gave the following results: mean score of fasting plasma glucose at baseline was higher than week 4, week 8 and week 12, respectively. fasting plasma glucose was statistically decreased over time comparing between baseline, week 4, week 8, and week 12 (p = .001, p = .001, p = .001 p = .001, respectively). The most difference was found in week 12 compared to baseline. Considering the mean difference in each pair over time, the fasting plasma glucose was started to decrease statistically significant at week 8 (p = .001). The level of fasting plasma glucose tended to decrease tendency from week 8 to week 12. See Table 4.13

Table 4.13 Pairwise comparison of fasting plasma glucose of experimental group across four points of time

Times to measure	Mean	Baseline	Week 4	Week8	Week12
Baseline	108.500				
Week 4	103.900	4.600*			
Week 8	94.933	13.567*	8.967*		
Week 12	89.267	19.233*	14.633*	5.667*	

For more details of data analysis of repeated-measure MANOVA in between group, within group among blood pressure, low density lipoprotein cholesterol, and blood glucose, see APPENDIX G2-3.

CHAPTER V
DISCUSSION

This chapter presents the summary of the study, the effects of a recurrent stroke prevention program on blood pressure, low-density lipoprotein cholesterol, and blood glucose among patients with first ischemic stroke. The discussion of research finding reflects on the characteristics of the participants, the hypothesis testing, conclusion, the limitations of the study, implications for nursing, and the recommendations for further study.

Summary of the study

This study aimed to explore the effects of a recurrent stroke prevention program on blood pressure, low-density lipoprotein cholesterol, and blood glucose among patients with first ischemic stroke. There were two specific aims of study including 1) to compare the different of blood pressure, low-density lipoprotein cholesterol, and blood glucose between the experimental group and the control group, and 2) to compare the different of blood pressure, low-density lipoprotein cholesterol, and blood glucose within the experimental group.

The results of this study revealed that the combined mean scores of systolic blood pressure, diastolic blood pressure, low density lipoprotein cholesterol, and blood glucose of experimental group after receiving the recurrent stroke prevention program were significantly different from the control group at .05 level in four different points of time. In addition, the mean scores of systolic blood pressure, diastolic blood pressure, and blood glucose of experimental groups were statistically decreased over time at .01 level in week 4, week 8, and week 12. Regarding the results of this study, it can be discussed based on the objectives of the study as following details.

Discussion

Objective 1: To compare the different of blood pressure, low-density lipoprotein cholesterol, and blood glucose between the experimental group and the control group

The results of multivariate test showed that mean of systolic blood pressure, diastolic blood pressure, low-density lipoprotein cholesterol, and fasting plasma glucose between experimental and control group were statistically significant in difference in points of time ($F (4, 55) = 2.563$, $p = .048$). The mean of systolic blood pressure, diastolic blood pressure, low-density lipoprotein cholesterol, and fasting plasma glucose were statistically significant differences in difference points of time interaction with group ($F (12, 47) = 21.698$, $p = .000$). These indicate that the combined mean scores of systolic blood pressure, diastolic blood pressure, low density lipoprotein cholesterol, and blood glucose of experimental group after receiving the recurrent stroke prevention program were significantly different from the control group at .05 level in four different points of time.

This appears to reflect the nature of patients with first ischemic stroke that have been experiencing unstable among levels of blood pressure, low-density lipoprotein cholesterol, and fasting plasma glucose in different point of times. Similarly, previous study conducted by Elnady, Mohammed, Elhewag, Mohamed, & Borai (2020) found that the patients with ischemic stroke had unpredictable health conditions especially the levels of blood pressure and low-density lipoprotein cholesterol. Thus, healthcare providers should re-check these two factors regularly to prevent recurrent stroke.

To be able to manage the recurrent stroke, the participants who attended the recurrent stroke prevention program had better results regarding levels of systolic blood pressure,

diastolic blood pressure, low-density lipoprotein cholesterol, and fasting plasma glucose compared to the one who did not participate this program. This may be due to the fact that the components remained in this program including the educational session about the stroke, 12-week exercise performing, telephone monitoring assist these participants to be able to manage their behaviors. This finding is in consistent with the previous study that patients with ischemic stroke had better levels of blood pressure and low-density lipoprotein cholesterol from the control group when they had a proper education program. It is possible that these patients can improve their health when they receive the specific knowledge, thus, they can apply it into everyday practice to maintain well-being.

According to the results of the study, it indicated that patients with first ischemic stroke who receiving a recurrent stroke prevention program had lower mean of systolic blood pressure, diastolic blood pressure, low-density lipoprotein cholesterol, and blood glucose than those received the usual care across time. Although low-density lipoprotein cholesterol was not significant, but it had decrease mean low-density lipoprotein cholesterol in each point of times. This indicates that the participants who received the recurrent stroke prevention program had lower blood pressure, low-density lipoprotein cholesterol, and blood glucose than the participant in the control group. The findings in this study support a growing literature that patients with first ischemic stroke who participate in at least one type of stroke prevention program have better health outcomes such as levels of blood pressure, low-density lipoprotein cholesterol or blood sugar (Dregan et al., 2012; Holzemer, Thanavaro, Malmstrom, & Cruz-Flores, 2011; Kono et al., 2013).

This study finding confirms the effectiveness of behavior change which involved the program on blood pressure, low-density lipoprotein cholesterol, and blood glucose in patients after ischemic stroke (Ryan R. Bailey, 2018; Ryan R Bailey, Stevenson, Driver, & McShan, 2020; Lawrence, Kerr, McVey, & Godwin, 2012). The recurrent stroke prevention program involved individual risk behaviors changing for control risk factors for recurrent stroke. According to four sessions education component, the patients gained their knowledge, skill, and attitude that motivate them changing their risk behaviors. Knowledge combined skills acquisition is understood to have a role as a precursor to behavior change, and education has been identified as a source of behavior.

They performed behaviors related knowledge from four education sessions with twelve weeks exercise program. The participants monitored making changes in their behaviors, including reducing consumption sugar, salt, fat, alcohol, exercising more, reducing smoking, and quit smoking. From telephone follow-up, some participants summarized their experience as following “This program has taught me to eat appropriate both type and amount of the food”. It means he misunderstood before participation this program. Some participants stated that they performed walking and resistant exercise regulated because it was easy, and their family member joined and supported during exercise. Fifteen from seventeen participants who currently smoked, stated that they were quitted smoke because they did not want to face the recurrent stroke. Two participants stated that it was difficult to quitted smoke, but he reduced smoking. Participants stated that their family was the important motivators to change their behaviors.

The active aerobic and resistance exercise in 12 weeks may decrease sympathetic nervous system stimuli, decrease catecholamine releasing, and decrease strengthen of blood vessel, this decreases total peripheral resistant that affect to reduce blood pressure. The result of existing study showed that home exercise by walking exercise for 30-60 min at frequency 3 days per week, could reduce systolic blood pressure in ischemic stroke patients (Kono et al., 2013). Similar to the result study of Irewall et al. (2015) showed that 60 minutes of aerobic exercise with resistance exercise, education session covered medication, alcohol, exercise, and diet showed statistically significant to reduce systolic blood pressure in ischemic stroke patients. The lower body resistance training 3 times a week for 8 weeks. Resistance training may play a significant role in improving hyperglycemia and dyslipidemia in 8 weeks (Zou, Wang, Qu, & Wang, 2015). The resistant exercise improves patients' muscle strength, improve balance, improve metabolic profiles, improve blood glucose level and serum lipid profiles. Therefore, resistance exercise may produce significant muscular, metabolic, physiological, and psychological effects for stroke patients (Aidar et al., 2014; Zou et al., 2015). Moreover, resistant exercise improves patients' muscle strength, improve balance, improve metabolic profiles, improve blood glucose level and low-density lipoprotein cholesterol. Quit smoking and avoid second-hand smoke may reduce atrial stiffness and improve endothelial cell function to reduce blood pressure. It decreased inflammation, oxidative stress, decrease to encourages the production of cortisol and decrease blood sugar.

Self-monitoring and sent data to researcher via line application in each week encourage them to follow the program. Each day, the patients recorded exercise prescription (activity selection, duration, intensity, and time), daily smoke and

secondhand smoking, daily eating diet and sodium intake, and medication adherence in self-monitoring form and sent to researcher via application line every week as validity check of this program. All participants in the experimental group performed eating behaviors and restricted salt intake 80% in daily life, no one forgot to take medicine, one hundred percentage were following exercise program, and two participants did not quit smoke. One smoker was invited to smoke from their college at workplace and another one, he smoked when did his job at night.

The participants discussed with the researcher when telephone call, they maintained to performed activities in this program because they did not want to experience the recurrent stroke and need to improve their disease conditions. Barriers and patients' health problems was supported when telephone call.

This study results might reflect a combination effect of the recurrent stroke prevention program. These results showed a significant decrease in salts intake can demonstrated to reduced renal sympathetic nerve activation and arterial stiffness (Guild, McBryde, Malpas, & Barrett, 2012; Sonoda, Takase, Dohi, & Kimura, 2012). Exercise and active physical activities have been demonstrated to grain insulin sensitivity, increase metabolism, and reduce anti-inflammatory and antioxidant effects, and enhances endothelial function (Goto et al., 2003). The active intervention and monitoring of risk factors probably need to maintain risk factors. This emphasizes the need for improved recurrent preventive follow-up to reach the outcomes (Irewall et al., 2015).

Thus, the recurrent stroke prevention program was effectiveness to control systolic blood pressure, diastolic blood pressure, fasting plasma glucose, and low-

density lipoprotein cholesterol among patients with first ischemic stroke and answer the research question of this study.

Smoking is linked to higher risk of ischemic stroke. It appeared to raise blood pressure or risk of hypertension to a modest degree (Niskanen et al., 2004). Atherosclerosis is dynamic and involve cholesterol transport into and out of cells in the blood vessel surface. The trigger in the pathway is often a blood clot that forms at the site of a plaque whose cap has ruptured. Tobacco and alcohol use may have chronic effects on several steps in the atherosclerotic process and more acute effects on the formation of blood clots. Alcohol and tobacco use both have important effect on cardiovascular risk factors as well as blood pressure (Mukamal, 2006).

Objective 2: To compare the different of blood pressure, low-density lipoprotein cholesterol, and blood glucose within the experimental group.

A comparison of systolic blood pressure from the first to the last points of time of the experimental group gave the following results: mean score of systolic blood pressure at baseline was higher than week 4, week 8 and week 12, respectively. Systolic blood pressure was statistically decreased over time comparing between baseline, week 8, and week 12 ($p = .001$, $p = .001$ $p = .001$, respectively). The most difference was found in week 12 compared to baseline. Considering the mean difference in each pair over time, the systolic blood pressure was started to decrease statistically significant at week 8 ($p = .001$). The level of systolic blood pressure tended to decrease tendency from week 8 to week 12. These results lead to the discussion as follows:

For systolic blood pressure, the results shown that mean score of systolic blood pressure at baseline was higher than week 4, week 8 and week 12. Systolic blood pressure was statistically decreased over time comparing between baseline, week 8, and

week 12. The most difference was found in week 12 compared to baseline. This means that the recurrent stroke prevention program can be utilized to control systolic blood pressure among patients with patients with first ischemic stroke. Similarly, a one quasi-experimental study conducted by Kono (2013) found that an educational and behavioral intervention was associated with a significant reduction in systolic blood pressure among patients with recurrent stroke.

For diastolic blood pressure, the analysis results showed that mean score of diastolic blood pressure at baseline was higher than week 4, week 8 and week 12. Diastolic blood pressure was statistically decreased over time comparing between baseline, week 8, and week 12. The most difference was found in week 12 compared to baseline. The level of diastolic blood pressure tended to decrease tendency from week 8 to week 12. Similarly, a one quasi-experimental study conducted by Kono (2013) found that an educational and behavioral intervention was associated with a significant reduction in diastolic blood pressure among patients with recurrent stroke.

For low-density lipoprotein cholesterol, in the experimental group, low-density lipoprotein cholesterol was statistically decreased over time comparing between baseline, week 4, week 8, and week 12. The most difference was found in week 12 compared to baseline. The level of low-density lipoprotein cholesterol tended to decrease tendency from week 4 to week 12. Previous studies results indicated that educational and behavioral interventions for patients were not associated with changes in mean low-density lipoprotein cholesterol levels (Maasland, Koudstaal, Habbema, & Dippel, 2007). Smoking cessation has been a significant decline in low-density lipoprotein cholesterol ($p < 0.001$) from baseline to 3 months after the beginning smoking cessation therapy (Komiyama et al., 2018).

For fasting plasma glucose, in the experimental group, the results showed that mean score of fasting plasma glucose at baseline was higher than week 4, week 8 and week 12. The most difference was found in week 12 compared to baseline. Considering the mean difference in each pair over time, the fasting plasma glucose was started to decrease statistically significant at week 8. The level of fasting plasma glucose tended to decrease tendency from week 8 to week 12.

According to the results of the study, it indicated that the participants who received the recurrent stroke prevention program had lower mean systolic blood pressure, diastolic blood pressure, low-density lipoprotein cholesterol, and blood glucose at baseline, week 4, week 8, and week 12. The recurrent stroke prevention program was an educational and behavioral intervention focused on risk behaviors change included eating diet and sodium intake, exercise, quit smoking, and medication adherence for controlling blood pressure, low-density lipoprotein cholesterol, and blood glucose as vascular risk factors for recurrent stroke.

Improving patients' knowledge. The participants were improved their knowledge and understanding cover eating healthy diet, restriction sodium intake, increasing physical activities, quit smoking, and medication adherence after ischemic stroke at once time a week (week 1-4) and provided booklets related topics in education sessions to repeat their understand at home, after starting the program. It indicated that intensive four education sessions during a month after starting the program was affected to grained knowledge and understanding of the patients to change risk behaviors for controlling blood pressure, low-density lipoprotein cholesterol, and blood glucose in first ischemic stroke patients. Patients as adult who received education should

optimizing their engagement in learning experiences and helping them master program content (Merriam & Bierema, 2014).

Patients' skills training. Exercise of this study as an intensity of 12-weeks duration 3 time/week 40-60 minutes/time, involving walking with resistance exercise. Moreover, they were trained to measure blood pressure before exercise. The patients were increased knowledge, skill, and empowerment about blood pressure control and avoiding further strokes (Ovaisi et al., 2011). Exercise and skills of self-blood pressure monitoring gained their skill and enhance their attitude and drive them to maintain behaviors and avoid a further stroke. Active exercise helps to reduce stimulation of the sympathetic nervous system and strengthen the blood vessels for reducing blood pressure (Abou Elmagd, 2016), increase in metabolism of the muscle fat and reduce fat in adipose tissue help to decrease cholesterol (Lira et al., 2010), and exercise can reduce the glucose in blood by increase muscles use glucose without insulin to promote plaque stability and favorable changes in vascular wall function, increase in metabolism of the muscle fat and reduce fat in adipose tissue help to decrease cholesterol, and reduce the glucose in blood by increase muscles use glucose (Ivey, Hafer-Macko, & Macko, 2008).

Instilling positive attitude. The researcher telephoned follow up 2 times. The details of telephone calling related health behaviors about eating, exercise, smoking, and medication taking in self-monitor form. It was the process of attending to one's actions and recording the presence or absence of target behaviors (McBain, Shipley, & Newman, 2015). These components supported behavior modification for stroke patients (Flemming et al., 2013).

Lower sodium diet help reduce retention of sodium and water in the body and inhibit sodium chloride reabsorption in the distal convoluted tubule leads to a decrease in extracellular fluid that decrease peripheral resistance for reducing blood pressure (Larsson, Wallin, & Wolk, 2016). Moreover, reducing saturated and trans fats and statin help to decrease cholesterol (Lim & Choue, 2013). Avoid sweetened foods and diabetes drug reduce blood glucose (Lakkur & Judd, 2015).

Quit smoking reduce atrial stiffness and improve endothelial cell function to reduce blood pressure. Smoking causes inflammation, oxidative stress, and associated with an abdominal obesity as risk factor for diabetes because it encourages the production of cortisol a hormone that increase blood sugar (Chen et al., 2019; Epstein et al., 2017). Acrolein inhibit the protective enzyme responsible for keeping the LDL cholesterol intact lead to increase oxidized LDL cholesterol in blood stream, increase high risk of stroke (Chadwick et al., 2015).

