

ผลของการออกกำลังกายกลุ่มแบบสควอทที่มีต่อความสามารถในการปฏิบัติกิจวัตรของผู้สูงอายุ



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วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาวิทยาศาสตรมหาบัณฑิต


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ลิขสิทธิ์ของจุฬาลงกรณ์มหาวิทยาลัย

EFFECT OF GROUP SQUAT EXERCISES TO PERFORM ACTIVITY OF DAILY
LIVING (ADL) IN ELDERLY PEOPLE



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สุนันทา ศรีศิริ : ผลของการออกกำลังกายกลุ่มแบบสควอทที่มีต่อความสามารถในการปฏิบัติกิจวัตรของผู้สูงอายุ. (EFFECT OF GROUP SQUAT EXERCISES TO PERFORM ACTIVITY OF DAILY LIVING (ADL) IN ELDERLY PEOPLE) อ.ที่ปรึกษาวิทยานิพนธ์หลัก: ศ.ดร.คาร์ล นิเชอร์, อ.ที่ปรึกษาวิทยานิพนธ์ร่วม: ผศ.ดร.รัตนา สำโรงทอง, 97 หน้า.

การวิจัยครั้งนี้มีวัตถุประสงค์หลักเพื่อศึกษาผลของการออกกำลังกายกลุ่มแบบสควอทที่มีต่อความสามารถในการปฏิบัติกิจวัตรและภาวะพึงพิงในการปฏิบัติกิจวัตรประจำวันของผู้สูงอายุ การวิจัยนี้เป็นงานวิจัยแบบกึ่งทดลองเพื่อเปรียบเทียบความแตกต่างระหว่างความสามารถในการปฏิบัติกิจวัตรและภาวะพึงพิงในการปฏิบัติกิจวัตรประจำวันก่อนและหลังการออกกำลังกายกลุ่มแบบสควอทของผู้สูงอายุในกลุ่มทดลอง กับ กลุ่มควบคุม กลุ่มทดลองคือผู้สูงอายุของชมรมผู้สูงอายุ ศูนย์บริการสาธารณสุข 19 และกลุ่มควบคุมคือผู้สูงอายุของชมรมผู้สูงอายุ ศูนย์บริการสาธารณสุข 15 กลุ่มละ 41 คน ที่ได้มาจากการสุ่มอย่างง่าย โดยวิธีการจับสลากแบบไม่กลับคืน และเมื่อโปรแกรมสิ้นสุดกลุ่มทดลองมีผู้สูงอายุ 36 คน และกลุ่มควบคุมมีผู้สูงอายุ 35 คน เครื่องมือที่ใช้เป็นแบบสอบถามที่ผู้วิจัยสร้างขึ้น วิเคราะห์ข้อมูลโดยหาค่าร้อยละ ค่าเฉลี่ย ค่าเบี่ยงเบนมาตรฐาน การทดสอบค่าที่แบบกลุ่มตัวอย่าง 2 ชุดเป็นอิสระต่อกัน และแบบกลุ่มตัวอย่าง 2 ชุดเกี่ยวข้องกัน และการวิเคราะห์ความแปรปรวนร่วมสองทาง กำหนดระดับนัยสำคัญทางสถิติที่ระดับ .05

ผลการศึกษาพบว่า หลังจากเข้าร่วมโปรแกรมการออกกำลังกายกลุ่มแบบสควอทจนครบแปดสัปดาห์ ผู้สูงอายุมีแนวโน้มในการปฏิบัติกิจวัตรดีขึ้นเช่นเดียวกับมีภาวะพึ่งพิงในการปฏิบัติกิจวัตรประจำวันลดน้อยลง รวมทั้งพบว่า หลังจากเข้าร่วมโปรแกรมการออกกำลังกายกลุ่มแบบสควอทผู้สูงอายุใช้เวลาในการลุกขึ้นเดินไปและกลับ 16 พุคน้อยกว่า (ดีกว่า)กลุ่มควบคุมอย่างมีนัยสำคัญทางสถิติที่ระดับ .05 ในขณะที่ผู้สูงอายุที่ออกกำลังกายกลุ่มแบบสควอทมีความสามารถในการลุกนั่งดีกว่ากลุ่มควบคุมอย่างมีนัยสำคัญทางสถิติที่ระดับ .05 ส่วนเวลาของความสมดุลในการทรงตัวขณะยืนยกขาที่ละข้างนั้น ผู้สูงอายุกลุ่มทดลองใช้เวลาในการยืนทรงตัวขณะยืนยกขาที่ละข้างดีกว่ากลุ่มควบคุมอย่างอย่างไม่มีนัยสำคัญทางสถิติที่ระดับ .05

นอกจากนี้ผลการศึกษาพบว่า การออกกำลังกายกลุ่มแบบสควอทอย่างต่อเนื่องมีประโยชน์อย่างมากต่อผู้สูงอายุ ส่งผลให้ผู้สูงอายุยังคงสามารถปฏิบัติกิจวัตรในชีวิตประจำวันขึ้นพื้นฐาน และรักษาระดับภาวะพึ่งพิงในการปฏิบัติกิจวัตรประจำวันได้ ดังนั้นยอมรับได้ว่า การออกกำลังกายกลุ่มแบบสควอทเหมาะสมกับผู้สูงอายุ และไม่ทำให้เกิดการบาดเจ็บตลอดระยะเวลาในการศึกษาครั้งนี้

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PERFORM ACTIVITY OF DAILY LIVING (ADL) IN ELDERLY
PEOPLE. ADVISOR: PROF. KARL J. NEESER, Ph.D. , CO-ADVISOR:
ASST.PROF.RATANA SOMRONGTHONG, Ph.D., 97 pp.

The general objective of the study was to assess effects of group squat exercise to perform activities of daily living and physical independence in elderly people from Health Centers in Bangkok. This research study was conducted as a quasi experiment research with pretest-posttest design on intervention and control group. The study used simple random sampling by lottery without replacement to select the participants in both groups. In the intervention group, out of 41 participants, 36 completed the program to the end. In the control group, out of 41 participants, 35 completed the program to the end. Data were collected by constructed questionnaire and analyzed by percentage, arithmetic mean, standard deviation, the independent t-test, the Pair t-test, and the Factorial ANOVA. The data were analyzed by using level of significance at 0.05.

The results showed a trend for better performance on activities of daily living in the participants of the eight week's intervention group as well as a trend for better performance on physical independence function. The intervention group had lower (better) Time-get-up-and-go test mean scores than the control group ($P<.05$), as well as a higher Chair stand test mean score ($P<.05$). There was no significant difference on Standing balance test in right and left leg after the program.

The results showed that the practice of specific squat exercises in groups and on regular base has numerous benefits for elderly people, therefore playing an important role to master activities of daily living and to keep physical independence. All the more considering that the squat program was unanimously well accepted and appreciated, and no injury has been registered.

Field of Study : Public Health.....

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LIST OF ABBREVIATIONS

ADL	Activity of daily living
HRQoL	Health-related quality of life
NSOT	National Statistical Office Thailand
LBM	Lean Body Mass
DOMS	Delayed-onset muscle soreness
BMI	Body mass index
WHR	Waist-to-hip ratio
Gw	Waist girth
Gh	Hip girth
QOL	Quality of life
SQ	Normal squat
CSQ	Chair squat
U.S.A.	United States of America
PS	Power and Sample Size Calculation Program



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CHAPTER I

INTRODUCTION

1.1 Background and Rationale

As we have all known time and again, exercise is good and has many health benefits. A meta-analysis research has demonstrated that exercise training can effectively improve the overall health related quality of life (Heyn, Abreu, and Ottenbacher, 2004). Not only is it beneficial now, but it will be also gainful 5, 10, even 15 years down the road. The benefits of exercise last into old age. In elderly populations, regular exercise has been found to confer a variety of health benefits such as reduced likelihood of coronary heart disease, diabetes, obesity, cancers, and metabolic syndrome (Bouchard, Blair, and Haskell, 2007; Gu and Conn, 2008).

Furthermore, exercise has been found to have a positive relationship with the psychological well-being of elder. For instance, Colcombe and Kramer (2003) found that older adults who received aerobic training showed a significantly greater improvement in cognitive performance than control subjects did. Despite mental health benefits are enhanced self-esteem, vitality, and satisfaction with life (Fox, Stathi, McKenna, and Davis, 2006), and reduced in levels of ill-being marked by psychological maladies for instance depression, anxiety, and chronic stress (Acevedo and Ekkekakis, 2006).

In Thailand, an increase in the aging phenomenon is similar to the other developing countries. Elderly who are older than 60 years of age consist of the fastest growing populations in Thailand (i.e. in 1998 the proportion of the Thai elder people were 8.6 percent and in 2002 they are increased to 10.7 percent). It is also estimated to be 12.6 percent in 2020 and reach to 20 percent within 25 years (Wongboonsin, 2003). Therefore, if these projections are correct, Thailand population will have a much larger proportion of elder people and a much smaller proportion of young. It means that Thailand will face the elderly problem soon. The phenomenon is due to a combination of factors, especially the dramatic decline in infant and child mortality, reduction of maternal deaths, technological advancement, and medical modernization. Hence, elderly are becoming an important issue in development in Thailand.

Although prolongation of life is an important public health goal, a more important one is the preservation of functional health: the ability to perform both basic and more advanced activity of daily living (ADL). Whereas a decline in functional health with aging is directly caused or aggravated by chronic health conditions such as heart failure, diabetes, and osteoarthritis, most older adults will live with, rather than die of, the disablement that accompanies chronic disease (Rejeski and Brawley, 2006). It is important to emphasize to health professionals and the public health area that the preservation of physical independence i.e. walking, sitting and rising from a chair, and ascending and descending stairs are important determinants of independence of elderly people (Flanagan, et al., 2003). This physical independence raise important issues related to decline in overall health-related quality of life (HRQoL) and professional caregivers' distress. Physical inactivity and disability in elderly may negatively affect their ability to perform activity of daily living and worsen their HRQoL status (Dechamps, et al., 2010).

Tabtimtes (2003) was studied on factors influencing exercise behavior of elders who were members Sritany Hospital Elderly Club in Bangkok. She found that 83.7% of elders practiced some form of exercise but the exercise was not adequate and correct. Only 16.3% of elders practiced complete and correct form of exercises. This result is relevant with National Statistical Office Thailand, NSOT (2008). NSOT conducted a national survey about the status of Thai elderly in 2007. They found that Thai elderly are the most sedentary population, with 58.9 % failing to participate in regular physical activity (NSOT, 2008).

Suriyawongpaisal, Chariyalertsak, and Wanvarie (2003) have studied the quality of life and functional status of elder patients with hip fractures in Thailand. They assessed activity of daily living (ADL) of the elder patients and indicated that there are severely restrictions in ADL: walking outdoors, cooking, dressing, bathing, climbing stairs, etc. The elder can increase ADL by limiting the impact of disease and illness, remain independent and are able to engage in meaningful pursuits (Heidrich, 1998).

Moreover, one of the most commonly discussed changes that occur with age is the loss of Lean Body Mass (LBM). The loss of LBM (a condition termed "sarcopenia") is important because it is the most active tissue. Its loss not only

influences basal metabolism but also total body water, which both declines with age. The loss LBM contributes to the loss of muscle strength, which is noted to decline by about eight to sixteen percent per decade after approximately 50 years of age (Akouaouach, et al., 2006). Muscle power, the product of the force and velocity of muscle shortening, declines faster and to a greater extent than muscle strength. Power, or the ability to generate force rapidly, has been shown to be particularly important for maintaining the ability to perform physical activity of daily living, such as stair climbing, walking and rising from a chair.

With increasing age, the loss in muscular strength and power of the thighs (quadriceps, hamstrings), butt (glutes) and hip muscles (Fig. 1.1) especially spoil the ability to perform important activities of daily living, such as rising from a chair or a toilet seat, walking and climbing stairs (Roubenoff,2003).

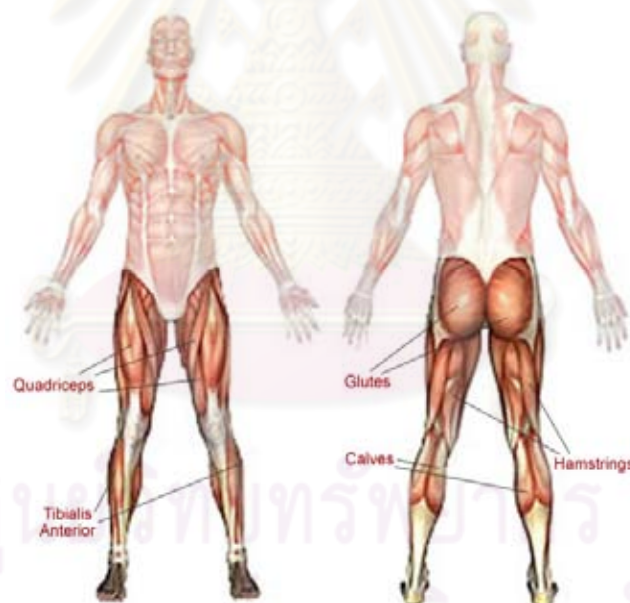


Figure 1.1 Leg muscles: strengthening glutes, quadriceps, and hamstrings (Manuel, 2006)

In particular, after the fifth decade, the decline in muscular strength is reported to be more than 3 percent per year and the decline in muscular power more than 5 percent per year (Lovell, Cuneo, and Gass, 2010). In addition, thigh strength plays a vital role in maintaining a good balance as falling down is common in seniors and can result in bone breakage and the end of an active life (Deley and Spinks, 2000). Moreover, Roubenoff (2003) showed that the loss of muscle and strength of the thighs muscles is not much a function of age, as it is a function of use, or disuse.

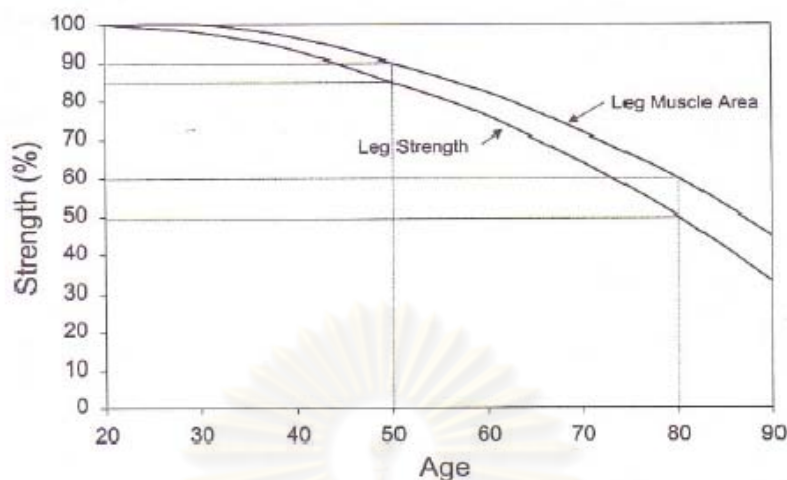


Figure 1.2 Estimate loss of muscle mass and strength in thighs muscles (Lovell, Cuneo and Gass, 2010)

The significance of regular exercise toward the accomplishment of preserving a healthy, independent lifestyle is universally recognized (Bauman, et al., 2002; Fiatarone Singh, 2002). For elderly people, it is more important, for functional abilities and performing activity of daily living, to be maintained with physical activity rather than with aspects of physical fitness (Pollock, et al, 1994).

At present, there are many exercise interventions with elderly to improve physical fitness (Hyen, Abreu, and Ottenbacher, 2004), which does not concentrate on losses in strength and flexibility seen among elderly as they age. The maintenance of strength and flexibility (i.e. reduce mobility and the ability to perform activity of daily living and prevent many elderly from participating in the physical activity) is needed to keep up the general health (Cohen-Mansfield, Marx, and Guralnik, 2003). Meanwhile, the losses of strength and flexibility in physical function damage not only health but also quality of life (McAuley, et al., 2000).

Elderly exercise programs should lay stress on using stretching, range of motion, and muscle strengthening to prevent injuries that can occur during normal exercise (Buckwalter, 1997) because activity of elderly should have low impact, thereby reducing the amount of force on the musculoskeletal and joint structures (Fletcher, et al., 1990). One type of exercise that may be greatly beneficial to elderly in multiple areas of health, physical independence and activity of daily living is squat (Flanagan, et al., 2003).