Medication adherence as anticoagulant drug, antihypertensive drug, diabetic drug and antihyperlipidemic drug, are dedication treatment to control stroke patients' health condition related blood pressure, low density lipoprotein cholesterol, and blood glucose after ischemic stroke (Kleindorfer et al., 2021).

The recurrent stroke prevention program gained knowledge, skills, and positive attitude of patients. This led patients to perform eating healthy diet and restrict sodium intake, exercise, quit smoking, and medication adherence for 12 weeks intervention. Those target behaviors were affected to physiological change of patients for 12 weeks to control blood pressure, low-density lipoprotein cholesterol, and blood glucose.

The recurrent stroke prevention program demonstrated statistically significant in systolic blood pressure, diastolic blood pressure, and fasting plasma glucose. The

mean of systolic blood pressure showed that there were changed from hypertension level 1 at baseline to prehypertension level in week 8 and week 12. While the participants in the control group were presented hypertension level 1 during different points of time.

For diastolic blood pressure, the participants in the experimental group had slightly decreased mean of diastolic blood pressure from baseline, week 4, week 8, and week 12, respectively. The mean of diastolic blood pressure showed that there were changed from hypertension level 1 at baseline to prehypertension level in week 8 and week 12. In the control group, the participants showed that there was slightly increased mean of diastolic blood pressure from baseline, week 4, week 8, and week 12, respectively. Mean of diastolic blood pressure in this group presented hypertension level 1 during different points of time.

For low-density lipoprotein cholesterol, the participants in the experimental group had lowered mean of low-density lipoprotein cholesterol from baseline, week 4, week 8, and week 12, respectively. The mean of low-density lipoprotein cholesterol showed that there were changed from above optimal at baseline to optimal at week 8 and week 12. In the control group, the participants showed there were slightly changed mean of low-density lipoprotein cholesterol. There were presented optimal at week 4, then changed to above optimal at week 8 and 12.

For fasting plasma glucose, the participants in the experimental group had decreased mean of fasting plasma glucose from baseline, week 4, week 8, and week 12, respectively. The mean of fasting plasma glucose showed that there were changed from early diabetic at baseline to normal at week 12. In the control group, the participants showed there were presented early diabetic during four period of times.

Conclusion

This nursing intervention, the recurrent stroke prevention program, provides risk behaviors change strategies to improve blood pressure and blood glucose in firsts ischemic stroke patients. Although, this program did not show affected to control combined blood pressure, low density lipoprotein, and blood glucose. However, the patients who received the recurrent stroke prevention program, had reduced low density lipoprotein cholesterol from week 4 to week 12. This program encourages patients with first ischemic stroke to perform target behaviors as eat healthy diet, restrict sodium intake, exercise, quit smoking, and medication adherence. Those behaviors made physical change in first ischemic stroke patients and affect to reduce systolic blood pressure, diastolic blood pressure, and fasting plasma glucose as major risk factors of recurrent stroke. These procedures of this program can be flexibly integrated into routine nursing care.

Implications of the study

The implications of this study focus on nursing science, nursing practice, nursing education, and nursing research as follows:

Implications for nursing practice

The results of this study can be able to implement into several nursing practice. First, nurses in stroke clinic can utilize the components remained in this intervention to manage blood pressure, blood sugar, and low-density lipoprotein cholesterol among patients with ischemic stroke. Second, other healthcare providers can work together by developing the process that can prevent recurrent stroke by assessing the factors that affect stroke such as continuous smoking, do not doing exercise, or not well appropriate

foods. Physicians could use the findings of this study in term of assessing blood sugar and low-density lipoprotein cholesterol regularly.

Nurses should design the proper intervention that can prevent recurrent stroke by controlling blood pressure, and blood sugar. Thus, nurses should be a knowledgeable people about recurrent stroke prevention, covered eating healthy diet, restriction sodium intake, increasing physical activities and quit smoking, and medication adherence. Nurses should provide booklets related topics in education sessions to repeat their understand at home. Especially, the details of intervention that nurses should enhance the patients to do including exercising and monitoring regularly.

Implications for nursing science

This intervention was developed by using existing empirical evidence which have been confirmed that improved health outcomes such as blood pressure, blood sugar, and LDL. Based on the component of the recurrent stroke prevention program was organized based on literature review and highest effect size studies were selected (Chiu et al., 2008; Kono et al., 2013; Moore et al., 2015; Z. Wang, Wang, Fan, Lu, & Wang, 2014).

Therefore, it could contribute to nursing science in terms of change those biological variables by emphasizing the exiting empirical evidence that have been already tested by previous researchers.

Implications for nursing education

There are many lessons learns that can be apply in nursing education. First, nursing lecturers can use the recurrent stroke prevention program as an evidence based to teach nursing students to taking care of patients with stroke. Second, blood pressure, blood glucose, and low-density lipoprotein cholesterol can be biological variables that

nurses can assess in nursing study. Third, the lecturers can teach students to look at the strategies to develop each component of the intervention by using existing evidence.

Implications for nursing research

This study was explored the effectiveness of the recurrent stroke prevention program in patients with first ischemic stroke in two super tertiary care hospitals in Phitsanulok province. It should be benefited, if conducted to explore the effects of the recurrent stroke prevention program in patients with other cardiovascular diseases as hypertension or diabetes mellitus, to control blood pressure, low-density lipoprotein cholesterol, and blood glucose.

Implications for nursing administration

Administration and head nurses can use the findings of this study as a guideline in prevention recurrent stroke. They can utilize each component of the intervention to provide knowledge regarding stroke prevention, exercising, and monitoring health conditions overtime. The developed guideline can also extend to period of discharge planning, living at home, and returning back to hospital again for follow up. A long the journey of this process, administrators should organize key person who can manage and follow the patients about 3 months continuously. This key person, then, can deliver the information to community nurses who can provide holistic care to monitoring clinical outcomes such as blood pressure, blood sugar, and low-density lipoprotein cholesterol. These strategies would help to decrease mortality rate and prevent serious health outcomes effectively.

Implications for nursing healthcare policy

The results of this study shed the light in many areas for policy makers. First, they can deliver the findings of study to develop a guideline for helping patients with

stroke. Second, policy makers can synthesize the components of this intervention and promote it in different settings such as nursing care in out-patient department and community.

Limitations of the study

This study has some limitations. Firstly, the study was conducted in the participants who registered in Phitsanulok province. To develop the best intervention, it may need a further study which conduct in other settings or difference type of hospital. Moreover, the limitation of this study is it small sample size. It needs to study in large number of patients for next study.

Recommendations for future research

1. This program can be studies in many setting to compare the result and confirm the rigorous procedures of the program.

2. This program should be conducted in large number of patients

3. This program should be replicated with extending the long-term evaluation as 6 months. The long-term outcome should be evaluated and should be concern about the cost of intervention compared with the long-term effectiveness.

4. The future studies should be included family member in this program as social support. Because this study data found that most participants had family members cooking food for them and encouraged them to maintain the intervention activities.

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APPENDICES

APPENDIX A
INSTRUMENTS

APPENDIX A 1

The demographics and clinical characteristics data collection form.
แบบสอบถามข้อมูลส่วนบุคคลและข้อมูลทางคลินิกที่เกี่ยวข้องกับโรคหลอดเลือดสมอง
ชนิดขาดเลือด (The demographic data and clinical information of Ischemic stroke)

ส่วนที่ 1 แบบสอบถามข้อมูลส่วนบุคคล

คำชี้แจง: กรุณาตอบคำถามต่อไปนี้ตามความเป็นจริงที่ตรงกับตัวท่านมากที่สุด โดยการลงข้อมูลให้ทำเครื่องหมาย √ หรือเติมข้อความในช่องว่าง

ข้อมูลส่วนบุคคล **วันที่เก็บข้อมูล .....รหัส .....**

1. อายุ ..... ปี

2. เพศ ( ) ชาย ( ) หญิง

3. ส่วนสูง ..... เซนติเมตร น้ำหนัก ..... กิโลกรัม

4. ท่านเคยสูบบุหรี่หรือไม่

( ) ไม่เคยสูบ

( ) เคยสูบแต่เลิกแล้ว รวมระยะเวลาที่สูบ .....ปี รวมระยะเวลาที่เลิกสูบ.....ปี ชนิดบุหรี่ที่สูบ.....

( ) ยังสูบอยู่ รวมระยะเวลาที่สูบ.....ปี ชนิดบุหรี่ที่สูบ..... จำนวนบุหรี่ที่สูบ ..... มวน/วัน

5. ท่านเคยดื่มสุราหรือไม่

( ) ไม่เคยดื่ม

( ) เคยดื่มแต่เลิกแล้ว รวมระยะเวลาที่ดื่ม.....ปี รวมระยะเวลาที่เลิกดื่ม .....ปี ชนิดสุราที่ดื่ม.....

( ) ยังดื่มอยู่ รวมระยะเวลาที่ดื่ม.....ปี ชนิดของสุรา .....ปริมาณการดื่ม.....แก้ว/วัน

6. ปัจจุบันท่านออกกำลังกายหรือไม่

( ) ไม่ออกกำลังกาย

( ) ออกกำลังกาย ท่านออกกำลังกายจำนวน .....ครั้ง/สัปดาห์

ระยะเวลาในการออกกำลังกายแต่ละครั้งนาน .....นาที

ชนิดของการออกกำลังกายที่ชอบออก .....

7. ตามปกติท่านรับประทานอาหารจำนวน.....มื้อต่อวัน

รสชาติอาหารที่ชอบรับประทาน .....

เมนูอาหารที่ชอบรับประทาน.....

ใครเป็นผู้เตรียมอาหารให้ท่าน (สามารถตอบได้มากกว่า 1 ข้อ)

( ) ผู้ป่วยเตรียมเอง ( ) คนในครอบครัวเป็นคนทำ ( ) ซื้อจากร้านอาหารมารับประทาน

ส่วนที่ 2 แบบสอบถามข้อมูลทางคลินิกที่เกี่ยวข้องกับโรคหลอดเลือดสมองชนิดขาดเลือด

8. ระยะเวลาที่เจ็บป่วยนับจากวันที่เกิดโรค.....เดือน.....วัน

9. โรคประจำตัว/โรคที่เกิดร่วม

( ) โรคความดันโลหิตสูง ( ) โรคไขมันในเลือดสูง

( ) โรคไต ( ) โรคหัวใจ

( ) โรคเบาหวาน ( ) อื่น ๆ ระบุ.....

10. ยาที่ใช้ในปัจจุบัน (ได้มากกว่าหนึ่งข้อ)

( ) ยาที่ใช้ลดความดันโลหิตสูง จำนวน .....ตัว

( ) ยาต้านการแข็งตัวของเกล็ดเลือด จำนวน .....ตัว

( ) ยาลดไขมันในเส้นเลือด จำนวน .....ตัว

( ) ยารักษาเบาหวาน จำนวน .....ตัว ( ) อื่น ๆ โปรดระบุ.....

11. ที่ผ่านมาท่านมีปัญหาในการรับประทานยาตามแพทย์สั่งหรือไม่

( ) ไม่มี

( ) มี ได้แก่ ☐ ลืมรับประทานยา

☐ รับประทานยาเกิน ☐ อื่น ๆ ระบุ .....

APPENDIX A 2

The National Institute of Health Stroke Scale Thai version (NIHSS-T)

แบบประเมินระดับความรุนแรงของโรคหลอดเลือดสมอง

The National Institute of Health Stroke Scale-THAI VERSION

คำชี้แจง ให้ท่านวงกลมล้อมรอบตัวเลขที่ตรงกับลักษณะของผู้ป่วย

แบบประเมิน The National Institute of Health Stroke Scale-T (0-42) (NIHSS)		
1a. Level of consciousness	รู้สึกตัวดี	0
	หลับ ปลุกตื่น	1
	ซึมมากต้องกระตุ้นแรง ๆ ถึงเคลื่อนไหว	2
	ไม่ตอบสนองต่อการกระตุ้นแรง ๆ	3
1b. Level of consciousness ถามอายุและเดือน	ตอบได้ถูกต้องทั้ง 2 ข้อ	0
	ตอบได้ถูกเพียง 1 ข้อ	1
	ไม่สามารถตอบคำถามได้หรือตอบผิดทั้ง 2 ข้อ	2
1c. Two commands หลับตา ลืมตาและกำมือแบมือ	ทำได้ถูกต้องทั้ง 2 อย่าง	0
	ทำได้ถูกต้องเพียงอย่างเดียว	1
	ไม่ทำตามคำสั่ง	2
2. Best gaze (การเคลื่อนไหวของตา)	ปกติ	0
	กลอกผิดปกติแนวนอน1หรือ2ตา	1
	กลอกไปด้านหนึ่งเองหรือไม่ได้เลย	2
3. Visual fields	ปกติ	0
	Partial hemianopia	1
	Complete hemianopia	2
	Bilateral hemianopia	3
4. Facial palsy	ปกติ	0
	หน้าเบี้ยวเล็กน้อย	1

แบบประเมิน The National Institute of Health Stroke Scale-T (0-42) (NIHSS)		
	หน้าเบี้ยวชัดเจนเฉพาะด้านล่าง	2
	หน้าเบี้ยวทั้งหน้า (1 หรือ 2 ข้าง)	3
5a. Best Motor Lt arms นั่งยกแขน 90 องศา 10วินาที	แขนไม่ตกนานกว่า 10 วินาที	0
	แขนตกก่อน 10 วินาทีแต่ไม่ถึงพื้น	1
	แขนตกถึงพื้น แต่ยกเหนือพื้นได้	2
	แขนตกถึงพื้น แต่ยกเหนือพื้นไม่ได้	3
	ไม่ขยับเลย	4
	แขนถูกตัด ข้อยึดติด	un
5b. Best Motor Rt arms นั่งยกแขน 90 องศา 10วินาที	แขนไม่ตกนานกว่า 10 วินาที	0
	แขนตกก่อน 10 วินาทีแต่ไม่ถึงพื้น	1
	แขนตกถึงพื้น ยกเหนือพื้นได้	2
	แขนตกถึงพื้น ยกเหนือพื้นไม่ได้	3
	ไม่ขยับเลย	4
	แขนถูกตัด ข้อยึดติด	un
6a. Best Motor Lt leg นอนยกขา 45 องศา 5 วินาที	ขาไม่ตกนานกว่า 5 วินาที	0
	ขาตกก่อน 5 วินาทีแต่ไม่ถึงพื้น	1
	ขาตกถึงพื้น แต่ยกเหนือพื้นได้	2
	ขาตกถึงพื้น แต่ยกเหนือพื้นไม่ได้	3
	ไม่ขยับเลย	4
	ขาถูกตัด ข้อยึดติด	un
6b. Best Motor Rt leg	ขาไม่ตกนานกว่า 5 วินาที	0
	ขาตกก่อน 5 วินาทีแต่ไม่ถึงพื้น	1

แบบประเมิน The National Institute of Health Stroke Scale-T (0-42) (NIHSS)		
นอนยกขา 45 องศา 5 วินาที	ขาตกถึงพื้น ยกเหนือพื้นได้	2
	ขาตกถึงพื้น ยกเหนือพื้นไม่ได้	3
	ไม่ขยับเลย	4
	ขาถูกตัด ข้อยึดติด	un
7. Limb Ataxia	ปกติ (ไม่เซ)	0
	ผิดปกติแขนหรือขา 1 limbs	1
	ผิดปกติแขนหรือขา 2 limbs	2
8. Sensory	ปกติ	0
	รู้สึกเจ็บไม่เท่ากันและรู้ว่ามีอะไรถูกตัว	1
	ไม่รู้สึกและไม่รู้ว่ามีอะไรถูกตัว	2
9. Best language	ปกติ no aphasia	0
	Mild – moderate aphasia	1
	Severe aphasia	2
	Mute , global aphasia	3
10. Dysarthria	ปกติ	0
	Mild to moderate	1
	Severe	2
	Intubated , physical barrier	un
11. Extinction and inattention	ไม่ผิดปกติ	0
	ผิดปกติ / อย่างใดอย่างหนึ่ง	1
	ผิดปกติ / มากกว่าหนึ่งอย่าง	2
	Total	42
	รวมคะแนนที่ได้	

APPENDIX A 3

The Modified Rankin Scale (mRS)