In strength training, the squat is an exercise that trains primarily the muscles of the thighs, as well as hips and buttocks. Squats are considered a vital exercise for increasing the strength and size of the legs and buttocks, but also to increase knee extensor muscle strength (Iwamoto, 2004). The parallel squat is the most common. The movement begins from a standing position. Weights are often used, either in the hand or as a bar braced across the trapezium muscle in the upper back (Fig 1.3). The movement involves bending the knees and hips to lower the torso and accompanying weight, then returning to the upright position. The squat can continue to a number of depths; the deeper the squat, the greater the training effect.

The squat has a number of variants (Chair squat, Single leg squat, Hindu squat, Pistol squat, Bench squat etc.), some of which can be combined. The choice depends on training level, skill, and purpose of the exercise. For the elderly the use of weight is not a priority as there exist variants without weight (Kenefick, 2009).



Figure 1.3 The basic squat exercise (Kenefick, 2009)

Flanagan, et al. (2003) has provided fundamental information about the effects of squatting exercises intervention on physical function in older adults in Los Angeles, U.S.A. They found that with older adults, chair squat places greater demand on the hip extensors, whereas normal squat places greater demand on the knee extensors and ankle plantar flexors.

Shimomura, et al. (2006) found that the squat exercises are safe for untrained subjects and cause delayed-onset muscle soreness (DOMS).

However, none of these studies has undertaken the effects of acute bouts of squat in a cross-sectional study design on activity of daily living and physical

independence among elderly in Thailand, age 60 and over. Including squat exercise program for elderly people need to be adjusted in order to relevance with Thai backgrounds. Thus, the effect of group squat exercises to perform activity of daily living and physical independence in elderly people is another challenging task that needs to be explored. The researcher would like to seek this gap with this study including applying the self-efficacy theory as the major concept for the individual to perceive self-efficacy, enable elderly people to enhance exercise behavior. There are many previous studies showing the positive relationship between self-efficacy and exercise program (McAuley, et al., 2000; Netz, et al., 2005; White, Wójcicki, and McAuley, 2009).

Therefore, the primary aim of the present study is to assess the effect of group squat exercises to perform activity of daily living and physical independence in elderly people of Elderly Club in Health Center 19, Bangkok Metropolis. The researcher hypothesized that a number of specific forms of group squat exercises practice is more effective to perform activity of daily living and physical independence in elderly people compared to a control group.

1.2 Expected Benefits and Application

It is expected that the findings of the study would be alternative exercise programs to better perform activities of daily living among the elderly for other Health Centers. The results and conclusions may be used therapists, and exercise specialists or even physicians to elaborate and design safe and efficient activity programs for the elderly Thai population. Furthermore it may become an interesting alternative exercise program for elderly people in all kind of elderly clubs and the expected results may increase not only muscular strength, but also the levels of exercise forms, activities and behaviors.

1.3 Research Questions

The following research questions are formulated for this study:

1. What are the effects of group squat exercises based on activity of daily living and physical independence among elderly Thai participants of the Elderly Club in Health Center 19, Bangkok Metropolis?

2. Are there significant differences in perceiving self-efficacy for exercise level before and after the experiment of elderly participants in Health Center 15 and 19, Bangkok Metropolis?
3. Are there significant differences to perform activity of daily living and to gain physical independence between control and intervention group?
4. What is the satisfaction level toward group squat exercises of elderly participants of the Elderly Club in Health Center 19, Bangkok Metropolis?

1.4 Research Objectives

14.1 General Objective

To assess effects of group squat exercises to perform activities of daily living and gain physical independence in elderly people of the Elderly Club in Health Center 19, Bangkok Metropolis.

14.2 Specific Objectives

1. To compare the effects of a group squat exercises program between intervention group (elderly people of Elderly Club in Health Center 19) and control group (elderly people of Elderly Club in Health Center 15) with reference to activity of daily living and physical independence.

2. To compare the perceiving self-efficacy for exercise levels before and after experiment in elderly participants of the Elderly Club in Health Center 15 and 19, Bangkok Metropolis.

3. To assess the satisfaction toward the group squat exercises program among elderly people who participated in this program at the Elderly Club in Health Center 19, Bangkok Metropolis.

1.5 Research Hypothesis

A number of specific forms of squat exercises practice is more effective to perform activities of daily living and to gain physical independence in elderly people compared to a control group.

1.6 Conceptual framework

The independence variable of this study consist of squat exercises program and perception of self-efficacy for exercise among elderly people who are member of the Elderly Club in Health Center 19, Bangkok Metropolis.

The dependence variables are activities of daily living and physical independence. The activity of daily living is routine activity that elderly people tend to practice every day. It includes three categories such as: (a) Independence : No need of assistance to perform activity in daily living (b) Need of assistance for a part of daily activities (c) Dependence: Total need, the person cannot perform any activity and needs another person for help.

The physical independence is the ability to perform alone a given function or activity. It is comprised of three categories such as: walking, sitting and rising from a chair, and controlling balance of body.

The group squat exercises program monitored by a trained leader of elderly people, member of the Elderly Club in Health Center 19. The Squat exercises group met for 15-30 minutes, 3 times per week, for 8 weeks. Each session of Squat exercise consisted of a 5 minutes' warm-up, followed by specific Group Squat exercises like chair squat, relay chair squat (2 teams), single leg squat left/right, pistol squat or jumping squat. The session ended with stretching and relaxation exercises for 5 minutes. Including the self-efficacy theory, as the major concept for the individual to perceive self-efficacy, enable elderly people to enhance their exercise behavior.

According to the experiment, the elderly person in the intervention group may be more effective to perform activity of daily living and gain physical independence when compared with control group as figure below:

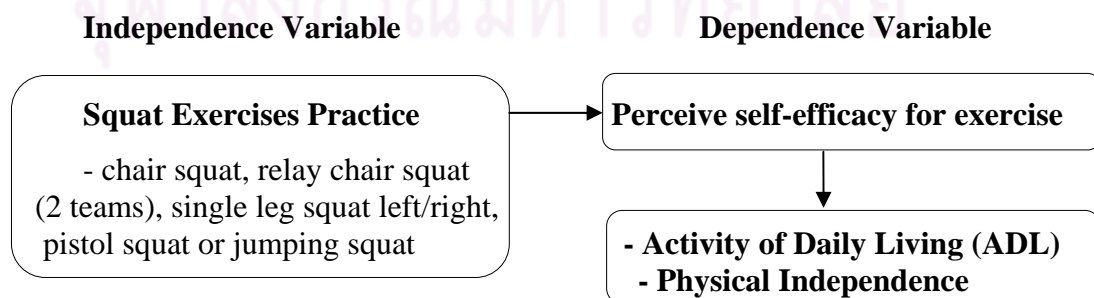


Figure 1.4 Conceptual framework

1.7 Operational Definitions

For the purpose of this study, the following terms are operationally defined:

Elderly people means people age 60 or older, men or women.

Socio-Demographic characteristics refer to gender, age, marital status, education level, house living place, BMI and WHR.

Gender refers to male and female.

Age refers to the number of years that someone has lived.

Marital status refers to the current marital status of the elderly. It is classified into single, married, widowed, divorced and separated.

Education level refers to the highest year of education of the elderly. It is divided into less than primary school, primary school, secondary school, high school or diploma, undergraduate, and higher undergraduate.

House Living place refers to the type of house where elderly people live. In this study, it is classified into housing with no floor, housing with two floors, brick house with three floors, and brick house with more than three floors.

BMI refers to Body mass index, a number calculated from a person's weight and height. BMI provides a reliable indicator of body fatness for most people and is used to screen for weight categories that may lead to health problems. The formula used to calculate in medicine produce a unit of measure of kg/m^2 (Ministry of Public Health, 2008).

WHR refers to Waist-to-hip ratio, that is, the ratio of the circumference of the waist to that of the hips. It is calculated by measuring of the waist girth divided by the hip girth. Waist to Hip Ratio (WHR) = G_w / G_h , where G_w = waist girth, G_h = hip girth (Ministry of Public Health, 2008)

Exercise means elder's behavior regarding body movement and walk that consumes high level of energy or muscle exercise. The exercise should be carried out about 30 minutes for 3-5 times a week. After an exercise session, one's heart beat rate should be around 100-120 times per minute. An elder should not feel dizziness or experience abnormal heartbeat during the exercises (American College of Sports Medicine, 2001).

Squat exercises are exercises that train primarily the muscles of the thighs, as well as hips and buttocks. They are an activity to generate movements of functional, multiple-joint exercise that have received considerable biomechanical evaluation with an aim to perform activity of daily living and physical independence (Flanagan et.al., 2003).

Perceive Self-Efficacy for exercise is defined as people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives. Self-efficacy beliefs determine how people feel, think, motivate themselves and behave. Such beliefs produce these diverse effects through four major processes. They include cognitive, motivational, affective and selection processes (Bandura, 1994). In this study, it refers to perception of capability among elderly people concerning for health, how they think of confidence, skill and capability to make successful exercise.

Activity of daily living (ADL) is defined as routine activity that elderly people tend do everyday life without needing assistance. There are ten basic ADL: eating, grooming, transfer, toilet use, dressing, stairs, bathing, mobility, bowels, and bladder (Mohoney and Barthel, 1965).

Physical Independence are defined as capacity to perform a given function or activity such as walking, sitting and rising from a chair and balancing of body by elderly people without needing assistance (Flanagan et.al., 2003).

Effects of group squat exercises are defined as the way of activity of daily living and physical independence are affected, changed or influenced by group squat exercises program.

Satisfaction on participating in group squat exercise program refers to the result of one's participation in any activity; it is a positive attitude showing satisfied condition with that situation, where as negative satisfaction will show dissatisfaction (Theppipit, 2004). In this study, it refers to opinion of elderly people after participating in the group squat exercises program.

CHAPTER II

LITERATURE REVIEW

The aim of this study was to assess the effects of group squat exercises to perform activity of daily living and to gain physical independence in elderly people of the Elderly Club in Health Center 19, Bangkok Metropolis and to compare the effects of group squat exercises program between intervention group and control group; activity of daily living and physical independence. This chapter presents a review of the concepts related to these topics as follows:

2.1 Concepts of the elderly

2.1.1 The Definition of Elderly

The World Health Organization (2000) defined elderly as a person over 60 years old or more according to ages. This meant that the age of sixty is likely to be a realistic expression of older age among people who are not having the advantage in earlier life.

The Royal Institute's dictionary (2003) defined elder person as a person over 60 years old, old age and deterioration.

So far the definition of elders were defined, most meaning of elderly based on age as the research factor. Throughout this study, elderly means people who are 60 years old or older, men or women.

2.1.2 Classification of elder people

The World Health Organization (2000) classified the older people into three phases such as elder person—between 60-74 years old age, old person—between 75-90 years of age, and very old person—90 years old and above.

The Geriatric Medicine Thailand (2007) has suggested age classification of the elder population in Thailand as the follows:

1. phase 1: between 60-69 years of age
2. phase 2: between 70-79 years of age
3. phase 3: 80 years old and above

The National Statistical Office Thailand (2008) divided the elder people into three groups as follows: (1) Older adult person: aged 60-69; (2) Old-old person: aged 70-79; and (3) Oldest person: aged 80 and over.

In summary, the classifications of elder people establish by organization or institute is quite similar. Therefore, in this study the research would like to use criterion specified by the National Statistical Office Thailand which cut off old person at 60 years and above.

2.1.3 Changing in elders

The researcher had studied and given explanation on the changing in elders in three aspects, i.e. physical changes; psychological changes; and social and cultural changes. The detail of those aspects are the follows:

2.1.3.1 Physical changes: Smith and Gove (2005) concluded that physical changes are those commonly associated with aging. The focus is on changes that occur normally and are not due to disease. These changes include hearing, vision, taste and smell, bone and muscle, digestion, circulation, and sexuality.

1) Hearing: Hearing loss affects the older person's ability to talk easily with others. Since ears and hearing organs had degenerated.

2) Vision: Degeneration of eye muscles and clouding of the lens are associated with aging. Several changes in vision result from this. Older people tend to have trouble focusing on near objects.

3) Taste and Smell: older people often complain that their meals are tasteless or that they no longer like their favorite foods. Most experts feel that these complaints are caused by a sense of loneliness at meals, or an unwillingness or inability to cook. Also, older persons may not buy more enjoyable foods when they have difficulty chewing due to poor dentures or dental problems.

4) Changes in Bones and Muscles: Aging adults, especially the very old, are vulnerable to broken bones. In addition, joints stiffen and connecting ligaments between bones lose their elasticity. Hand and foot pain may result.

5) Teeth and Mouth: Older adults are more likely to lose teeth to gum disease than to problems with the teeth themselves.

6) Digestion: Gum receding and shrinking, losing teeth, difficult to chew hard or tough foods, reduction in saliva that made though digestion of starch and sugar, and

reduced thirst. So it is cause older people to have less frequent bowel movements and to suffer from constipation.

7) Circulation: The older heart slows down and is less able to pump blood through the body than the younger heart. This results in older people having less energy and stamina for physical work. Decreased circulation also contributes to cold sensitivity, particularly in the hands and feet. Because oxygen, necessary for proper physical and cognitive functioning, is carried through the blood, the elder with poor circulation may experience forgetfulness and other symptoms of poor cognition.

8) Sexuality: Change in sex organs lead to changes in frequency and pattern of performance, namely, among older male, the male hormones are reduced, which diminish the sexual desire and testicles and reduce semen. For women, decrease in female hormones, shrinking breast tissues, smaller size, sagging and thinning of the uterus muscles which makes the uterus protruded through the vagina.

2.1.3.2 Psychological changes: Change in psychological or mental of elder person had been occurred as a result from degenerated body organs, loss of intimate person, loss social and economic status due to retirement age, and loss the relationship within the family since the elderly might not have friends and binding relationship with society as well as missing or reducing income (Chaicanit, 2009).

2.1.3.3 Social and cultural changes: This is a change that has related to the cause of body and soul problems of the elderly. Thai society has become more westernize which moderately impact the elderly. Thus, the Modern society tended to prohibit the elderly from various activity, such as, work and family role as receiver, loss controlling power and social functions, and unable to work or no economical value. Most elderly felt left out and lonely (Chaicanit, 2009).

It can be summarized that changing in elders is the process whereby elders would have experience three changes i.e. physical changes, psychological changes and social cultural changes. Therefore, it was important to understand changes among the elder people in order to connected with each other to fully realize the factors related with health problems among the elders

2.2 Exercise in elder person

To understand conceptualization of exercise in elder person, the definition of exercise, how much exercise is needed, rules for selecting exercise activity among elders, specific exercise tips for older people, steps to exercise the elderly and benefits of exercise among the elderly were discussed as follows:

2.2.1 Definition of Exercise

Department of Health, Ministry of Public Health (1995) gave the meaning of exercise as “muscle’s activity for health body and good figure, increase skills and capabilities in sport including muscle rejuvenation after injury or handicap”.

The United State National Institutes of Health (1995) defined exercise as “one kind of physical activity that formally performs, planned, structured, and repetitive bodily movement done to improve physical fitness”.

The Royal Institute’s dictionary (2003) defined exercise as “force and energy utilization in order to make body strong, and to improve functions”.

Sriposhang (2005) defined exercise as “any activity conducted by an individual through body exertion and movement of different parts of the body to better and strength the body system, promote good health including rejuvenation or recovering from injury or handicap.

In conclusion, exercise defined as planned, structured, and practice of body movement/any activity that consume high level of energy or muscle exercise to better and strength the body system, promote good health including rejuvenation or recovering from injury or handicap. So, it can be stated that exercise behavior, involve the bodily movement produced by skeletal muscles that expends energy, measured by kilocalories ranging continuously from low to high, and is positively correlated with physical fitness.

2.2.2 How Much Exercise is Needed?

The amount of exercise needed to achieve the desired benefits varies based on individual goals and capabilities. American College of Sports Medicine (2001) has shown that activity incorporated into daily life may have benefits similar to that of more structured exercise programs, elder people will probably need to set aside 20 to 30 minutes daily specifically for exercise.

2.2.3 Rules for Selecting Exercise Activity among Elders

Buckwalter (1997) found that elderly exercise programs should lay stress on using of stretching, range of motion, and muscle strengthening to prevent injuries that can occur during normal exercise. This result is relevance the study from Fletcher, Froelicher, Hartley, Haskell, and Pollock (1990) that activity of elderly should have low impact, thereby reducing the amount of force on the musculoskeletal and joint structures. In addition, Sriposhang (2005) suggested the rules and methods of exercise for the older as the follow:

- 1) Exercise for elder should be moderate with resting in between. Fast exercise was inappropriate since it causes tiredness easily.
- 2) Never exert until it created danger.
- 3) After exercise, is important to recuperate.
- 4) Exercise in a group should be done with people of the same age since exercising with younger persons might require training that could result in an injury.
- 5) Exercise rhythm should not be changed abruptly.
- 6) Do not eat for two hours before vigorous exercise.
- 7) Drink plenty of fluids before, during, and after a workout.
- 8) Adjust activity according to the weather and reduce it when fatigued or ill.
- 9) When exercising, listen to the body's warning symptoms, and consult a physician if exercise induces chest pain, irregular heartbeat, undue fatigue, nausea, unexpected breathlessness, or light-headedness.