ชุดที่ 5 แบบประเมินระดับความพิการของผู้ป่วยโรคหลอดเลือดสมอง

คำชี้แจง ผู้ประเมินให้คะแนนตามข้อมูลที่ตรงกับลักษณะของผู้ป่วยโรคหลอดเลือดสมอง

ช่องใส่เครื่องหมาย	คะแนน	รายละเอียด
	0	ไม่มีความผิดปกติเลย
	1	ไม่มีความผิดปกติที่รุนแรง สามารถประกอบกิจวัตรประจำวันได้ตามปกติทุกอย่าง
	2	มีความผิดปกติเล็กน้อยสามารถประกอบกิจวัตรประจำวันได้เกือบทุกอย่าง
	3	มีความผิดปกติพอควรต้องการคนอื่นช่วยในการทำกิจวัตรประจำวันบางอย่างแต่เดินได้เองโดยไม่มีคนช่วย
	4	มีความผิดปกติมากสามารถเดินได้ แต่ต้องมีคนช่วยพยุง ไม่สามารถทำกิจวัตรประจำวันโดยไม่มีคนช่วย
	5	มีความผิดปกติรุนแรงต้องนอนกับเตียง ปัสสาวะราด ต้องการการดูแลอย่างใกล้ชิด
	6	เสียชีวิต

คะแนนที่ได้ (0–6): _____

คะแนนน้อยกว่า 3 คาดว่าผู้ป่วยจะสามารถช่วยเหลือตนเองในการประกอบชีวิตประจำวันได้

APPENDIX A 4

The Thai version Patient Health Questionnaire 9 (PHQ-9)
แบบทดสอบภาวะซึมเศร้า (PHQ-9)

คำชี้แจง ในช่วง 2 สัปดาห์ที่ผ่านมา ท่านมีอาการดังต่อไปนี้บ่อยแค่ไหน (กรุณาทำเครื่องหมาย √ เพื่อเลือกคำตอบของท่าน)

0 หมายความว่า ไม่เคยเลย

1 หมายความว่า มีบางวันหรือไม่บ่อย

2 หมายความว่า มีค่อนข้างบ่อย

3 หมายความว่า มีเกือบทุกวัน

เนื้อหา	ไม่เคยเลย (0)	บางวัน (1)	ค่อนข้างบ่อย (2)	เกือบทุกวัน (3)
1. เบื่อ ทำอะไร ๆ ก็ไม่เพลิดเพลิน				
2. ไม่สบายใจ ซึมเศร้า หรือท้อแท้				
3. หลับยาก หรือหลับ ๆ ตื่น ๆ หรือหลับมากไป				
4. เหนื่อยง่าย หรือไม่ค่อยมีแรง				
5. เบื่ออาหาร หรือกินมากเกินไป				
6. รู้สึกไม่ดีกับตัวเอง คิดว่าตัวเองล้มเหลว หรือเป็นคนทำให้ตัวเอง หรือครอบครัวผิดหวัง				
7. สมาธิไม่ดีเวลาทำอะไร เช่น ดูโทรทัศน์ ฟังวิทยุ หรือทำงานที่ต้องใช้ความตั้งใจ				
8. พูดหรือทำอะไรช้าจนคนอื่นมองเห็น หรือกระสับกระส่ายจนท่านอยู่ไม่นิ่งเหมือนเคย				
9. คิดทำร้ายตนเอง หรือคิดว่าถ้าตาย ๆ ไปเสียคงจะดีหรือคิดทำร้ายตนเอง				

APPENDIX A 5

แบบประเมินกิจวัตรประจำวันของผู้ป่วยโรคหลอดเลือดสมอง (The Barthel Index: BI)

คำชี้แจง ให้ท่านวงกลมรอบตัวเลขที่ตรงกับข้อมูลปัจจุบันของท่านให้ครบทั้ง 10 หัวข้อด้านล่าง

1. การรับประทานอาหาร

0	ต้องมีคนช่วย, ให้อาหารทางสายยาง
5	มีคนช่วยบางส่วน เช่น ตัดเนื้อ, เตรียมอาหารให้
10	ทานเองได้เมื่อเตรียมอาหารวางไว้ให้

2. การอาบน้ำ

0	ต้องมีคนช่วย
5	ทำเองได้ ทำความสะอาดร่างกายเช็ดตัวได้ทุกส่วน

3. ล้างหน้า แปรงฟัน หวีผม

0	ต้องมีคนช่วย
5	ทำเองได้

4. การแต่งตัว

0	ต้องมีคนช่วย
5	มีคนช่วยบางส่วน
10	ทำเองได้ รวมทั้งติดซิบ ติดกระดุม

5. การถ่ายอุจจาระ

0	กลั้นไม่ได้ อุจจาระราดหรือท้องผูกต้องสวนอุจจาระให้
5	ต้องช่วยสวนหรือเหน็บ
10	ทำได้เอง สวนหรือเหน็บเองได้

6. การขับถ่ายปัสสาวะ

0	ปัสสาวะเองไม่ได้ คาสายสวน
5	ต้องการความช่วยเหลือบางขั้นตอน
10	ปัสสาวะเองได้

7. การเข้าห้องน้ำ

0	ต้องมีคนช่วยเหลือ
5	มีคนช่วยบางส่วน
10	ทำเองได้

8. การขึ้นลงจากเตียง

0	ลุกจากเตียงไม่ได้ นั่งไม่สมดุล
5	ลุกนั่งได้แต่ต้องมีคนพยุงช่วย 1-2 คน
10	ลุกนั่งได้ ต้องการคนช่วยเหลือน้อย
15	ลุกนั่งได้เอง

9. การเคลื่อนไหว นั่ง ยืน เดิน

0	ช่วยเหลือตัวเองไม่ได้ หรือ นั่งบนรถเข็นแต่ไปน้อยกว่า 50 หลา
5	นั่งบนรถเข็นและไปได้ไกล 50 หลา
10	เดินได้ไกล 50 หลา โดยมีคนช่วยเหลือเล็กน้อย
15	เดินได้เอง อาจใช้ไม้เท้าช่วย

10. การขึ้นบันได

0	ขึ้นบันไดเองไม่ได้
5	ขึ้นบันไดเองได้ แต่ต้องมีคนช่วยเล็กน้อย
10	ขึ้นบันไดเองได้ อาจต้องมีราวเกาะช่วย

การแปรผล

รวมคะแนน Barthel Index..... (เต็ม 100 คะแนน)

APPENDIX A 6
TMSE (Thai Mental State Examination)
แบบทดสอบสมรรถภาพสมองของคนไทย

แบบการตรวจสภาพจิตแบบย่อ ใช้ทดสอบการทำงานของสมองด้านความรู้ ความเข้าใจ ซึ่งใช้กันอย่างแพร่หลายในการคัดกรองคนไข้สมองเสื่อม ในการจำแนกความบกพร่องในการทำหน้าที่ของสมองด้านความรู้ ความเข้าใจ และอาการสมองเสื่อมในผู้สูงอายุไทย มีคะแนนเต็ม 30 คะแนน

1. Orientation (6 คะแนน)

วัน, วันที่, เดือน, ช่วงของวัน 4

ที่ไหน 1

ใคร (คนในภาพ)

2. Registration (3 คะแนน) บอกของ 3 อย่างแล้วให้พูดตาม

ต้นไม้ รถยนต์ มือ 3

3. Attention (5 คะแนน) ให้บอกวันย้อนหลัง วันอาทิตย์ วันเสาร์

ศุกร์ พฤหัสบดี พุธ อังคาร จันทร 5

4. Calculation (3 คะแนน) 100-7 ไปเรื่อย ๆ 3 ครั้ง

100 93 86 79 3

5. Language (10 คะแนน)

5.1 ถามว่าสิ่งนี้เรียกว่าอะไร (นาฬิกา, เสื้อผ้า) 2

5.2 ให้พูดตาม “ยายพาหลานไปซื้อขนมที่ตลาด” 1

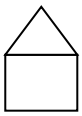
5.3 ทำตามคำ (3 ขั้นตอนบอกทั้งประโยคพร้อม ๆกัน)

หยิบกระดาษด้วยมือขวา 1

พับกระดาษเป็นครึ่งแผ่น 1

แล้วส่งกระดาษให้ผู้ตรวจ 1

5.4 อ่านข้อความแล้วทำตาม **“หลับตา”** 1

5.5 วาดภาพให้เหมือนตัวอย่าง  2

5.6 กล้วยกันส้มเหมือนกันคือ.....(เป็นผลไม้)

แมวกับหมาเหมือนกันคือ.....(เป็นสัตว์,เป็นสิ่งมีชีวิต) 1

6. Recall (3 คะแนน) ถามของ 3 อย่างที่ให้จำตามข้อ 2

ต้นไม้ รถยนต์ มือ 3

ภาวะสมองผิดปกติ คะแนน ≤

คะแนนรวม

APPENDIX A 7

คู่มือ

โปรแกรมป้องกันการเกิดโรคหลอดเลือดสมองซ้ำ

สำหรับผู้ป่วยโรคหลอดเลือดสมองชนิดขาดเลือด

(ฉบับผู้วิจัย/พยาบาล)

จัดทำโดย

นางสาวอรพิน จุลมุสิ

นิสิตหลักสูตรพยาบาลศาสตรดุษฎีบัณฑิต

คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย

อาจารย์ที่ปรึกษาหลัก รองศาสตราจารย์ ดร. จินตนา ยูนิพันธุ์

อาจารย์ที่ปรึกษาร่วม รองศาสตราจารย์ ดร.ชนกพร จิตปัญญา

คู่มือนี้เป็นส่วนหนึ่งของดุษฎีนิพนธ์ปริญญาพยาบาลศาสตรดุษฎีบัณฑิต

สาขาพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย

APPENDIX A 8

แผนดำเนินการประกอบการออกกำลังกาย

โปรแกรมป้องกันการเกิดโรคหลอดเลือดสมองซ้ำสำหรับผู้ป่วยโรคหลอดเลือดสมองชนิดขาดเลือด

(ฉบับผู้วิจัย/พยาบาล)

จัดทำโดย

นางสาวอรพิน จุลมุสิ

นิสิตหลักสูตรพยาบาลศาสตรดุษฎีบัณฑิต

คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย

อาจารย์ที่ปรึกษาหลัก รองศาสตราจารย์ ดร. จินตนา ยูนิพันธุ์

อาจารย์ที่ปรึกษาร่วม รองศาสตราจารย์ ดร.ชนกพร จิตปัญญา

คู่มือนี้เป็นส่วนหนึ่งของดุษฎีนิพนธ์ปริญญาพยาบาลศาสตรดุษฎีบัณฑิต

สาขาพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย

APPENDIX A 9

แผนการสอน

การให้ความรู้เกี่ยวกับการปรับเปลี่ยนพฤติกรรมสุขภาพสำหรับผู้ป่วยโรคหลอดเลือดสมองชนิดขาดเลือด

โปรแกรมป้องกันการเกิดโรคหลอดเลือดสมองซ้ำนี้พัฒนาขึ้นโดยการประยุกต์ใช้กิจกรรมจากโปรแกรมที่เกี่ยวข้องจากการทบทวนวรรณกรรม และการวิเคราะห์ อภิมานจากผลการวิจัยที่เกี่ยวข้อง ซึ่งพิจารณาตามผลลัพธ์ต่อความดันโลหิต ไขมันชนิดความหนาแน่นต่ำ และน้ำตาลในเลือดในผู้ป่วยโรคหลอดเลือดสมองชนิดขาดเลือด โปรแกรมป้องกันการเกิดโรคหลอดเลือดสมองซ้ำ สำหรับผู้ป่วยโรคหลอดเลือดสมองชนิดขาดเลือด ประกอบด้วย 1) การให้ความรู้เกี่ยวกับการปรับเปลี่ยนพฤติกรรมสุขภาพภายหลังเกิดโรคหลอดเลือดสมอง ได้แก่ การรับประทานอาหาร การจำกัดอาหารที่มีโซเดียมสูง การเพิ่มกิจกรรมทางกาย การเลิกสูบบุหรี่และหลีกเลี่ยงการสัมผัสควันบุหรี่ และการรับประทานยาภายหลังเกิดโรคหลอดเลือดสมองชนิดขาดเลือด 2) การออกกำลังกายอย่างต่อเนื่อง 12 สัปดาห์ และ3) การติดตามอย่างต่อเนื่องทางโทรศัพท์และแอพลิเคชันไลน์ ผู้วิจัยทำหน้าที่ในการเป็นผู้ให้ความรู้และนำการฝึกการออกกำลังกาย และให้คำปรึกษาในการจัดการกับปัญหาที่ผู้ป่วยไม่สามารถแก้ไขได้เอง และกระตุ้นให้ผู้ป่วยตระหนักถึงความสำคัญในการควบคุมความดันโลหิต ไขมันในเลือดชนิดความหนาแน่นต่ำ และน้ำตาลในเลือดให้อยู่ในระดับปกติ ซึ่งเป็นปัจจัยสำคัญในการเกิดโรคหลอดเลือดสมองซ้ำ

ผู้สอน นางสาวอรพิน จุลมุสิ

ผู้เรียน ผู้ป่วยโรคหลอดเลือดสมองชนิดขาดเลือดและผู้ดูแล

วัตถุประสงค์

1. เพื่อให้ผู้ป่วยมีความรู้ความเข้าใจและสามารถฝึกทักษะในการปรับเปลี่ยนพฤติกรรมด้านการรับประทานอาหาร การเพิ่มกิจกรรมทางกาย การเลิกสูบบุหรี่และการหลีกเลี่ยงควันบุหรี่ และการรับประทานยาตามแผนการรักษาของแพทย์ภายหลังเกิดโรคหลอดเลือดสมองชนิดขาดเลือดอย่างถูกต้อง

2. เพื่อให้ผู้ป่วยเห็นความสำคัญของการปรับเปลี่ยนพฤติกรรมด้านการรับประทานอาหาร การเพิ่มกิจกรรมทางกาย การเลิกสูบบุหรี่และการหลีกเลี่ยงควันบุหรี่ และการรับประทานยาตามแผนการรักษาของแพทย์ภายหลังเกิดโรคหลอดเลือดสมองชนิดขาดเลือด

กลุ่มเป้าหมาย

กลุ่มเป้าหมายคือผู้ป่วยโรคหลอดเลือดสมองชนิดขาดเลือดครั้งแรก ที่มารับการรักษาที่หอผู้ป่วยโรคหลอดเลือดสมองของโรงพยาบาลพุทธชินราช จังหวัดพิษณุโลกและโรงพยาบาลมหาวิทยาลัยนเรศวร จำนวน 25 คน และผู้ดูแล

สถานที่ดำเนินการ หอผู้ป่วยอายุรกรรมของโรงพยาบาลพุทธชินราช จังหวัดพิษณุโลกและโรงพยาบาลมหาวิทยาลัยนเรศวร

กำหนดการเรียนการสอน

ประกอบด้วยการให้ความรู้ 4 ครั้ง ภายในสัปดาห์ที่ 1-4 รวมเวลาที่ใช้ทั้งหมด 160 นาที

การให้ความรู้ครั้งที่ 1 การรับประทานอาหารสำหรับผู้ป่วยโรคหลอดเลือดสมองชนิดขาดเลือด (ใช้เวลา 40 นาที)

APPENDIX A 10

แนวปฏิบัติในการติดตามทางโทรศัพท์

การโทรศัพท์เป็นช่องทางสำคัญที่ช่วยให้ผู้วิจัยสามารถติดตามการปฏิบัติตามโปรแกรมของผู้ป่วย ให้คำแนะนำสำหรับผู้ป่วยที่ต้องการคำปรึกษาในปัญหา และให้แรงเสริมในปรับเปลี่ยนพฤติกรรมสุขภาพอย่างต่อเนื่อง 12 สัปดาห์ ด้วยการชื่นชมให้กำลังใจขณะติดตามผู้ป่วยในแต่ละครั้ง

1. แนวปฏิบัติในการติดตามทางโทรศัพท์และแอพพลิเคชั่นไลน์

ผู้วิจัย/พยาบาลโทรศัพท์และใช้แอพลิเคชันไลน์ในติดตามการปรับเปลี่ยนพฤติกรรม โดยใช้เวลา 20 นาที/ครั้ง ในการติดตามแต่ละครั้งผู้วิจัย/พยาบาลจะปฏิบัติดังต่อไปนี้

1.1 ผู้วิจัย/พยาบาลชวนผู้ป่วยพูดคุยเกี่ยวกับเรื่องราวทั่วไป เพื่อละลายพฤติกรรมและสร้างบรรยากาศให้ผ่อนคลายก่อนเริ่มกิจกรรมตามโปรแกรม ใช้เวลา 5 นาที