2.2.4 Specific Exercise Tips for Older People

It is never too late to start exercising. At any age, even small improvements in physical fitness and activity can prolong life and independent living. The following tips for exercising may be helpful (Harvey, 2003):

- 1) Any older person should have both complete physical and medical examination and professional instruction before starting an exercise program.
- 2) Remember the adage "Start low and go slow." For sedentary, older people one or more of the following programs may be helpful and safe: low-impact aerobics, gait training, balance exercises, tai-chi, self-paced

walking, and lower extremity resistance training using elastic tubing or ankle weights (Even in the nursing home, programs aimed at improving strength, balance, gait, and flexibility have significant benefits).

- 3) Strength training assumes even more importance as one ages, because after age 30 everyone undergoes a slow process of muscular erosion. The effect can be reduced or even reversed by adding resistance training to an exercise program. Strength training also improves heart and blood vessel health and general well being.
- 4) Power training, which aims for the fastest rate at which a muscle or muscle group can perform work, may be particularly helpful for older women in strengthening muscles and preventing falls.
- 5) Flexibility exercises promote healthy muscle growth and help reduce the stiffness and loss of balance that accompanies aging, easing these activities.
- 6) Chair exercises are available for people who are unable to walk.
- 7) Older women are at risk for incontinence accidents during exercise. This can be reduced or prevented by performing Kegel exercises, limiting fluids (without risking dehydration), going to the bathroom frequently, and using pads or insertable devices that can help prevent leakage.

2.2.5 Steps to Exercise of Elderly

Ministry of Public Health, Department of Medical Services (2002) suggested the steps to exercise of elderly as the follow:

- 1) First step: warm up—this step prepares the body before the actual exercise session. An elder should warm up the body for 5 minutes to stretch and strengthen the muscle and relax the joint by swinging legs and arm, stretching etc.
- 2) Second step: conduct actual exercise—this step allows the body to burn fat, builds up the lung endurance, heart and blood circulation by practicing chosen activity for 10-30 minutes. The American College of Sport Medicine (2001) uses 220 minus the individual age for maximum heart beat rate per minute. An elder should have highest heart rate per minutes as show in table 2.1:

Table 2.1 Percentage of highest heart rate per minutes for different age period (years)

Age (year)	Highest heart beat rate (time/minute)	65 percent/minute	70 percent/minute	75 percent/minute	80 percent/minute
50	170	110	119	127	132
55	165	107	116	124	132
60	160	104	112	120	128
65	155	101	109	116	124
70	150	98	105	112	120
75	145	95	101	108	116

Source: Ministry of Public Health, Department of Medical Services (2002)

- 3) Third step: cool down—after an elder does an exercise as specified in the second step—an elder should slowly relax the body from the tense exercise and not stopping immediately.

2.2.6 Benefits of Exercise among the Elderly

As we age, the body tends to degenerate gradually and physical activity can become more of a burden. This decline in physical activity may lead to a poor self-efficacy, a lack of self-confidence, and health risks. National Institute of Aging, Department of Medical Services, Ministry of Public Health (2002) describes benefit of exercise for the elder as follows:

- 1) To reduce risk of early death, risk of death by heart disease and cancer.
- 2) To assist good circulation of blood, good working lung and heart in order to prevent heart disease, hypertension, good excretory system and faint.
- 3) To prevent osteoporosis, making muscles strong and more durable and making better shape, balance, and agile walking.
- 4) To increase disease resistance.
- 5) To fight stress, depression, anxiety, and to increase health hygiene and good sleep.
- 6) To control body weight and to increase libido.

Laurin, Verreault, Lindsay, MacPherson, and Rockwood (2001) performed a study, in order to evaluate the association between regular physical activity and the occurrence of cognitive impairment and dementia. 6,434 seniors of the ages 65 and up were among those screened for dementia using a mental state examination and were

then analyzed with a case control approach in order to test the effect of physical activity on cognitive impairment. This research found that compared with no exercise, physical activity was associated with lower risks of cognitive impairment, Alzheimer disease, and dementia of any type. The study also revealed that low, moderate, and high levels of physical activity were related to lower risk of dementia and cognitive impairment than those seniors with no physical activity.

Netz, et al. (2005) had a meta-analysis examined data from 36 studies linking physical activity and psychological well-being in elder adults without clinical disorders. They revealed that physical activity had the strongest effects on self-efficacy, and improvements in cardiovascular status, strength, and functional capacity were linked to overall well-being improvement. Longer exercise duration was less beneficial for several types of well-being.

Wilcox, et al. (2006) examined the impact of evidence-based programs adopted by community providers of physical activity by community providers of physical activity preprograms for older adults. Results showed that older adults who participated in two newly adopted programs experienced statistically significant benefits regarding physical activity participation, depression, stress, and body mass index. They also proposed that older individuals should be encouraged to engage in regular and moderate physical activity.

White, Wójcicki, and McAuley (2009) examined the proposition that physical activity influences global QOL through self-efficacy and health-status. The study indicated direct effects of a latent physical activity variable on self-efficacy but not disability limitations or physical self-worth; direct effects of self-efficacy on disability limitations and physical self worth but not QOL; and direct effects of disability limitations and physical self-worth on QOL. The study also supports the role of self-efficacy in the relationship between physical activity and QOL as well as an expanded QOL model including both health status indicators and global QOL.

Hughes, et al. (2009) assessed that impact of existing best-practice physical activity programs for older adults on physical activity participation and health related outcomes. They found that statistically significant benefits at 5 and 10 months with regard to self-efficacy for exercise adherence over time ($P < 0.001$), adherence in the face of barriers ($P = 0.01$), increased upper- and lower-body strength ($P = 0.02$, $P = 0.01$),

and exercise participation ($P=0.01$). They suggested that best-practice community-based physical activity programs can measurably improve aspects of functioning that are risk factors for disability among older adults.

Through research examples, like the ones mentioned, it can be easily seen that physical activity and exercise is highly beneficial to the aging adult. Physical health and self-confidence are two areas that can be improved by a regular exercise routine, giving the elderly longer, healthier, and happier lives. The elderly age group is one of the fastest growing population, and because of this it is important that research continues, in hopes of providing them with a healthier future.

2.3 Concepts of squat exercise

According to Flanagan, et al. (2003), a basic squat is “a lower body exercise used in strength training. The main emphasis of the exercise is on the quadriceps and the glutes, but it also involves the hamstrings, the calves, and the lower back. The squat has the potential for bigger and faster muscle growth than many other exercises”. Thus, squat is a functional and multiple-joint exercise that has received considerable biomechanical evaluation. This exercise trains primarily the muscles of the thighs, as well as hips and buttocks. Moreover, squats are considered a vital exercise for increasing the strength and size of the legs and buttocks.

2.3.1 Rules for squat exercises (Quinn, 2003):

- 1) Keep the lower back straight and mostly flat; do not round your back.
- 2) Keep knees pointing out slightly, do not let them creep inwards as you push yourself up.
- 3) The bar should rest on upper trap muscles and the rear heads of the shoulders.
- 4) Push from your glutes (butt), not your knees; your hips should raise first and everything else should rise with them.
- 5) Fill your stomach with air before descending and keep it tight with your chest out while pushing up.
- 6) Push up with your eyes focused 30-45 degrees above normal eye level.
- 7) Try to keep your knees behind your toes to avoid injury.

2.3.2 Variation of Squat

There are several variations of the squat, some of which can be combined. The choice depends on training level, skill, and purpose of the exercise. The variants of squat are the following (Waehner, 2007):

- 1) **Back squat** - the bar is held on the back of the body at the base of the neck or lowers across the upper back. In power lifting the barbell is often held in a lower position in order to create a lever advantage, while, in weightlifters often held the barbell in a higher position which produces a posture closer to that of the Clean and Jerk. These variations are called low bar and high bar, respectively.
- 2) **Front squat** - the weight (usually a barbell) is held in front of the body across the clavicles and deltoids in either a clean grip, as is used in weightlifting, or with the arms crossed and hands placed on top of the barbell.
- 3) **Overhead squat** - a barbell is held overhead in a wide-arm snatch grip; however, it is also possible to use a closer grip if flexibility allows.
- 4) **Chair squat** - Place a chair just behind you and stand in front of it with feet about hip- or shoulder-width apart. Bend the knees and slowly squat towards the chair. Either hovers over chair or sit for a second, then fully extend the legs until you're back to standing position as the figure below:



- 5) **Zercher squat** - the bar is held in the crooks of the arms, on the inside of the elbow.
- 6) **Hack squat** - a barbell is held in the hands just behind the legs; invented by early 1900s professional wrestler Georg Hackenschmidt.
- 7) **Sissy squat** - a dumbbell is held behind the legs while the heels are lifted off the ground and the torso remains flat while the lifter leans backwards; sometimes done with a plate held on the chest and one arm holding onto a chair or beam for support.

- 8) **Single leg squat** - Trains the hip abductors and external rotators to maintain hip stability during a single-leg movement similar to running. It starts by standing with arms extended out in front, and then balancing on one leg with opposite leg extended straight leg forward as high as possible. Squat down as far as possible while keeping leg elevated off of floor. Keep back straight and supporting knee pointed same direction as foot supporting. Raise body back up to original position until knee and hip of supporting leg is straight. Return and repeat. Continue with opposite leg as figure below:



- 9) **Split squat** - an assisted one-legged squat where the non-lifting leg is rested on the ground a few 'steps' behind the lifter.



- 10) **Bulgarian squat** is performed much like a split squat, but the foot of the non-lifting leg is rested on a knee-high platform behind the lifter.

- 11) **Hindu squat** - is done without weight where the heels are raised and body weight is placed on the toes; the knees track far past the toes.

- 12) **Jump squat** – a plyometrics exercise where the squatter jumps off the floor at the top of the lift.



- 13) **Bodyweight squat** - done with no weight or barbell, often at higher repetitions than other variants.
- 14) **Box squat** - at the bottom of the motion the squatter will sit down on a bench or other type of support then rise again.
- 15) **Pistol Squat** - a bodyweight squat done on one leg to full depth, while the other leg is extended off the floor as figure below:



- 16) **Belt Squat** - is an exercise performed the same as other squat variations except the weight is attached to a hip belt i.e. a dip belt.

Flanagan, et al. (2003) has conducted a study about squatting exercises in older adults: kinematic and kinetic comparisons in Los Angeles, U.S.A. The sample groups consisted of 22 healthy, older adults (age 70-85) performing three trials each of: 1) a squat to a self-selected depth (normal squat; SQ) and 2) a squat onto a chair with a standardized height of 43.8 cm (chair squat; CSQ). They found that CSQ generated greater hip flexion angles, peak moments, power, and work, whereas SQ generated greater knee and ankle flexion angles, peak moments, power, and work. SQ generated a greater knee extensor impulse, a greater plantar flexor impulse and a greater total support impulse. The EMG temporal patterns were consistent with the kinetic data.

Iwamoto, et al. (2004) has conducted a study about efficacy of training program for ambulatory competence in elderly women in Japan. Twenty-five elderly women were enrolled in training program, which was a three-month program consisting of dynamic balance training with Galileo 900 (Novotec, Pforzheim, Germany) once a week, combined with daily static balance (standing on one leg like a flamingo) and resistance (half-squat) trainings. The results found that after three months of training, the step length, knee extensor muscle strength, and maximum

standing time on one leg were significantly increased, while the walking speed and hip flexor muscle strength were not significantly altered. During the study period, no serious adverse events such as new vertebral fractures or adverse cardiovascular symptoms were observed in any participant. The present preliminary study shows that our training program may have the potential to promote ambulatory competence in elderly women.

Shimomura, et al. (2009) studied the effect of squat exercise and branched-chain amino acid supplementation on plasma free amino acid concentrations in young women. The results found that the squat exercises are safe for untrained subjects and cause delayed-onset muscle soreness (DOMS).

In this study, researcher selected the four kinds of squat to adapt in elderly people i.e. chair squat, single leg squat, pistol squat, and jumping squat for elderly exercise because the advisor and experts approved these variants of squat. Moreover, these squats are an easy exercise, no expensive equipment or annual gym fees required and safety for untrained subjects and cause delayed-onset muscle soreness (DOMS). Furthermore, these exercises help to decrease back, ankle and hip pain (Flanagan, et al., 2003).

2.4 The Self efficacy of exercise

To maximize adherence to exercise programs it is essential to consider a multidimensional framework, as is afforded by self-efficacy theory. According to Bandura (1994), self-efficacy theory had come from Social cognitive theory when an individual possessed skills to behave appropriately with enough support and perceived self-efficacy was a crucial element to predict or decide that an individual was willing to change behavior and continuously follow the advice.

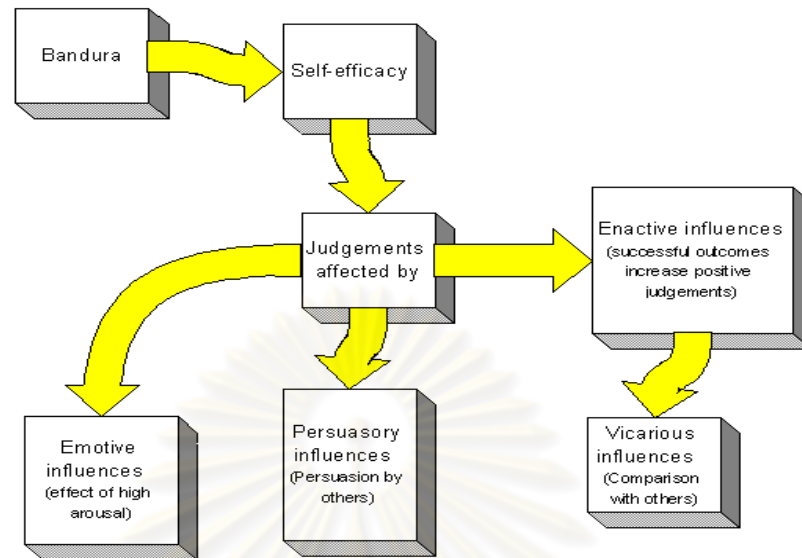


Fig 2.1 Self-Efficacy (Bandura, 1994)

Human motivation and action are essentially regulated by planning. This cognitive view of motivation based on four types (Bandura, 1994):

1. Enactive - habitually successful - but have to attribute success to own ability rather than luck.
2. Vicarious - judge our performance by looking at others - especially peers
3. Precursory - Others express their confidence in a person's ability
4. Emotive - Level of arousal, sleep or panic.

Moreover, this cognitive control of behavior is based on three types of beliefs: (1) general outcome expectancies, beliefs that a certain outcome will occur regardless of personal behavior; (2) specific outcome expectancies, beliefs that a certain consequence will be produced by personal action; and (3) self-efficacy expectations, the individuals' beliefs in their capabilities to perform a course of action to attain a desired outcome (Bandura, 1994).

Efficacy expectations are dynamic and are both appraised and enhanced by four mechanisms (Bandura, 1994):

1) Performance accomplishments are one's personal mastery experiences, defined as past successes or failures. These experiences form expectations that are generalized to other situations that may be similar or substantially different from the original experience. For example, strong efficacy expectations are developed through repeated success of a behavior, and reduced efficacy expectations can result from

failures. We can increase personal mastery for a behavior through participant modeling, performance exposure, self-instructed performances, and performance desensitization, the process through which aversive behavior is paired with a pleasant or relaxing experience.

2) Vicarious experience, which is observing others perform threatening activities without adverse consequences, can also enhance personal self-efficacy by demonstrating that the activity is “do-able” with a little effort and persistence. Vicarious experience can be enhanced through live modeling (observing others perform an activity), or symbolic modeling.

3) Verbal persuasion. People are led to believe they can successfully accomplish a task or behavior through the use of suggestion, exhortation, or self-instruction. However, because verbal persuasion is not grounded in personal experience, it is a weaker inducer of efficacy and may be extinguished by histories of past failures.

4) Emotional arousal. We can enhance perceived self-efficacy by diminishing emotional arousals such as fear, stress, and physical agitation since they are associated with decreased performance, reduced success, and other avoidance behaviors. Emotional arousal can be mitigated with repeated symbolic exposure that allows people to practice dealing with stress, relaxation techniques, and symbolic desensitization (the process through which symbolic representation of stressors are paired with a relaxing or pleasant experience).