1.2 ผู้วิจัย/พยาบาลสอบถามเกี่ยวกับการปรับเปลี่ยนพฤติกรรมการรับประทานอาหาร การออกกำลังกาย การหลีกเลี่ยงการสูบบุหรี่และการสัมผัสควันบุหรี่ และการรับประทานยาเมื่อกลับไปอยู่บ้าน โดยพิจารณาร่วมกับข้อมูลจากแบบบันทึกพฤติกรรมด้วยตนเองสำหรับผู้ป่วยโรคหลอดเลือดสมองชนิดขาดเลือดที่ผู้ป่วยส่งเข้าทางแอพลิเคชันไลน์ ใช้เวลา 5 นาที

1.3 ผู้วิจัย/พยาบาลกระตุ้นให้ผู้ป่วยระบายความรู้สึกในการปรับเปลี่ยนพฤติกรรมสุขภาพรวมเกี่ยวกับปัญหา อุปสรรคที่พบในการปฏิบัติกิจกรรมตามโปรแกรม ใช้เวลา 5 นาที

1.4 ผู้ป่วยและผู้วิจัย/พยาบาลอภิปรายเกี่ยวกับการปรับเปลี่ยนพฤติกรรมในการรับประทานอาหาร การออกกำลังกาย การเลิกสูบบุหรี่ และการรับประทานยาที่ผ่านมา และกำหนดเกณฑ์เป้าหมายระยะสั้นใหม่ด้วยตนเองในแต่ละครั้งของการติดตามทางโทรศัพท์ ใช้เวลา 5 นาที

APPENDIX A 11

ชุดที่ 1 ความรู้สำหรับผู้ป่วยโรคหลอดเลือดสมองชนิดขาดเลือด

APPENDIX A 11

การรับประทานอาหาร
สำหรับผู้ป่วยโรคหลอดเลือดสมองชนิดขาดเลือด

โดย อรพิน จุลมุสิ

นิสิตหลักสูตรพยาบาลศาสตรดุษฎีบัณฑิต จุฬาลงกรณ์มหาวิทยาลัย

อาจารย์ที่ปรึกษาหลัก รองศาสตราจารย์ ดร. จินตนา ยูนิพันธุ์

อาจารย์ที่ปรึกษาร่วม รองศาสตราจารย์ ดร.ชนกพร จิตปัญญา

ชุดที่ 2 ความรู้สำหรับผู้ป่วยโรคหลอดเลือดสมองชนิดขาดเลือด

การจำกัดอาหารที่มีโซเดียมสูง
สำหรับผู้ป่วยโรคหลอดเลือดสมองชนิดขาดเลือด

โดย อรพิน จุลมุสิ

นิสิตหลักสูตรพยาบาลศาสตรดุษฎีบัณฑิต จุฬาลงกรณ์มหาวิทยาลัย

อาจารย์ที่ปรึกษาหลัก รองศาสตราจารย์ ดร. จินตนา ยูนิพันธุ์

อาจารย์ที่ปรึกษาร่วม รองศาสตราจารย์ ดร.ชนกพร จิตปัญญา

ชุดที่ 3 ความรู้สำหรับผู้ป่วยโรคหลอดเลือดสมองชนิดขาดเลื

การเพิ่มกิจกรรมทางกาย
ภายหลังเกิดโรคหลอดเลือดสมองชนิดขาดเลือด

โดย อรพิน จุลมุสิ

นิสิตหลักสูตรพยาบาลศาสตรดุษฎีบัณฑิต จุฬาลงกรณ์มหาวิทยาลัย

อาจารย์ที่ปรึกษาหลัก รองศาสตราจารย์ ดร. จินตนา ยูนิพันธุ์

อาจารย์ที่ปรึกษาร่วม รองศาสตราจารย์ ดร.ชนกพร จิตปัญญา

ชุดที่ 4 ความรู้สำหรับผู้ป่วยโรคหลอดเลือดสมองชนิดขาดเลือด

การเลิกสูบบุหรี่และหลีกเลี่ยงการสัมผัสควันบุหรี่ภายหลังเกิดโรคหลอดเลือดสมองชนิดขาดเลือด

โดย อรพิน จุลมุสิ

นิสิตหลักสูตรพยาบาลศาสตรดุษฎีบัณฑิต จุฬาลงกรณ์มหาวิทยาลัย

อาจารย์ที่ปรึกษาหลัก รองศาสตราจารย์ ดร. จินตนา ยูนิพันธุ์

อาจารย์ที่ปรึกษาร่วม รองศาสตราจารย์ ดร.ชนกพร จิตปัญญา

ชุดที่ 5 ความรู้สำหรับผู้ป่วยโรคหลอดเลือดสมองชนิดขาดเลือด

การรับประทานยา
สำหรับผู้ป่วยโรคหลอดเลือดสมองชนิดขาดเลือด

โดย อรพิน จุลมุสิ

นิสิตหลักสูตรพยาบาลศาสตรดุษฎีบัณฑิต จุฬาลงกรณ์มหาวิทยาลัย

อาจารย์ที่ปรึกษาหลัก รองศาสตราจารย์ ดร. จินตนา ยูนิพันธุ์

อาจารย์ที่ปรึกษาร่วม รองศาสตราจารย์ ดร.ชนกพร จิตปัญญา

APPENDIX A 12

คู่มือประกอบการออกกำลังกาย
ตามโปรแกรมป้องกันการเกิดโรคหลอดเลือดสมองซ้ำ

โดย อรพิน จุลมุสิ

นิสิตหลักสูตรพยาบาลศาสตรดุษฎีบัณฑิต จุฬาลงกรณ์มหาวิทยาลัย

อาจารย์ที่ปรึกษาหลัก รองศาสตราจารย์ ดร. จินตนา ยูนิพันธุ์

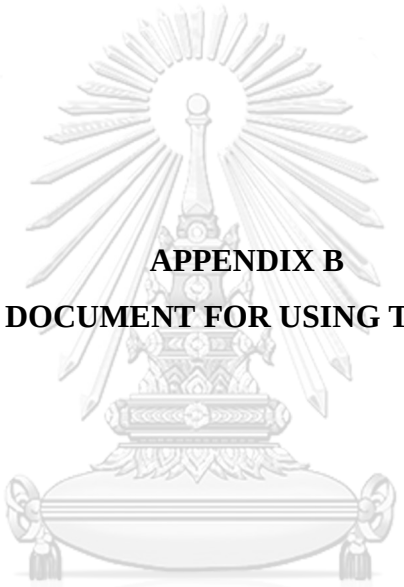
อาจารย์ที่ปรึกษาร่วม รองศาสตราจารย์ ดร.ชนกพร จิตปัญญา

APPENDIX A 13

แบบบันทึกพฤติกรรมด้วยตนเอง

สำหรับผู้ป่วยโรคหลอดเลือดสมองชนิดขาดเลือด

รหัสผู้เข้าร่วมวิจัย .....



APPENDIX B
PERMISSION DOCUMENT FOR USING THE INSTRUMENTS

ฝ่ายวิจัย
คณะแพทยศาสตร์ศิริราชพยาบาล
มหาวิทยาลัยมหิดล
โทร. 92680

ที่ อว 78.071/Evจ2272/2564
วันที่ 8 มิถุนายน 2564
เรื่อง ขอส่งหนังสือ ยินดีให้ความอนุเคราะห์ใช้เครื่องมือวิจัย จาก น.ส.อรพิน จุลมุสิ (ภายนอกคณะฯ)
เรียน หัวหน้าภ.เวชศาสตร์ฟื้นฟู

ตามที่คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย ได้ขอความอนุเคราะห์ให้ น.ส. อรพิน จุลมุสิ นิสิตชั้นปริญญาดุษฎีบัณฑิตใช้เครื่องมือวิจัย คือ Barthel Index (Thai Version) จากงานวิจัย เรื่อง “The inter-rater reliability of Barthel Index (Thai Version) inStroke patients” ของ รศ. พญ.ปิยะภัทร เดชพระธรรม และคณะฯ สาขาเวชศาสตร์ฟื้นฟูภาควิชาเวชศาสตร์ฟื้นฟู คณะแพทยศาสตร์ศิริราชพยาบาลมหาวิทยาลัยมหิดล (2549)เพื่อเป็นข้อมูลประกอบการพัฒนาวิทยานิพนธ์ เรื่อง“ผลของโปรแกรมป้องกันการเกิดโรคหลอดเลือดสมองซ้ำ ต่อความดันโลหิตไขมันในเลือดชนิดความหนาแน่นต่ำ และน้ำตาลในเลือดในผู้ป่วยโรคหลอดเลือดสมองชนิดขาดเลือดครั้งแรก” โดยมี รศ. ดร.จินตนา ยูนิพันธุ์ เป็นอาจารย์ที่ปรึกษาวิทยานิพนธ์และ รศ. ดร.ชนกพร จิตปัญญาเป็นอาจารย์ที่ปรึกษาวิทยานิพนธ์ร่วม ความละเอียดดังแจ้งแล้วนั้น

คณะแพทยศาสตร์ศิริราชพยาบาลมหาวิทยาลัยมหิดล พิจารณาแล้วยินดีอนุมัติให้ น.ส. อรพิน จุลมุสิ ใช้เครื่องมือวิจัยฯได้ตามที่ขอความอนุเคราะห์มา ทั้งนี้รายละเอียดขอให้ประสานงานโดยตรงได้ที่ ภาควิชาเวชศาสตร์ฟื้นฟู คณะแพทยศาสตร์ศิริราชพยาบาล มหาวิทยาลัยมหิดล โทร.0 2419 7508-9

จึงเรียนมาเพื่อโปรดทราบ

ประเสริฐ เอื้อวรากุล

ร่าง น.ส. พนิดา รัตนสมบูรณ์
ตรวจสอบ น.ส. อุสา ทีโน

คณะแพทยศาสตร์ศิริราชพยาบาล
มหาวิทยาลัยมหิดล
ฝ่ายวิจัย
2 ถนนวังหลัง บางกอกน้อย กรุงเทพ 10700
โทร. 0 2419 2680

ที่ อว 78.07/02875
วันที่ 2 มิถุนายน 2564
เรื่อง ยินดีให้ความอนุเคราะห์ใช้เครื่องมือวิจัย ของ น.ส.อรพิน จุลมุสิ

เรียน คณบดีคณะพยาบาลศาสตร์
จุฬาลงกรณ์มหาวิทยาลัย
อ้าง หนังสือ คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย ที่ อว 64.11/00306 ลงวันที่ 28 เมษายน
ถึง 2564

ตามที่คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย ได้ขอความอนุเคราะห์ให้ น.ส. อรพิน จุลมุสิ นิสิตชั้นปริญญาดุษฎีบัณฑิตใช้เครื่องมือวิจัย คือ Barthel Index (Thai Version) จากงานวิจัย เรื่อง “The inter-rater reliability of Barthel Index (Thai Version) inStroke patients” ของ รศ. พญ.ปิยะภัทร เดชพระธรรม และคณะฯ สาขาเวชศาสตร์ฟื้นฟูภาควิชาเวชศาสตร์ฟื้นฟู คณะแพทยศาสตร์ศิริราชพยาบาลมหาวิทยาลัยมหิดล (2549)เพื่อเป็นข้อมูลประกอบการพัฒนาวิทยานิพนธ์ เรื่อง“ผลของโปรแกรมป้องกันการเกิดโรคหลอดเลือดสมองซ้ำ ต่อความดันโลหิตไขมันในเลือดชนิดความหนาแน่นต่ำ และน้ำตาลในเลือดในผู้ป่วยโรคหลอดเลือดสมองชนิดขาดเลือดครั้งแรก” โดยมี รศ. ดร.จินตนา ยูนิพันธุ์ เป็นอาจารย์ที่ปรึกษาวิทยานิพนธ์และ รศ. ดร.ชนกพร จิตปัญญาเป็นอาจารย์ที่ปรึกษาวิทยานิพนธ์ร่วม ความละเอียดดังแจ้งแล้วนั้น

คณะแพทยศาสตร์ศิริราชพยาบาลมหาวิทยาลัยมหิดล พิจารณาแล้วยินดีอนุมัติให้ น.ส. อรพิน จุลมุสิ ใช้เครื่องมือวิจัยฯได้ตามที่ขอความอนุเคราะห์มา ทั้งนี้รายละเอียดขอให้ประสานงานโดยตรงได้ที่ ภาควิชาเวชศาสตร์ฟื้นฟู คณะแพทยศาสตร์ศิริราชพยาบาล มหาวิทยาลัยมหิดล โทร.0 2419 7508-9

จึงเรียนมาเพื่อโปรดทราบ

66573
30 เม.ย. 2564

ที่ อว 64.11/ 00306

คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย
อาคารบรมราชชนนีศรีศตพรรษ ชั้น 11
ถนนพระราม 1 แขวงวังใหม่ เขตปทุมวัน
กรุงเทพฯ 10330

28 เมษายน 2564

เรื่อง ขออนุญาตใช้เครื่องมือในการทำวิทยานิพนธ์

เรียน คณบดีคณะแพทยศาสตร์ศิริราชพยาบาล มหาวิทยาลัยมหิดล

เนื่องด้วย นางสาวอรพิน จุลมุสิ นิสิตชั้นปริญญาดุษฎีบัณฑิต คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย กำลังดำเนินการพัฒนาวิทยานิพนธ์ เรื่อง "ผลของโปรแกรมป้องกันการเกิดโรคหลอดเลือดสมองซ้ำ ต่อความดันโลหิต ไขมันในเลือดชนิดความหนาแน่นต่ำ และน้ำตาลในเลือด ในผู้ป่วยโรคหลอดเลือดสมองชนิดขาดเลือดครั้งแรก" โดยมี รองศาสตราจารย์ ดร.จินตนา ยูนิพันธุ์ เป็นอาจารย์ที่ปรึกษาวิทยานิพนธ์ และ รองศาสตราจารย์ ดร.ชนกพร จิตปัญญา เป็นอาจารย์ที่ปรึกษาวิทยานิพนธ์ร่วม ในการนี้ใคร่ขออนุญาตใช้เครื่องมือการวิจัย คือ Barthel Index (Thai Version) จากงานวิจัย เรื่อง The inter-rater reliability of Barthel Index (Thai Version) in stroke patients. ของรองศาสตราจารย์แพทย์หญิง ปิยะภัทร เดชพระธรรม และคณะฯ สาขาเวชศาสตร์ฟื้นฟู ภาควิชาเวชศาสตร์ฟื้นฟู คณะแพทยศาสตร์ศิริราชพยาบาล มหาวิทยาลัยมหิดล (2549)

จึงเรียนมาเพื่อโปรดพิจารณาอนุญาตให้นิสิตใช้เครื่องมือการวิจัยดังกล่าว คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย หวังเป็นอย่างยิ่งว่าจะได้รับความอนุเคราะห์จากท่าน และขอขอบพระคุณอย่างสูงมา ณ โอกาสนี้

ขอแสดงความนับถือ

(ผู้ช่วยศาสตราจารย์ ดร.สุรศักดิ์ ตรีนัย)
รองคณบดี
ปฏิบัติการแทนคณบดีคณะพยาบาลศาสตร์

สำเนาเรียน	หัวหน้าภาควิชาเวชศาสตร์ฟื้นฟู
ฝ่ายวิชาการ	โทร. 02-218-1131, 08-1933-9791 E-mail: fonbox@chula.ac.th
อาจารย์ที่ปรึกษา	รองศาสตราจารย์ ดร.จินตนา ยูนิพันธุ์ โทร. 02-218-1153
อาจารย์ที่ปรึกษาร่วม	รองศาสตราจารย์ ดร. ชนกพร จิตปัญญา โทร. 02-218-1366
ชื่อนิสิต	นางสาวอรพิน จุลมุสิ โทร. 06-2669-9451 E-mail: orapinja0@gmail.com

คณะแพทยศาสตร์ศิริราชพยาบาล
มหาวิทยาลัยมหิดล
ฝ่ายวิจัย
2 ถนนวังหลัง บางกอกน้อย กรุงเทพ 10700
โทร. 0 2419 2680

ที่ อว 78.07/03058
วันที่ 11 มิถุนายน 2564
เรื่อง ยินดีให้ความอนุเคราะห์ใช้เครื่องมือวิจัย ของ น.ส.อรพิน จุลมุสิ

เรียน คณบดีคณะพยาบาลศาสตร์
จุฬาลงกรณ์มหาวิทยาลัย
อ้าง หนังสือ คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย ที่ อว 64.11/00305 ลงวันที่ 28 เมษายน
ถึง 2564

ตามที่คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย ได้ขอความอนุเคราะห์ให้ น.ส. อรพิน จุลมุสิ นิสิตชั้นปริญญาดุษฎีบัณฑิตใช้เครื่องมือวิจัย คือ TheThai version of National Institute of Health Stroke Scale (NIHSS) จากงานวิจัยเรื่อง “Establishment of the Thai version of NationalInstitute of Health Stroke Scale (NIHSS) and a Validation Study”ของ รศ. นพ.ยงชัย นิละนท์ และคณะฯสาขาอายุรศาสตร์ระบบประสาทและสมอง ภาควิชาอายุรศาสตร์ คณะแพทยศาสตร์ศิริราชพยาบาลมหาวิทยาลัยมหิดล (2553) เพื่อเป็นข้อมูลประกอบการพัฒนาวิทยานิพนธ์เรื่อง “ผลของโปรแกรมป้องกันการเกิดโรคหลอดเลือดสมองซ้ำ ต่อความดันโลหิตไขมันในเลือดชนิดความหนาแน่นต่ำ และน้ำตาลในเลือดในผู้ป่วยโรคหลอดเลือดสมองชนิดขาดเลือดครั้งแรก” โดยมี รศ. ดร.จินตนา ยูนิพันธุ์ เป็นอาจารย์ที่ปรึกษาวิทยานิพนธ์และ รศ. ดร.ชนกพร จิตปัญญาเป็นอาจารย์ที่ปรึกษาวิทยานิพนธ์ร่วม ความละเอียดดังแจ้งแล้วนั้น

คณะแพทยศาสตร์ศิริราชพยาบาลมหาวิทยาลัยมหิดล พิจารณาแล้วยินดีอนุมัติให้ น.ส. อรพิน จุลมุสิ ใช้เครื่องมือวิจัยฯได้ตามที่ขอความอนุเคราะห์มา ทั้งนี้รายละเอียดขอให้ประสานงานโดยตรงได้ที่ สาขาวิชาประสาทวิทยา ภาควิชาอายุรศาสตร์คณะแพทยศาสตร์ศิริราชพยาบาล มหาวิทยาลัยมหิดล โทร.0 2419 7101-2

66575
30 มี.ย. 2564

ที่ อว 64.11/ 00305

คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย
อาคารบรมราชชนนีศรีศตพรรษ ชั้น 11
ถนนพระราม 1 แขวงวังใหม่ เขตปทุมวัน
กรุงเทพฯ 10330

28 เมษายน 2564

เรื่อง ขออนุญาตใช้เครื่องมือในการทำวิทยานิพนธ์

เรียน คณบดีคณะแพทยศาสตร์ศิริราชพยาบาล มหาวิทยาลัยมหิดล

เนื่องด้วย นางสาวอรพิน จุลมุสิ นิสิตชั้นปริญญาดุษฎีบัณฑิต คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย กำลังดำเนินการพัฒนาวิทยานิพนธ์ เรื่อง "ผลของโปรแกรมป้องกันการเกิดโรคหลอดเลือดสมองซ้ำ ต่อความดันโลหิต ไขมันในเลือดชนิดความหนาแน่นต่ำ และน้ำตาลในเลือด ในผู้ป่วยโรคหลอดเลือดสมองชนิดขาดเลือดครั้งแรก" โดยมี รองศาสตราจารย์ ดร.จินตนา ยูนิพันธุ์ เป็นอาจารย์ที่ปรึกษาวิทยานิพนธ์ และรองศาสตราจารย์ ดร.ชนกพร จิตปัญญา เป็นอาจารย์ที่ปรึกษาวิทยานิพนธ์ร่วม ในการนี้ใคร่ขออนุญาตใช้เครื่องมือการวิจัย คือ The Thai version of National Institute of Health Stroke Scale (NIHSS) จากงานวิจัย เรื่อง Establishment of the Thai version of National Institute of Health Stroke Scale (NIHSS) and a Validation Study ของ รองศาสตราจารย์ นายแพทย์ยงชัย นิละนนท์ และคณะฯ สาขาอายุรศาสตร์ระบบประสาทและสมอง ภาควิชาอายุรศาสตร์ คณะแพทยศาสตร์ศิริราชพยาบาล มหาวิทยาลัยมหิดล (2553)

จึงเรียนมาเพื่อโปรดพิจารณาอนุญาตให้นิสิตใช้เครื่องมือการวิจัยดังกล่าว คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย หวังเป็นอย่างยิ่งว่าจะได้รับความอนุเคราะห์จากท่าน และขอขอบพระคุณอย่างสูงมา ณ โอกาสนี้

ขอแสดงความนับถือ

(ผู้ช่วยศาสตราจารย์ ดร.สุรศักดิ์ ตรีนัย)
รองคณบดี
ปฏิบัติการแทนคณบดีคณะพยาบาลศาสตร์

สำเนา หัวหน้าภาควิชาอายุรศาสตร์
ฝ่ายวิชาการ โทร. 02-218-1131, 08-1933-9791 E-mail: fonbox@chula.ac.th
อาจารย์ที่ปรึกษา รองศาสตราจารย์ ดร.จินตนา ยูนิพันธุ์ โทร. 02-218-1153
อาจารย์ที่ปรึกษาร่วม รองศาสตราจารย์ ดร. ชนกพร จิตปัญญา โทร. 02-218-1366
ชื่อนิสิต นางสาวอรพิน จุลมุสิ โทร. 06-2669-9451 E-mail: orapinja0@gmail.com

คณะแพทยศาสตร์ศิริราชพยาบาล
มหาวิทยาลัยมหิดล
ฝ่ายวิจัย
2 ถนนวังหลัง บางกอกน้อย กรุงเทพ 10700
โทร. 0 2419 2680

ที่ อว 78.07/03059
วันที่ 11 มิถุนายน 2564
เรื่อง ยินดีให้ความอนุเคราะห์ใช้เครื่องมือวิจัย ของ น.ส.อรพิน จุลมุสิ

เรียน คณบดีคณะพยาบาลศาสตร์
จุฬาลงกรณ์มหาวิทยาลัย
อ้าง หนังสือ คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย ที่ อว 64.11/00307 ลงวันที่ 28 เมษายน
ถึง 2564

ตามที่คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย ได้ขอความอนุเคราะห์ให้ น.ส. อรพิน จุลมุสิ นิสิตชั้นปริญญาดุษฎีบัณฑิตใช้เครื่องมือวิจัย คือ ThaiMental State Examination: TMSE จากงานวิจัยเรื่อง“แบบทดสอบสภาพสมองของไทย” ของ ศ. นพ.นิพนธ์ พวงวรินทร์ และคณะฯ สาขาอายุรศาสตร์ระบบประสาทและสมอง ภาควิชาอายุรศาสตร์คณะแพทยศาสตร์ศิริราชพยาบาล มหาวิทยาลัยมหิดล (2536) เพื่อเป็นข้อมูลประกอบการพัฒนาวิทยานิพนธ์ เรื่อง“ผลของโปรแกรมป้องกันการเกิดโรคหลอดเลือดสมองซ้ำ ต่อความดันโลหิตไขมันในเลือดชนิดความหนาแน่นต่ำ และน้ำตาลในเลือดในผู้ป่วยโรคหลอดเลือดสมองชนิดขาดเลือดครั้งแรก” โดยมี รศ. ดร.จินตนา ยูนิพันธุ์ เป็นอาจารย์ที่ปรึกษาวิทยานิพนธ์และ รศ. ดร.ชนกพร จิตปัญญาเป็นอาจารย์ที่ปรึกษาวิทยานิพนธ์ร่วม ความละเอียดดังแจ้งแล้วนั้น

คณะแพทยศาสตร์ศิริราชพยาบาลมหาวิทยาลัยมหิดล พิจารณาแล้วยินดีอนุมัติให้ น.ส. อรพิน จุลมุสิ ใช้เครื่องมือวิจัยฯได้ตามที่ขอความอนุเคราะห์มา ทั้งนี้รายละเอียดขอให้ประสานงานโดยตรงได้ที่ สาขาวิชาประสาทวิทยา ภาควิชาอายุรศาสตร์คณะแพทยศาสตร์ศิริราชพยาบาล มหาวิทยาลัยมหิดล โทร.0 2419 7101-2

จึงเรียนมาเพื่อโปรดทราบ

66574
30 มี.ค. 2564

ที่ อว 64.11/ 00307

คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย
อาคารบรมราชชนนีศรีศตพรรษ ชั้น 11
ถนนพระราม 1 แขวงวังใหม่ เขตปทุมวัน
กรุงเทพฯ 10330

28 เมษายน 2564

เรื่อง ขออนุญาตใช้เครื่องมือในการทำวิทยานิพนธ์

เรียน คณบดี คณะแพทยศาสตร์ศิริราชพยาบาล มหาวิทยาลัยมหิดล

เนื่องด้วย นางสาวอรพิน จุลมุสิ นิสิตชั้นปริญญาดุษฎีบัณฑิต คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย กำลังดำเนินการพัฒนาวิทยานิพนธ์ เรื่อง "ผลของโปรแกรมป้องกันการเกิดโรคหลอดเลือดสมองซ้ำ ต่อความดันโลหิต ไขมันในเลือดชนิดความหนาแน่นต่ำ และน้ำตาลในเลือดในผู้ป่วยโรคหลอดเลือดสมองชนิดขาดเลือดครั้งแรก" โดยมี รองศาสตราจารย์ ดร.จินตนา ยูนิพันธุ์ เป็นอาจารย์ที่ปรึกษาวิทยานิพนธ์ และ รองศาสตราจารย์ ดร.ชนกพร จิตปัญญา เป็นอาจารย์ที่ปรึกษาวิทยานิพนธ์ร่วม ในการนี้ใคร่ขออนุญาตใช้เครื่องมือการวิจัย คือThai Mental State Examination: TMSE จากงานวิจัย เรื่อง แบบทดสอบสภาพสมองของไทย ของ ศาสตราจารย์ นายแพทย์ นิพนธ์ พวงวรินทร์ และคณะฯ สาขาอายุรศาสตร์ระบบประสาทและสมอง ภาควิชาอายุรศาสตร์ คณะแพทยศาสตร์ศิริราชพยาบาล มหาวิทยาลัยมหิดล (2536)

จึงเรียนมาเพื่อโปรดพิจารณาอนุญาตให้นิสิตใช้เครื่องมือการวิจัยดังกล่าว คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย หวังเป็นอย่างยิ่งว่าจะได้รับความอนุเคราะห์จากท่าน และขอขอบพระคุณอย่างสูงมา ณ โอกาสนี้

ขอแสดงความนับถือ

(ผู้ช่วยศาสตราจารย์ ดร.สุรศักดิ์ ตรีน้ัย)
รองคณบดี
ปฏิบัติการแทนคณบดีคณะพยาบาลศาสตร์

สำเนา หัวหน้าภาควิชาอายุรศาสตร์
ฝ่ายวิชาการ โทร. 02-218-1131, 08-1933-9791 E-mail: fonbox@chula.ac.th
อาจารย์ที่ปรึกษา รองศาสตราจารย์ ดร.จินตนา ยูนิพันธุ์ โทร. 02-218-1153
อาจารย์ที่ปรึกษาร่วม รองศาสตราจารย์ ดร. ชนกพร จิตปัญญา โทร. 02-218-1366
ชื่อนิสิต นางสาวอรพิน จุลมุสิ โทร. 06-2669-9451 E-mail: orapinja0@gmail.com

ภาควิชาจิตเวชศาสตร์ คณะแพทยศาสตร์
โรงพยาบาลรามาธิบดี มหาวิทยาลัยมหิดล
270 ถนนพระราม 6 ราชเทวี กรุงเทพมหานคร 10400
โทร. 022011929 โทรสาร 023547299

ที่ อว 78.065/ ๔๑๘
วันที่ ๓ พฤษภาคม 2564
เรื่อง อนุญาตให้ใช้เครื่องมือวิจัย

เรียน คณบดีคณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย

ตามหนังสือคณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัยโดย นางสาวอรพิน จุลมุสิ นิสิตชั้นปริญญาดุษฎีบัณฑิต คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย แจ้งความประสงค์ขออนุญาตใช้แบบทดสอบภาวะซึมเศร้า Patient Health Questionnaire -9 Thai Version (PHQ-9) พัฒนาโดย ศาสตราจารย์ นายแพทย์มาโนช หล่อตระกูล เพื่อใช้ประกอบการวิจัย เรื่อง ผลของโปรแกรมป้องกันการเกิดโรคหลอดเลือดสมองชนิดขาดเลือดครั้งแรก ความละเอียดแจ้งแล้วนั้น

ภาควิชาฯ และศาสตราจารย์ นายแพทย์มาโนช หล่อตระกูล ได้พิจารณาแล้วเห็นว่าเป็นประโยชน์และสมควรสนับสนุนอย่างยิ่ง จึงอนุญาตให้ใช้แบบประเมินดังกล่าว

ขอแสดงความนับถือ

(รองศาสตราจารย์ แพทย์หญิงสุวรรณี พุทธิศรี)
หัวหน้าภาควิชาจิตเวชศาสตร์

Gmail orapin ja <orapinja0@gmail.com>

Asking permission for using the instrument.

3 ข้อความ

orapin ja <orapinja0@gmail.com> 19 เมษายน 2564 17:28
ถึง: j.c.vanswieten@erasmusmc.nl
ส่งเมา: orapin ja <orapinja0@gmail.com>

Subject: Asking permission for using the instrument.

Dear Prof. John C. van Swieten, MD, PhD

My name is Miss Orapin Jullmusi, a Ph.D. candidate in the Faculty of Nursing, Chulalongkorn University, Thailand. Currently, I am in the process of developing a proposal on the topic "The Effects of a Recurrent Stroke Prevention Program on Blood Pressure, Low-Density Lipoprotein Cholesterol, and Blood Glucose Among Patients with First Ischemic Stroke". My advisors are Assoc. Prof. Dr. Jintana Yunibhand and Assoc. Prof. Dr. Chanokporn Jitpanya. As I have reviewed the literature, I found that the Modified Rankin Score (mRS) is a disability scale with possible scores and most widely used in patients with stroke.

Therefore, I would like to ask your permission to translate and adapt to Thai patients with stroke and then use this questionnaire for screening stroke patients in my study. If you have any questions or suggestions on my usage, please do not hesitate to contact me. Thank you very much in advance. I am looking forward to hearing from you.

Sincerely yours.

Miss Orapin Jullmusi, MNS (Gerontological Nursing), RN.

Candidate Ph.D. student,

Faculty of Nursing, Chulalongkorn University,

Bangkok 10330, Thailand

Tel: (+66) 62 6699 451

E-mail: orapinja0@gmail.com

E-mail: Orapin.J@student.chula.ac.th

J.C. van Swieten <j.c.vanswieten@erasmusmc.nl> 19 เมษายน 2564 17:41
ถึง: orapin ja <orapinja0@gmail.com>

Of course, yuo can do, John

[ข้อความที่เกี่ยวข้องถูกซ่อนไว้]

orapin ja <orapinja0@gmail.com> 19 เมษายน 2564 17:48
ถึง: "J.C. van Swieten" <j.c.vanswieten@erasmusmc.nl>

Dear Prof. John C. van Swieten, MD, PhD

Thank you very much in advance. Sincerely yours.

Miss Orapin Jullmusi, MNS (Gerontological Nursing), RN.

Candidate Ph.D. student,

Faculty of Nursing, Chulalongkorn University,

APPENDIX C
LIST OF EXPERTS

List of experts for Content Validity Testing

1. Dr. Natthapol Riablershirun, MD, a neurology, medical department, Sunpasithiprasong Hospital, Ubonratchathani

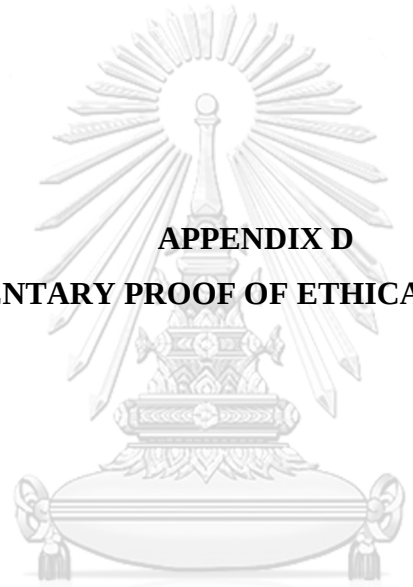
2. Assoc. Prof. Supreeda Monkong, Ph.D. Ramathibodi, School of Nursing

3. Dr. Kansuda Wunjuntuk, Ph.D. profrssor for food, nutrition, Department of Home Economic, Faculty of Agriculture, Kasetsart University.