The theory of self-efficacy suggests that the stronger the individuals’ efficacy expectations, the more likely they will initiate and persist with a given activity. Both self-efficacy and outcome expectations play an influential role in the adoption and maintenance of exercise behavior in adults. An adult may have high self-efficacy expectations for exercise, but if he or she does not believe the exercise will improve health, strength, or function, then it is unlikely that he or she will adhere to a regular exercise program (Sriposhang, 2005; Williams, Lawson, and Forbes, 2008).

In this study, the researcher applied the self-efficacy theory as the major concept for the individual to perceive self-efficacy, enable elderly people to enhance exercise behavior.

2.5 Related Research

Related research on squat exercise both international and domestic as the follow:

Tabtimtes (2003) conducted a study on factors influencing exercise behavior of elders who were members at Sritany Hospital Elderly Club in Bangkok. The sampled groups consisted of 80 elders age between 60-75 years old. The result found that 83.7% of elders practiced some form of exercise but the exercise was not adequate and correct. Only 16.3% of elders practiced complete and correct form of exercise.

Suriyawongpaisal, Chariyalertsak, and Wanvarie (2003) studied the quality of life and functional status of elder patients with hip fractures in Thailand. They assessed activity of daily living (ADL) of the 251 elder patients and indicated that there are severely restrictions in ADL of walking outdoors, cooking, dressing, bathing, climbing stairs, etc.

Flanagan, et al. (2003) studied the effects of squatting exercises intervention on physical function in older adults in Los Angeles, U.S.A. They found that with older adults, chair squat places greater demand on the hip extensors, whereas normal squat places greater demand on the knee extensors and ankle plantar flexors.

Theppipit (2004) studied the effects of exercise program applying health promotion model for older Thai Muslim in Muang Distric, Suratthani province. Findings that the experimental group had better score on perceived benefit of exercise, perceived barrier of exercise, perceived self efficacy exercise, and exercise behavior than the control group.

Sriposhang (2005) has studied the effectiveness of holistic exercise promotion program among the elderly in Thamacala municipality, Nakhonpathom province. The participants of this study were elder people over 55 years old. The results found that the holistic exercise promotion program had significantly increased level of the knowledge of exercise, perceived self efficacy, exercise behavior and exercise outcome expectation ($p < 0.001$).

Katula, et al. (2006) conducted the strength training in older adults: an empowering intervention. Results of this study revealed that the two groups experienced differential gain in the desire for upper body strength and were

marginally different in gains for upper body strength self-efficacy. They also concluded that empowerment-based exercise program may be particularly motivating for older adults by creating more meaningful physical activity experience for them.

Paterson, Jones, and Rice (2007) conducted the study about aging and physical activity data to base recommendations for exercise in older adults. They confirm that the benefits of physical activity in reducing risk of various age-related morbidities and all-cause mortality. However, an exercise program can minimize declines cardio-respiratory fitness, strength, power, and indirectly balance. This program can prevent older adults from crossing functional thresholds of inability.

Berlau, Corrada, and Kawas (2009) showed that the prevalence of disability in the oldest-old is high and continues to increase with age. Findings that ADL difficulty was present in 71 % of the 90-94 years old, in 89% of the 95-99 years old, and in 97% of centenarians. ADL dependency was present in 44% of the 90-94 years old, in 66% of the 95-99 years old, and in 92 % of centenarians, The ADL most commonly causing difficulty was walking whereas the ADL most commonly causing dependency was bathing.

Ronnarithivichai, et al. (2009) conducted a study about evaluation of physical fitness before and after 9-square-table aerobic excise and rubber ring stretching of elders in the health promotion program for the elderly, faculty of nursing, Mahidol University. Results of the study revealed that overall physical fitness of the elderly before attending the exercise program were in a level between low to middle. After attending the three months exercise program, the overall physical fitness was significantly increased ($p < 0.05$). Muscle strength and endurance, muscle and joint flexibility, cardiorespiratory endurance and bone density after exercise program were significantly higher than before the exercise program ($p < 0.05$).

Lovell, Cunico, and Gass (2010) have conducted a study about the effect of strength training and short-term detraining on maximum force and the rate of force development of older men. The sample groups consisted of twelve elder men for strength training and control group. The result showed that strength training increased rate of force development, maximum bilateral isometric force, upper leg muscle mass and strength above pre-training values, respectively ($p < 0.05$).

CHAPTER III

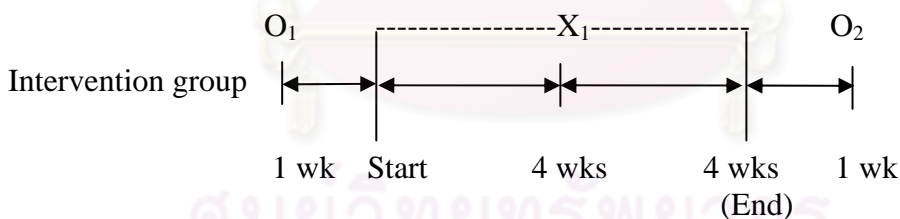
METHODS AND MATERIALS

3.1 Research design

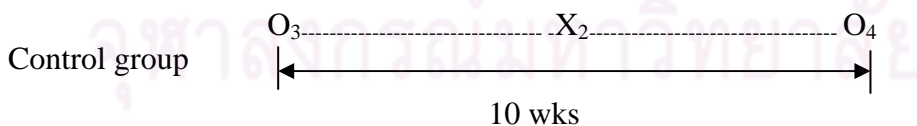
This was a Quasi-Experiment Research with pretest-posttest design on intervention and control group. The intervention group were elderly people from Health Center 19, Bangkok metropolis. The control group were elderly people from Health Center 15, Bangkok metropolis. One group had 30 minutes per 3-times weekly conventional exercise; the other group had 30 minutes per 3-times weekly group squat exercises.

The primary outcomes measurement as ADL scores were being assessed before program and at the end of the program. As well as Physical independence measurements such as the Timed Get-up-and-go test, Chair Stand test and Standing Balance test were being evaluated before and at the end of the program. The program was conducted from 24th January to 18th March, 2011 (8 weeks), and the researcher adopted the ADL questionnaires by Mohoney and Barthel (1965).

Intervention group (Group squat exercises in Elderly Club, Health Center 19)



Control group (Conventional exercise in Elderly Club, Health Center 15)



O₁, O₃ refer to evaluation of the activity of daily living (ADL) and Physical independence testing by the intervention and control group before the experiment.

O₂, O₄ refer to evaluation of the activity of daily living (ADL) and Physical independence testing by the intervention and control group after the experiment.

X₁ refer to group squat exercises for elderly people in the intervention group.

X₂ refer to conventional exercise practice for elderly people in the control group.

Procedures Group Squat Exercises Program

There are two steps in doing the group squat exercises program:

1. Preparation stage

1.1 The researcher studied many local and international documents, books, concepts, theory, and research papers to incorporate all knowledge and experiences in doing the research.

1.2 The researcher designed the group squat exercises program and submitted to advisor and experts for considering the variants of squat and time for exercise in order to ensure the safety of group squat exercises for elderly people. Then the researcher revised the group squat exercises program.

1.3 Submitting research proposal to the Research Ethical Committee on Human Rights Related to Human Experimentation, Chulalongkorn University.

1.4 A letter from the College of Public Health Science, Chulalongkorn University was submitted to director of Health department, Bangkok Metropolitan Administration to collect data from the elderly clubs, Health Center 15 and 19, and secure cooperation in the study.

1.5 Coordination with officials who were responsible for elderly club, Health Center 15 and 19, to explaining the objectives of the study and getting full cooperation for program implementation.

1.6 Researcher trained the leaders of the Elderly Club, Health Centre 19 (8 persons—2 males and 6 females) and explained steps and procedures of the group squat exercises program.

1.7 Researcher trained the assistance researchers (8 persons—internships students in Health Education Program of Srinakharinwirot University; 2 males and 6 females) to collect data from elderly people and to explain the steps and procedures of questionnaire and physical independence testing, including record of the result of testing.