4. Miss Rudge Rattanasatien, MSN, APN, RN Nursing Department, Faculty of Medicine, Maharaj Nakorn Chaing Mai hospital

5. Dr. Jirawan Prodbumrung, Ph.D. Department of Rehabilitation, Buddhachinaraj Phitsanulok Hospital, Phitsanulok province

APPENDIX D
DOCUMENTARY PROOF OF ETHICAL CLEARANCE



AF 02-12

The Research Ethics Review Committee for Research Involving Human Research Participants, Group I, Chulalongkorn University
Jamjuree 1 Building, 2nd Floor, Phyathai Rd., Patumwan district, Bangkok 10330, Thailand,
Tel: 0-2218-3202, 0-2218-3049 E-mail: eccu@chula.ac.th

COA No. 046/2021

Certificate of Approval

Study Title No. 224.1/63 : THE EFFECTS OF A RECURRENT STROKE PREVENTION PROGRAM ON BLOOD PRESSURE, LOW DENSITY LIPOPROTEIN CHOLESTEROL, AND BLOOD GLUCOSE AMONG PATIENTS WITH FIRST ISCHEMIC STROKE

Principal Investigator : MISS ORAPIN JULLMUSI

Place of Proposed Study/Institution: Faculty of Nursing, Chulalongkorn University

The Research Ethics Review Committee for Research Involving Human Research Participants, Group I, Chulalongkorn University, Thailand, has approved constituted in accordance with Belmont Report 1979, Declaration of Helsinki 2013, Council for International Organizations of Medical Sciences (CIOM) 2016, Standards of Research Ethics Committee (SREC) 2017, and National Policy and guidelines for Human Research 2015.

Signature: Prida Tasanapradit
(Associate Prof. Prida Tasanapradit, M.D.)
Chairman

Signature: Raveenan Mingpakanee
(Assistant Prof. Raveenan Mingpakanee, Ph.D.)
Secretary

Date of Approval : 25 February 2021 Approval Expire date : 24 February 2022

The approval documents including;

1) Research proposal
2) Participant Information Sheet and Consent Form
3) Researcher
4) Questionnaires

Protocol No. 224.1/63
Date of Approval 25 FEB 2021
Approval Expire Date 24 FEB 2022

The approved investigator must comply with the following conditions:

1. *It's unethical to collect data of research participants before the project has been approved by the committee.*
2. *The research/project activities must end on the approval expired date. To renew the approval, it can be applied one month prior to the expired date with submission of progress report.*
3. *Strictly conduct the research/project activities as written in the proposal.*
4. *Using only the documents that bearing the RECCU's seal of approval: research tools, information sheet, consent form, invitation letter for research participation (if applicable).*
5. *Report to the RECCU for any serious adverse events within 5 working days.*
6. *Report to the RECCU for any amendment of the research project prior to conduct the research activities.*
7. *Report to the RECCU for termination of the research project within 2 weeks with reasons.*
8. *Final report (AF 01-15) and abstract is required for a one year (or less) research/project and report within 30 days after the completion of the research/project.*
9. *Research project with several phases; approval will be approved phase by phase, progress report and relevant documents for the next phase must be submitted for review.*
10. *The committee reserves the right to site visit to follow up how the research project being conducted.*
11. *For external research proposal the dean or head of department oversees how the research being conducted.*

AF 08-09/02.0

COA No. 022
IRB No. 027/64

คณะกรรมการจริยธรรมการวิจัยในมนุษย์ โรงพยาบาลพุทธชินราช พิษณุโลก
BUDDHACHINARAJ PHITSANULOK HOSPITAL INSTITUTIONAL REVIEW BOARD
90 ศรีธรรมไตรปิฎก ตำบลในเมือง อำเภอเมือง จังหวัดพิษณุโลก 65000 เบอร์โทรศัพท์ 05527 0300

เอกสารรับรองโครงการวิจัย

คณะกรรมการจริยธรรมการวิจัยในมนุษย์ โรงพยาบาลพุทธชินราช พิษณุโลก ดำเนินการให้การรับรองโครงการวิจัยตามแนวทางหลักจริยธรรมการวิจัยในคนที่เป็นมาตรฐานสากลได้แก่ Declaration of Helsinki, The Belmont Report, CIOMS Guideline และ International Conference on Harmonization in Good Clinical Practice หรือ ICH-GCP

ชื่อโครงการ	: (ไทย) ผลของโปรแกรมป้องกันการเกิดโรคหลอดเลือดสมองซ้ำ ต่อความดันโลหิต ไขมันในเลือด ชนิดความหนาแน่นต่ำ และน้ำตาลในเลือด ในผู้ป่วยโรคหลอดเลือดสมองชนิดขาดเลือดครั้งแรก
Study Title	: (English) The Effects Of A Recurrent Stroke Prevention Program On Blood Pressure, LowDensity Lipoprotein Cholesterol,And Blood Glucose Among Patients With First Ischemic Stroke
เลขที่โครงการวิจัย	: 283/63
ผู้วิจัยหลัก	: (ไทย) นางสาวอรพิณ จุลมุสิ
Principal investigator	: (English) -
สังกัดหน่วยงาน	: คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย
ผู้ร่วมวิจัย	: (ไทย) -
Co-investigators	: (English) -
สังกัดหน่วยงาน	: -
วิธีทบทวน	: แบบเร่งรัด (Expedited)
รายงานความก้าวหน้า	: ส่งรายงานความก้าวหน้าอย่างน้อย 1 ครั้ง/ปี หรือ ส่งรายงานฉบับสมบูรณ์หากดำเนินโครงการเสร็จสิ้นก่อน 1 ปี

เอกสารรับรอง

1. แบบเสนอโครงการวิจัย
2. เอกสารชี้แจงผู้เข้าร่วมการวิจัย
3. หนังสือแสดงเจตนายินยอมเข้าร่วมการวิจัย
4. แบบสอบถาม
5. ตารางแสดงผลลัพธ์งานวิจัย

ลงนาม: .....

(แพทย์หญิงอรวรรณ ไชยมหาพฤกษ์)
ประธานคณะกรรมการจริยธรรมการวิจัยในมนุษย์

วันที่รับรอง	: (ไทย) 4 มีนาคม 2564
Date of Approval	: (English) Mar 4, 2021
วันหมดอายุ	: (ไทย) 3 มีนาคม 2565
Approval Expedited Date	: (English) Mar 3, 2022

ทั้งนี้ การรับรองนี้มีเงื่อนไขดังที่ระบุไว้ด้านหลังทุกข้อ (ดูด้านหลังของเอกสารรับรองโครงการวิจัย)

APPENDIX E
INFORMED CONSENT AND PARTICIPANT INFORMATION

Version3.0 (23/2/2564) AF 03-06

เอกสารข้อมูลสำหรับผู้มีส่วนร่วมในการวิจัย และหนังสือแสดงยินยอมเข้าร่วมการวิจัย (กลุ่มทดลอง)

ชื่อโครงการวิจัย ผลของโปรแกรมป้องกันการเกิดโรคหลอดเลือดสมองซ้ำต่อความดันโลหิต ไขมันในเลือด ชนิดความหนาแน่นต่ำและน้ำตาลในเลือด ในผู้ป่วยโรคหลอดเลือดสมองชนิดขาดเลือดครั้งแรก

ชื่อผู้วิจัย นางสาวอรพิน จุลมุสิ . **ตำแหน่ง** นิสิตระดับปริญญาดุษฎีบัณฑิต
สถานที่ติดต่อผู้วิจัย (ที่ทำงาน) คณะพยาบาลศาสตร์ มหาวิทยาลัยนเรศวร เลขที่ 99 หมู่ 9 ต.ท่าโพธิ์ อ.เมืองพิษณุโลก จ.พิษณุโลก 65000
(ที่บ้าน) บ้านเลขที่ 221 หมู่7 ต.ช่องลม อ.ลานกระบือ จ.กำแพงเพชร 62170
โทรศัพท์ที่บ้าน – **โทรศัพท์มือถือ** 062 6699 451
E-mail: orapinja0@gmail.com

ขอเรียนเชิญท่านเข้าร่วมในการวิจัย ก่อนที่ท่านจะตัดสินใจเข้าร่วมในการวิจัยนี้ มีความจำเป็นอย่างยิ่งที่ท่านควรทำความเข้าใจว่างานวิจัยนี้เกี่ยวข้องอะไรและทำเพราะเหตุใด กรุณาใช้เวลาในการอ่านข้อมูลต่อไปนี้อย่างระเอียดรอบคอบ ท่านสามารถสอบถามผู้วิจัยได้หากข้อยความใดไม่ชัดเจน ท่านสามารถขอคำแนะนำในการเข้าร่วมโครงการวิจัยนี้จากครอบครัว เพื่อน หรือแพทย์ประจำตัวของท่านได้ ท่านมีเวลาอย่างเพียงพอในการตัดสินใจโดยอิสระ หากท่านตัดสินใจแล้วว่าจะเข้าร่วมในการวิจัยนี้ ขอให้ท่านลงนามในเอกสารแสดงความยินยอมของงานวิจัยนี้

1. งานวิจัยนี้จัดทำเพื่อศึกษาผลของโปรแกรมป้องกันการเกิดโรคหลอดเลือดสมองซ้ำต่อความดันโลหิต ไขมันในเลือดชนิดความหนาแน่นต่ำและน้ำตาลในเลือด ในผู้ป่วยโรคหลอดเลือดสมองชนิดขาดเลือดครั้งแรก เพื่อลดโอกาสเกิดโรคหลอดเลือดสมองซ้ำ เนื่องจากโรคหลอดเลือดสมองชนิดขาดเลือดเป็นปัญหาสุขภาพที่สำคัญของประเทศไทย และมีอัตราการเกิดสูงกว่าโรคหลอดเลือดสมองชนิดอื่น ๆ นอกจากนี้ผู้ป่วยที่รอดชีวิตมีโอกาสเกิดโรคหลอดเลือดสมองซ้ำสูง ดังจะเห็นได้จากผลการศึกษาของสตาเมเยอร์และคณะในปี พ.ศ.2562 พบว่าการเกิดโรคหลอดเลือดสมองซ้ำพบได้มากหลังจากเกิดโรคหลอดเลือดสมองครั้งแรก โดยพบความเสี่ยงในการเกิดโรคหลอดเลือดสมองซ้ำถึงร้อยละ 1.2 ในระยะ 30 วันแรก พบร้อยละ 3.4 ภายในระยะเวลา 3 เดือน นอกจากนั้นในระยะ 1 ปีและ 5 ปี พบการเกิดโรคซ้ำถึงร้อยละ 7.4 และร้อยละ 19.4 ตามลำดับ จากสถิติดังกล่าวจะเห็นได้ว่าการป้องกันการเกิดโรคหลอดเลือดสมองซ้ำจึงควรให้ความสำคัญทันทีภายหลังเกิดโรคหลอดเลือดสมองครั้งแรก เนื่องจากการกลับเป็นซ้ำของโรคหลอดเลือดสมองจัดเป็นผลกระทบที่ร้ายแรง ส่งผลให้ผู้ป่วยมีความพร่องในการทำหน้าที่ของร่างกายและการทำงานของระบบประสาทเพิ่มมากขึ้น มีอัตราการตายเพิ่มสูงขึ้นเป็นสองเท่าจากการเกิดโรคหลอดเลือดสมองครั้งก่อนหน้า และต้องเสียค่าใช้จ่ายในการรักษาเพิ่มขึ้น ภายหลังการเกิดโรคหลอดเลือดสมองชนิดขาดเลือด ผู้ป่วย ต้องควบคุมโรครวมถึงปัจจัยเสี่ยงต่อการเกิดโรคซ้ำ ได้แก่ ความดันโลหิตสูง ภาวะไขมันในเลือดสูง และภาวะน้ำตาลในเลือดสูงได้

2. ผู้วิจัยเป็นผู้ดำเนินการอธิบายข้อมูลในงานวิจัยให้กับท่านด้วยตนเอง และแจกเอกสารข้อมูลและแบบขอความยินยอมให้ท่านลงลายมือชื่อหากท่านยินยอมเข้าร่วมงานวิจัย

3. ท่านได้รับเชิญให้เข้าร่วมงานวิจัยนี้ เนื่องจากท่านเป็นผู้ป่วยโรคหลอดเลือดสมองชนิดขาดเลือดที่ได้รับการรักษาที่หอผู้ป่วยโรคหลอดเลือดสมองหรือหอผู้ป่วยอายุรกรรมของโรงพยาบาลพุทธชินราชจังหวัด

เลขที่โครงการวิจัย 224.1/63
วันที่รับรอง 25 ก.พ. 2564
วันหมดอายุ 24 ก.พ. 2565

Version3.0 (23/2/2564)

AF 03-06

เอกสารข้อมูลสำหรับผู้มีส่วนร่วมในการวิจัย และหนังสือแสดงยินยอมเข้าร่วมการวิจัย (กลุ่มควบคุม)

ชื่อโครงการวิจัย ผลของโปรแกรมป้องกันการเกิดโรคหลอดเลือดสมองซ้ำต่อความดันโลหิต ไขมันในเลือด ชนิดความหนาแน่นต่ำและน้ำตาลในเลือด ในผู้ป่วยโรคหลอดเลือดสมองชนิดขาดเลือดครั้งแรก

ชื่อผู้วิจัย นางสาวอรพิน จุลมุสิ **ตำแหน่ง** นิสิตระดับปริญญาดุษฎีบัณฑิต
สถานที่ติดต่อผู้วิจัย (ที่ทำงาน) คณะพยาบาลศาสตร์ มหาวิทยาลัยนเรศวร เลขที่ 99 หมู่ 9 ต.ท่าโพธิ์ อ.เมืองพิษณุโลก จ.พิษณุโลก 65000
(ที่บ้าน) บ้านเลขที่ 221 หมู่7 ต.ช่องลม อ.ลานกระบือ จ.กำแพงเพชร 62170
โทรศัพท์ที่บ้าน – **โทรศัพท์มือถือ** 062 6699 451
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2. ผู้วิจัยเป็นผู้ดำเนินการอธิบายข้อมูลในงานวิจัยให้กับท่านด้วยตนเอง และแจกเอกสารข้อมูลและแบบขอความยินยอมให้ท่านลงลายมือชื่อหากท่านยินยอมเข้าร่วมงานวิจัย

3. ท่านได้รับเชิญให้เข้าร่วมงานวิจัยนี้ เนื่องจากท่านเป็นผู้ป่วยโรคหลอดเลือดสมองชนิดขาดเลือดที่ได้รับการรักษาที่หอผู้ป่วยโรคหลอดเลือดสมองหรือหอผู้ป่วยอายุรกรรมของโรงพยาบาลพุทธชินราชจังหวัด

APPEMDIX F
ASSUMPTIONS TESTING OF REPEATED MEASURE MANOVA

Assumptions testing of repeated measure MANOVA

The assumptions testing of repeated measure MANOVA including continuous dependent variables, categorical independent variables, adequate sample size, multivariate normality, absence of multicollinearity, linearity, and homogeneity of covariance (Laerd Statistics, 2018) were met.

Assumption 1: Continuous dependent variables

There were four dependent variables in this study including systolic blood pressure, diastolic blood pressure, fasting plasma glucose, and low-density lipoprotein cholesterol. The level of measurement among these continuous variables were interval level. Therefore, the assumption is not violated.

Assumption 2: Categorical independent variables

The categorical independent variables of this study were the experimental (the recurrent stroke prevention program) and control groups. Therefore, the assumption is not violated.

Assumption 3: Adequate sample size

The sample size estimation was determined from previous intervention studies with repeated measure design like this study and calculated by G*power program. The final sample size was 30 in each group. Therefore, the assumption is not violated.

Assumption 4: Multivariate normality

Skewness (Sk) and Kurtosis (Ku) values were used to test multivariate normality. After testing the Skewness and Kurtosis of four dependent variables in four period of times, it was found that the Skewness and Kurtosis were in between ±3. The distribution of the scores for the levels of all dependent variables were closed to zero. These values demonstrate that data dose not remarkable depart from normal distribution. See Table 1.

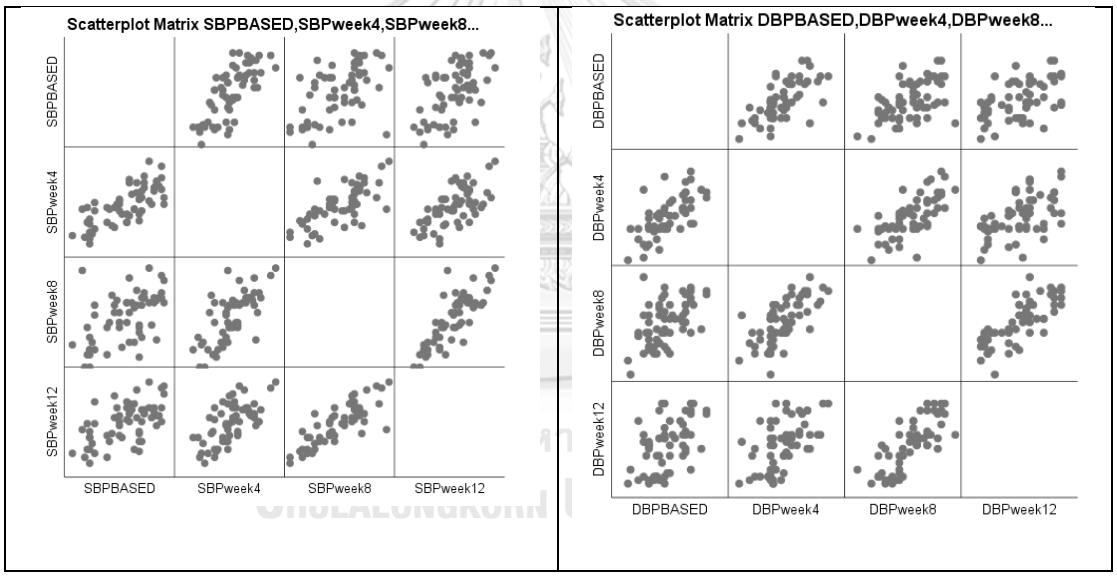
Table 1 Descriptive statistic and multivariate normality test (N = 60)

	Experimental Group (n = 30)						Control Group (n = 30)					
	Min	**Max**	**Mean**	**SD**	**Sk**	**Ku**	**Min**	**Max**	**Mean**	**SD**	**Sk**	**Ku**
SBP baseline	121.00	157.00	142.87	10.57	-0.61	-1.01	125.00	158.00	141.90	9.98	-0.02	-0.84
SBP week4	122.00	159.00	141.33	11.31	-0.14	-1.14	118.00	168.00	141.40	11.46	0.29	0.37
SBP week8	120.00	150.00	135.97	9.56	0.04	-1.30	125.00	160.00	144.10	8.83	-0.27	-0.07
SBP week12	117.00	145.00	131.90	8.59	0.03	-1.36	130.00	158.00	142.93	7.76	0.16	-0.74
DBP baseline	74.00	104.00	89.67	7.16	-0.05	-0.40	75.00	104.00	87.93	7.18	0.42	-0.54
DBP week4	72.00	103.00	88.27	7.41	0.08	-0.17	73.00	106.00	88.73	7.63	0.34	0.14
DBP week8	76.00	95.00	84.60	5.47	0.44	-0.80	72.00	100.00	89.53	6.09	-0.80	1.09
DBP week12	74.00	94.00	80.53	5.69	0.59	-0.77	78.00	97.00	89.43	5.20	-0.09	-0.83
LDL baseline	88.00	138.00	112.07	14.19	-0.16	-0.87	78.00	133.00	103.57	17.07	-0.15	-1.45
LDL week4	71.00	125.00	104.60	13.43	-0.46	-0.29	71.00	138.00	99.03	15.16	0.48	-0.01
LDL week8	75.00	118.00	96.17	11.60	0.81	-0.95	72.00	138.00	100.47	16.57	0.08	-0.40
LDL week12	73.00	114.00	90.03	10.78	0.47	-0.54	80.00	126.00	103.73	13.62	-0.17	-1.33
FPG baseline	86.00	129.00	108.50	13.77	-0.01	-1.38	85.00	126.00	103.90	12.07	0.16	-1.13
FPG week4	78.00	125.00	103.90	13.36	-0.11	-0.87	80.00	137.00	104.43	14.60	0.41	-0.55
FPG week8	75.00	118.00	94.93	11.77	0.46	-0.65	84.00	131.00	104.53	12.65	0.26	-0.75
FPG week12	71.00	114.00	89.27	9.15	0.54	0.41	84.00	128.00	109.50	10.43	-0.40	0.00

SE_{sk} = .427, SE_{ku} = .833, *p < .05

Assumption 5: Linearity

The assumption of linearity requires that the associations among variables must be in linear pattern. There should be a liner relationship between each pair of dependent variables for each related group of the independent variable. This assumption was tested using scatterplots of pairs of variables. In this study, scatterplots showed that the values tending to rise together indicate a positive correlation and confirm with Q-Q plot. In this study, normal Q-Q plots of regression standardized residual showed linear association among variables. Thus, it could be concluded that the assumption of linearity was met. See Figure 1-2.



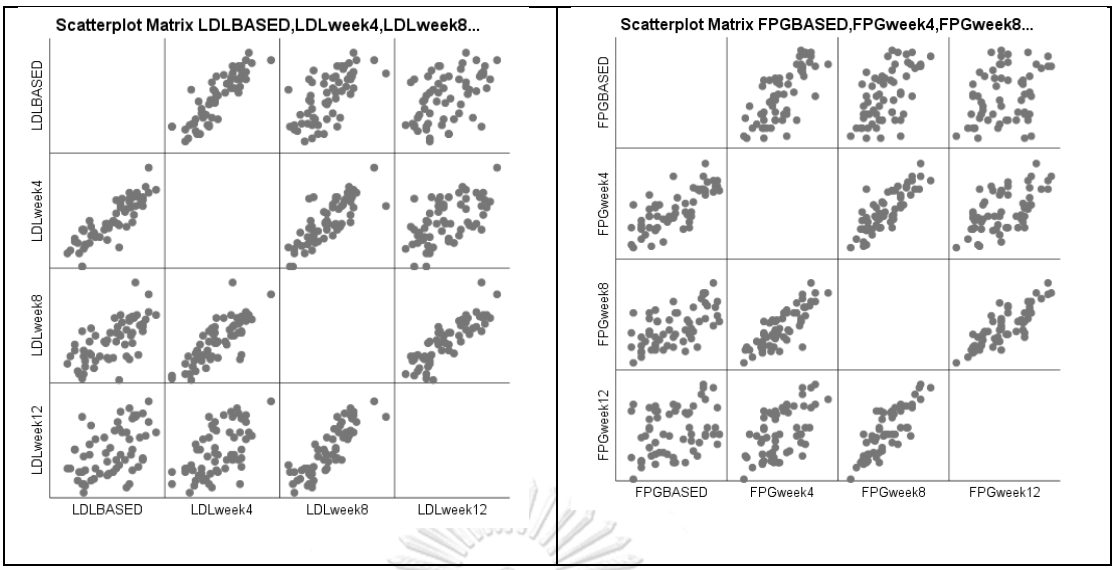
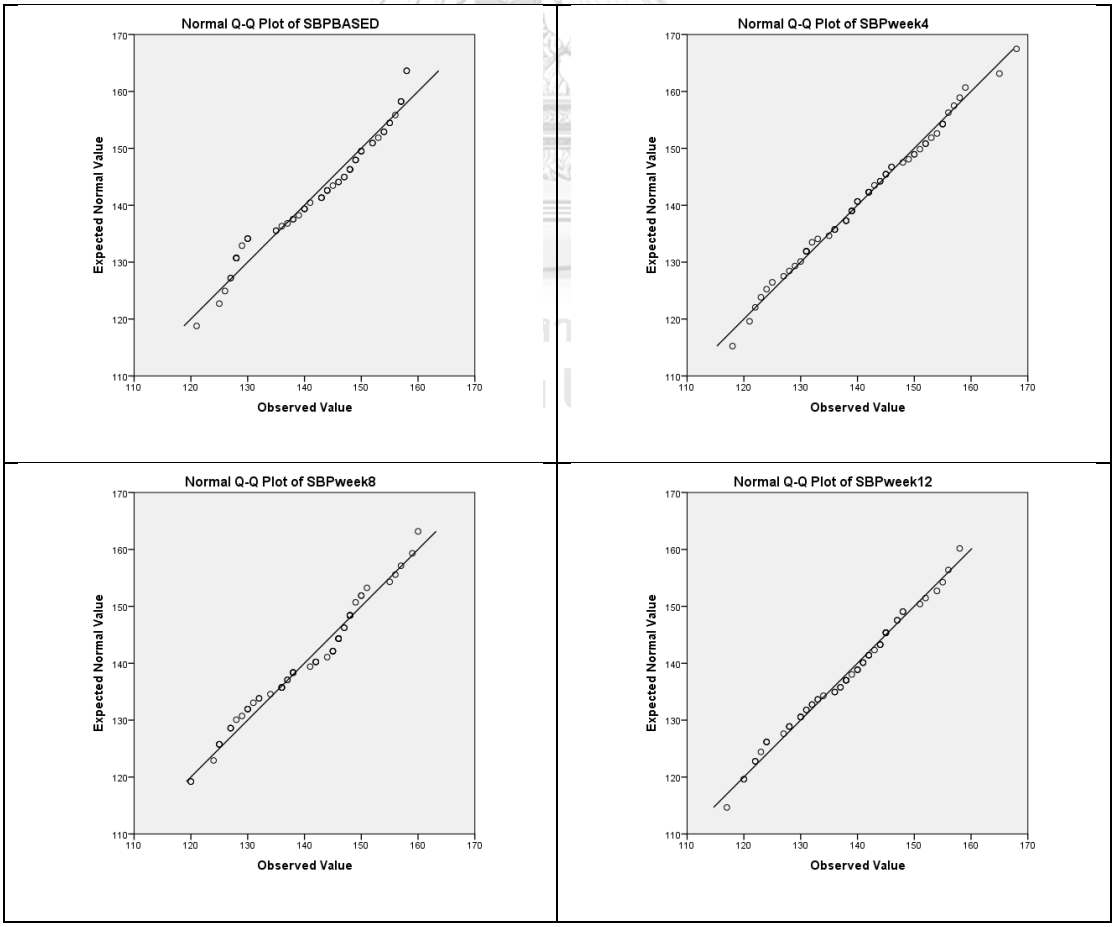
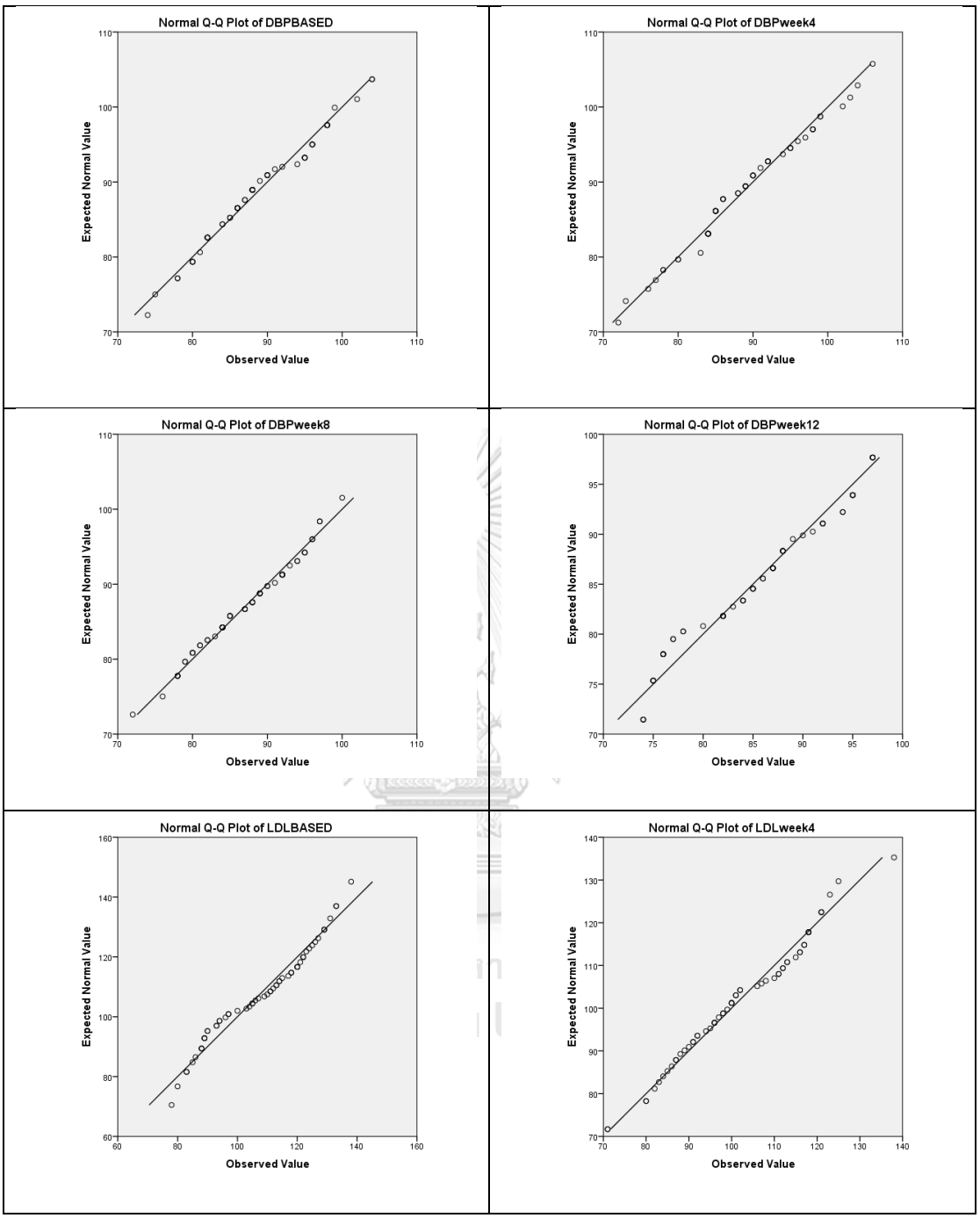


Figure 1 Scatterplots of dependent variables




Normal Q-Q Plot of DBPBASED
Expected Normal Value
Observed Value
Normal Q-Q Plot of DBPweek4
Expected Normal Value
Observed Value
Normal Q-Q Plot of DBPweek8
Expected Normal Value
Observed Value
Normal Q-Q Plot of DBPweek12
Expected Normal Value
Observed Value
Normal Q-Q Plot of LDLBASED
Expected Normal Value
Observed Value
Normal Q-Q Plot of LDLweek4
Expected Normal Value
Observed Value

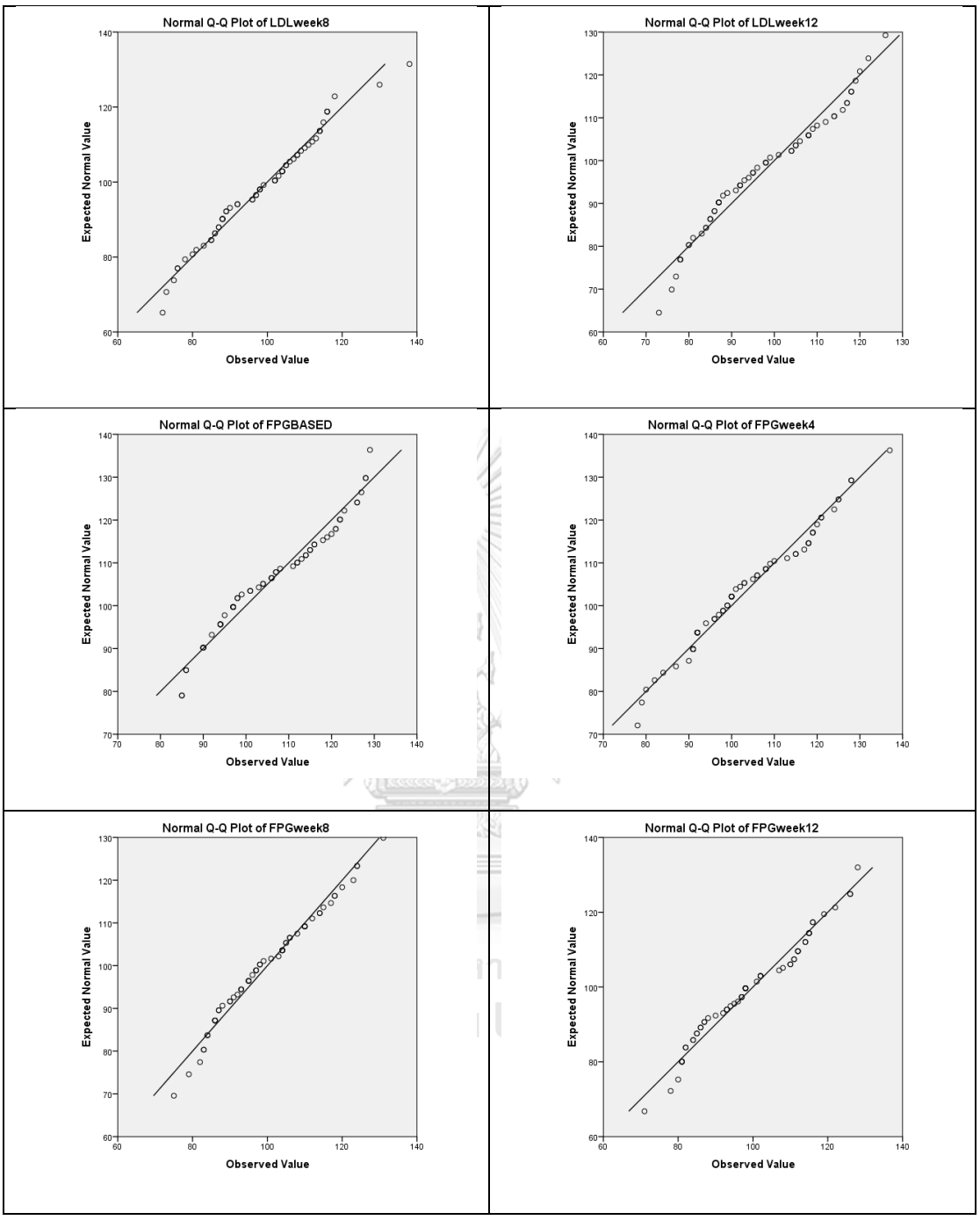


Figure 2 Q-Q plots of dependent variables

Assumption 6: Multivariate outlier

Multivariate outliers were screened by computing Mahalanobis distance for each case on four continuous variables. In this study, the result of Mahalanobis distance (MD) was not detected multivariate outlier. Therefore, the assumption is not violated (MD = .134 – 15.241, p = .002 - .987).

Assumption 7: Multicollinearity

Multicollinearity is defined as the interrelatedness of the dependent variables. Generally, there should be no multicollinearity between variables in the study. It is believed that the high correlations among variables would make the evaluation of statistical results problematic (Laerd Statistics, 2018). In this study, it was found that there was no multicollinearity among studied variables. See Table 2.

Table 2 Pearson correlations among studied variables (N=60)

	SBP base	SBP wk4	SBP wk8	SBP wk12	DBP base	DBP wk4	DBP wk8	DBP wk12	LDL base	LDL wk4	LDL wk8	LDL wk12	FPG base	FPG wk4	FPG wk8	FPG wk12
SBP base	1															
SBP wk4	.740**	1														
SBP wk8	.544**	.712**	1													
SBP wk12	.592**	.651**	.825**	1												
DBP base	.771**	.582**	.310*	.327*	1											
DBP wk4	.581**	.789**	.541**	.422**	.673**	1										
DBP wk8	.527**	.602**	.747**	.646**	.534**	.688**	1									
DBP wk12	.445**	.513**	.666**	.783**	.500**	.556**	.775**	1								
LDL base	.301*	.196	.034	.060	.189	.049	-.086	-.095	1							
LDL wk4	.160	.088	-.001	.129	.085	.008	-.169	-.008	.747**	1						
LDL wk8	.252	.144	.199	.355**	.074	.032	.033	.199	.598**	.820**	1					
LDL wk12	.194	.147	.344**	.525**	.044	.084	.258*	.477**	.336**	.564**	.838**	1				
FPG base	.393**	.221	.053	.019	.403**	.212	.075	.063	.278*	.193	.101	-.014	1			
FPG wk4	.395**	.259*	.074	.099	.453**	.304*	.168	.194	.201	.188	.117	.047	.869**	1		
FPG wk8	.411**	.255*	.243	.299*	.413**	.260*	.283*	.399**	.262*	.290*	.371**	.377**	.680**	.794**	1	
FPG wk12	.235	.119	.304*	.392**	.212	.137	.283*	.494**	.172	.237	.436**	.568**	.490**	.583**	.859**	.235

** p-value < .01, * p-value < .05

Assumption 8: Homogeneity of covariance

In this study, Box's M was utilized to test the homogeneity of covariance. It was a multivariate statistical test used to check the equality of multiple variance-covariance matrices. Considering the dependent variables including systolic blood pressure, diastolic blood pressure, low density lipoprotein cholesterol, and blood glucose at four periods of time (baseline, week 4, week 8, and week 12), it was found that there was no significant between groups (Box's M =175.40, F=.91, df1=136, df2=10388.36, p=.77) as shown in Table 3.

Table 3 Box's test of equality of covariance metrices

Box's M	F	df1	df2	p-value
175.40	.91	136	10388.36	.77

* Box's M is significant at p<.05

Furthermore, Pillai's Trace, Wilks' Lambda, Hotelling's Trace, and Roy's Largest Root were utilized to test the multivariate analysis of variance. For this study Pillai's Trace test was selected due to the number of participants in experimental and control groups were equal. It was a value that ranged from 0 to 1. It is better addresses violations of assumptions (Laerd Statistics, 2018).

Moreover, Levene's Test was also used to test the equality of error variances. It was found that the variances among dependent variables including systolic blood pressure, diastolic blood pressure, low density lipoprotein cholesterol, and blood glucose at four periods of time (baseline, week 4, week 8, and week 12), it was found that the equality of error variances were equal across four times of measurement. See Table 4.

Table 4 Levene's Test of Equality of Error Variances

Variables	F	df1	df2	p-value
SBP baseline	.891	1	58	.349
SBP week4	.384	1	58	.538
SBP week8	1.088	1	58	.301
SBP week12	.912	1	58	.343
DBP baseline	.015	1	58	.902
DBP week4	.005	1	58	.943
DBP week8	.042	1	58	.839
DBP week12	.583	1	58	.448
LDL baseline	3.569	1	58	.064
LDL week4	.196	1	58	.660
LDL week8	3.820	1	58	.055
LDL week12	3.325	1	58	.073
FPG baseline	1.110	1	58	.296
FPG week4	.175	1	58	.677
FPG week8	.142	1	58	.708
FPG week12	.161	1	58	.689

SBP= Systolic blood pressure, DBP=Diastolic blood pressure, LDL=Low-density lipoprotein cholesterol, FPG= Fasting plasma glucose.

Assumption 9 Sphericity

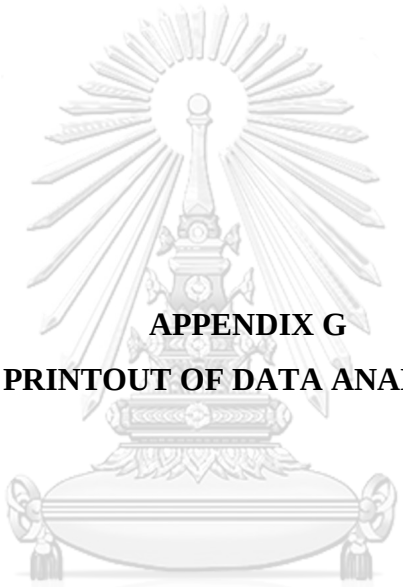
Mauchly's Test of Sphericity was used to test the assumption of sphericity. Table 4.12 demonstrates the results of Sphericity testing by using the Mauchly analysis. There appears to be sufficient evidence that the sphericity assumption has not been violated. See Table 5.

Table 5 Mauchly's Test of Sphericity

Within Subjects Effect	Measure	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b]		
						Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Time	SBP	.770	14.843	5	.011	.874	.935	.333
	DBP	.799	12.763	5	.026	.891	.954	.333
	LDL	.549	33.988	5	.000	.715	.757	.333
	FPG	.624	26.744	5	.000	.809	.861	.333

a. Design: Intercept + GROUP Within Subjects Design: Time

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.



APPENDIX G
PRINTOUT OF DATA ANALYSIS

APPENDIX G 1

Table 6 Comparison mean of systolic blood pressure, diastolic blood pressure, low-density lipoprotein cholesterol between the experimental group (n= 30) and the control group (n= 30)

Outcomes	Groups	Mean	SD	MD	SE_{MD}	df	t	p
SBPBASED	EXERIMENTAL	142.87	10.57	0.97	2.65	58.00	0.36	0.72
	CONTROL	141.90	9.98	0.97	2.65			
SBPweek4	EXERIMENTAL	141.33	11.31	-0.07	2.94	58.00	-0.02	0.98
	CONTROL	141.40	11.46	-0.07	2.94			
SBPweek8	EXERIMENTAL	135.97	9.56	-8.13	2.38	58.00	-3.42	0.00*
	CONTROL	144.10	8.83	-8.13	2.38			
SBPweek12	EXERIMENTAL	131.90	8.59	-11.03	2.11	58.00	-5.22	0.00*
	CONTROL	142.93	7.76	-11.03	2.11			
DBPBASED	EXERIMENTAL	89.67	7.16	1.73	1.85	58.00	0.94	0.35
	CONTROL	87.93	7.18	1.73	1.85			
DBPweek4	EXERIMENTAL	88.27	7.41	-0.47	1.94	58.00	-0.24	0.81
	CONTROL	88.73	7.63	-0.47	1.94			
DBPweek8	EXERIMENTAL	84.60	5.47	-4.93	1.49	58.00	-3.30	0.00*
	CONTROL	89.53	6.09	-4.93	1.49			
DBPweek12	EXERIMENTAL	80.53	5.69	-8.90	1.41	58.00	-6.33	0.00*
	CONTROL	89.43	5.20	-8.90	1.41			
LDLBASED	EXERIMENTAL	112.07	14.19	8.50	4.05	58.00	2.10	0.04*
	CONTROL	103.57	17.07	8.50	4.05			
LDLweek4	EXERIMENTAL	104.60	13.43	5.57	3.70	58.00	1.51	0.14
	CONTROL	99.03	15.16	5.57	3.70			
LDLweek8	EXERIMENTAL	96.17	11.60	-4.30	3.69	58.00	-1.16	0.25
	CONTROL	100.47	16.57	-4.30	3.69			

Outcomes	Groups	Mean	SD	MD	SE_{MD}	df	t	p
LDLweek12	EXERIMENTAL	90.03	10.78	-13.70	3.17	58.00	-4.32	0.00*
	CONTROL	103.73	13.62	-13.70	3.17			
FPGBASED	EXERIMENTAL	108.50	13.77	4.60	3.34	58.00	1.38	0.17
	CONTROL	103.90	12.07	4.60	3.34			
FPGweek4	EXERIMENTAL	103.90	13.36	-0.53	3.61	58.00	-0.15	0.88
	CONTROL	104.43	14.60	-0.53	3.61			
FPGweek8	EXERIMENTAL	94.93	11.77	-9.60	3.15	58.00	-3.04	0.00*
	CONTROL	104.53	12.65	-9.60	3.15			
FPGweek12	EXERIMENTAL	89.27	9.15	-20.23	2.53	58.00	-7.99	0.00*
	CONTROL	109.50	10.43	-20.23	2.53			

*p<.05, SBP= Systolic blood pressure, DBP=Diastolic blood pressure, LDL=Low-density lipoprotein cholesterol, FPG= Fasting plasma glucose.

From Table 6, a comparison of mean of systolic blood pressure between the experimental group and the control group in each point of time, the results showed that mean systolic blood pressure of the experimental group and the control group was significantly at week 8 and week 12, t= -3.42 and -5.22, respectively. The statistically significant mean systolic blood pressure at .05 level (p= .00, both points of time).

The mean different of diastolic blood pressure between the experimental group and the control group in each point of time, the results showed that mean diastolic blood pressure of the experimental group and the control group at week 8 and week 12, t=-3.30, -6.33, respectively. The statistically significant mean diastolic blood pressure at .05 level (p= .00, both points of time). See Table 6.

The mean different of low-density lipoprotein cholesterol between the experimental group and the control group in each point of time, the results showed that mean low-density lipoprotein cholesterol of the experimental group and the control

group at week 12, t=-4.32. The statistically significant mean low-density lipoprotein cholesterol at .05 level (p = .00). See Table 6.

A comparison of mean different of fasting plasma glucose between the experimental group and the control group in each point of time, the results showed that mean fasting plasma glucose of the experimental group and the control group at week 8 and week 12, t= -3.04, -7.99, respectively. The statistically significant mean fasting plasma glucose at .05 level (p= .00, both points of time). See Table 6.

APPENDIX G 2

Table 7 Comparing repeated measure MANONVA in different points of time between groups

Source	Measure	Type III Sum of Squares	df	Mean Square	F	p	Partial Eta Squared
Intercept	SBP	4724181.600	1	4724181.600	15323.127	.000	.996
	DBP	1830681.338	1	1830681.338	13955.916	.000	.996
	FPG	2515149.004	1	2515149.004	4978.956	.000	.988
	LDL	2458350.417	1	2458350.417	3553.188	.000	.984
GROUP	SBP	1251.267	1	1251.267	4.059	.049	.065
	DBP	592.204	1	592.204	4.515	.038	.072
	FPG	2489.704	1	2489.704	4.929	.030	.078
	LDL	58.017	1	58.017	.084	.773	.001
Error	SBP	17881.633	58	308.304			
	DBP	7608.208	58	131.176			
	FPG	29299.042	58	505.156			
	LDL	40128.567	58	691.872			

For the repeated measures MANOVA between the experimental and control groups, the results revealed that there were statistically significant in mean different between systolic blood pressure (F = 4.059, p = .049), diastolic blood pressure (F = 4.515, p = .038), and fasting plasma glucose (F = 4.929, p = .030) in difference four points of time. While there was not statistically significant in mean score of low-density lipoprotein cholesterol (F = .084, p = .77) in difference four points of time. See Table 7.

APPENDIX G 3

Table 8 Comparing repeated measure MANONVA in different points of time within groups

Source	Measure	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Time	SBP	790.563	1	790.563	28.634	.000	.331
	DBP	497.941	1	497.941	39.330	.000	.404
	LDL	3953.070	1	3953.070	59.002	.000	.504
	FPG	1857.541	1	1857.541	37.956	.000	.396
Time * GROUP	SBP	1456.403	1	1456.403	52.751	.000	.476
	DBP	991.901	1	991.901	78.346	.000	.575
	LDL	4385.363	1	4385.363	65.454	.000	.530
	FPG	5237.541	1	5237.541	107.022	.000	.649
Error (Time)	SBP	1601.333	58	27.609			
	DBP	734.308	58	12.660			
	FPG	2838.468	58	48.939			
	LDL	3885.967	58	66.999			

For the repeated measures MANOVA within the experimental and control groups, the results revealed that there were statistically significant in mean different between systolic blood pressure (F = 52.346, p = .00), diastolic blood pressure (F = 78.346, p = .00), low-density lipoprotein cholesterol (F = 65.454, p = .00) and fasting plasma glucose (F = 107.022, p = .00) in difference four points of time interaction with group. See Table 8.

APPENDIX G 4

Table 9 Comparing repeated measure MANONVA in different points of time within groups

Source	Measure	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Time	SBP	790.563	1	790.563	28.634	.000	.331
	DBP	497.941	1	497.941	39.330	.000	.404
	LDL	3953.070	1	3953.070	59.002	.000	.504
	FPG	1857.541	1	1857.541	37.956	.000	.396
Time * GROUP	SBP	1456.403	1	1456.403	52.751	.000	.476
	DBP	991.901	1	991.901	78.346	.000	.575
	LDL	4385.363	1	4385.363	65.454	.000	.530
	FPG	5237.541	1	5237.541	107.022	.000	.649
Error (Time)	SBP	1601.333	58	27.609			
	DBP	734.308	58	12.660			
	FPG	2838.468	58	48.939			
	LDL	3885.967	58	66.999			

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