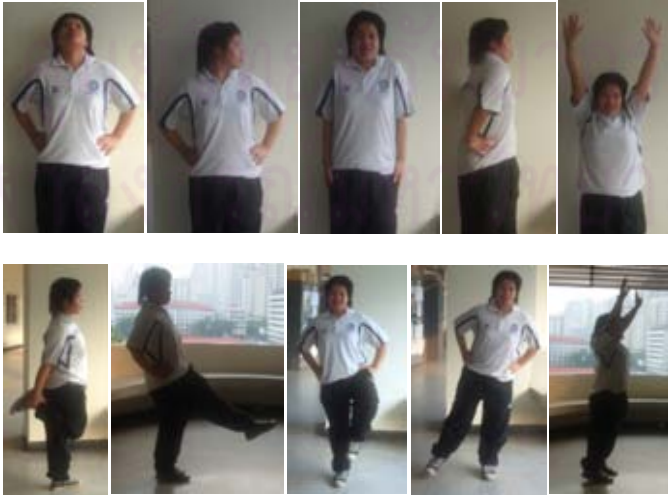
1.8 Preparation for the experiment place and activities.

2. Implementation stage

2.1 Explanation of the objectives of the study, procedures, and duration of the program to the samples.

2.2 Collection and data analysis before starting the intervention by measuring questionnaire and physical independence testing of each participating elderly person.

2.3 Program was carried out based on the concept of self-efficacy theory in order to develop elderly people behaviors in exercise. Based on this concept, group squat exercises activities have been planed as the follows:

Session	Activities Experimental Group	Evaluation
1 (1 st week)	1. Pre-test 2. Ice breaking; introduction session and sharing the experience of exercise.	1. Questionnaire 2. Physical independence testing
2 (2 nd -3 rd weeks)	1. Ice breaking; introduction session and sharing the experience of exercise. 2. Warm up with stretching for 5 minutes by 10 physical exercises such as neck exercise, shoulder exercise, waist stretch, lift the arm, lift in each leg, stretch one' leg to forward, lift the foot and tip the ankle, step foot and lift one' leg to upper, lift one' leg to side and stand on the tiptoe, etc.  3. Group squat exercises on Monday, Wednesday, and Friday in details as following:	1. Observation of the participants 2. Signature of the participants

3.1 Monday and Friday (15 minutes):

- 3 people, 1 chair: 3 sets of squat, 8 repetitions for each set.



- 6 people, 2 chairs: squat and go as relay (2 teams) for 2 minutes.



5 m.



- 6 people, 1 chair: squat and go for “touch the wall”, 8 repetitions for each set, 3 sets.



5 m.



3.2 Wednesday (15 minutes):



- Single leg squat left/right by two: 3 sets, 4 repetitions each leg.



- Pistol squat left/right by two: 3 sets, 4 repetitions each leg.



4. Session end: stretching exercises and relaxation exercises for 5 minutes.

<p>3 (4th -5th weeks)</p>	<p>1. Warm up with stretching for 5 minutes by 10 physical exercises such as neck exercise, shoulder exercise, waist stretch, lift the arm, lift in each leg, stretch one' leg to forward, lift the foot and tip the ankle, step foot and lift one' leg to upper, lift one' leg to side and stand on the tiptoe, etc.</p>  <p>2. Group squat exercise on Monday, Wednesday, and Friday in details as following: 2.1 Monday and Friday (15 minutes): - 3 people, 1 chair: 3 sets of squat, 10 repetitions for each set.</p> 	<p>1. Observation of the participants 2. Signature of the participants</p>
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- 6 people, 2 chairs: squat and go as relay (2 teams) for 5 minutes.



5 m.

- 6 people, 1 chair: squat and go for “touch the wall”, 8 repetitions for each set, 3 sets.



5 m.

2.2 Wednesday (15 minutes):





- Single leg squat left/right by two: 4 sets, 4 repetitions each leg.



- Pistol squat left/right by two: 4 sets, 4 repetitions each leg.



3. Session end: stretching exercises and relaxation exercises for 5 minutes.

<p>4 (6th -7th weeks)</p>	<p>1. Warm up with stretching for 5 minutes by 10 physical exercises such as neck exercise, shoulder exercise, waist stretch, lift the arm, lift in each leg, stretch one' leg to forward, lift the foot and tip the ankle, step foot and lift one' leg to upper, lift one' leg to side and stand on the tiptoe, etc.</p>  <p>2. Group squat exercises on Monday, Wednesday, and Friday in details as following: 2.1 Monday and Friday (20 minutes): - 3 people, 1 chair: 3 sets of squat, 12 repetitions for each set.</p>  <p>- 6 people, 2 chairs: squat and go as relay (2 teams) for 5 minutes.</p>  <p style="text-align: center;">5 m.</p> 	<p>1. Observation of the participants 2. Signature of the participants</p>
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- 6 people, 1 chair: squat and go for “touch the wall”,
12 repetitions for each set, 3 sets.

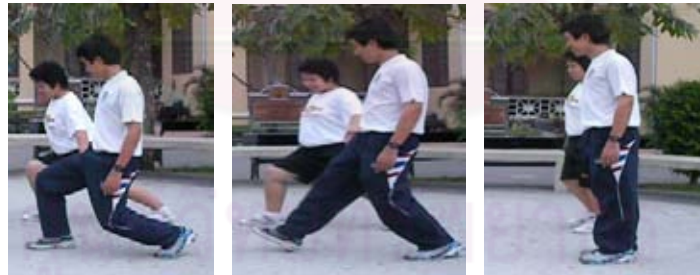


2.2 Wednesday (20 minutes):

- Single leg squat left/right by two: 3 sets, 4 repetitions
each leg.






- Pistol squat left/right by two: 3 sets, 4 repetitions each
leg.







- Jump squat by two: 3 sets, 4 repetitions.



3. Session end: stretching exercises and relaxation
exercises for 5 minutes.

<p>5 (8th -9th week)</p>	<p>1. Warm up with stretching for 5 minutes by 10 physical exercises such as neck exercise, shoulder exercise, waist stretch, lift the arm, lift in each leg, stretch one' leg to forward, lift the foot and tip the ankle, step foot and lift one' leg to upper, lift one' leg to side and stand on the tiptoe, etc.</p>  <p>2. Group squat exercise on Monday, Wednesday, and Friday in details as following: 2.1 Monday and Friday (20 minutes): - 3 people, 1 chair: 3 sets of squat, 12 repetitions in each set.</p>  <p>- Pistol squat left/right by two: 3 sets, 4 repetitions each leg.</p> 	<p>1. Observation of the participants 2. Signature of the participants</p>
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	<p>- Jump squat by two: 3 sets, 4 repetitions.</p>  <p>2.2 Wednesday (20 minutes):</p> <p>- Single leg squat left/right by two: 3 sets, 4 repetitions each leg.</p>  <p>- Pistol squat left/right by two: 3 sets, 4 repetitions each leg.</p>  <p>- Jump squat by two: 4 sets, 2 repetitions.</p>  <p>3. Session end: stretching exercises and relaxation exercises for 5 minutes.</p>	
6 (10 th week)	Post-test and give a certificate to all participants	1. Questionnaire 2. Physical independence testing

3.2 Study area and population

This was a Quasi-Experiment Research with pretest-posttest design on intervention and control group. The intervention group were elderly people from Health Center 19 whereas the control group were elderly people from Health Center 15. The study population were both male and female, elderly persons, who are member of the Elderly Club of Health Centre 15 and 19, Bangkok Metropolitan. 245 and 284 elderly persons were member of these Clubs at the time of study.

3.3 Sample and Sample size

3.3.1 Sample

This study used simple random sampling by lottery without replacement to select the participants in both groups. These random sampling selected the 41 elderly people from the list of people who had applied to join the program.

In the intervention group, out of 41 participants (36 females, 5 males) 36 persons completed the program to the end. While in the control group, out of 41 participants (36 females, 5 males) 35 persons completed the program to the end. The total of sample on the start of the program was 82 people, and 71 completed the program (See Figure 3.1). Attendance rates for the 8 weeks period were similar in both groups (87.8% in the intervention group and 85.3% in the control group, respectively).

The researcher determined the inclusion criteria as follows:

- a) The participants have to be 60 years or older,
- b) Can walk independently,
- c) Have the ability to understand basic motor command, and
- d) Agree to participate in the study.

Exclusion participants are diagnosed with psychiatric conditions, who have a cardiac event and/or procedure within the past 6 months, who exhibit chest pain or shortness of breath, who have severe knee problems, who are unable to provide their own transportation, who have severe visual impairment, who have severe hearing loss or speech disorder, who have a co morbid condition that would impair their ability to safely exercise, or who refuse or are reluctant to undergo the physical test prior to baseline testing.

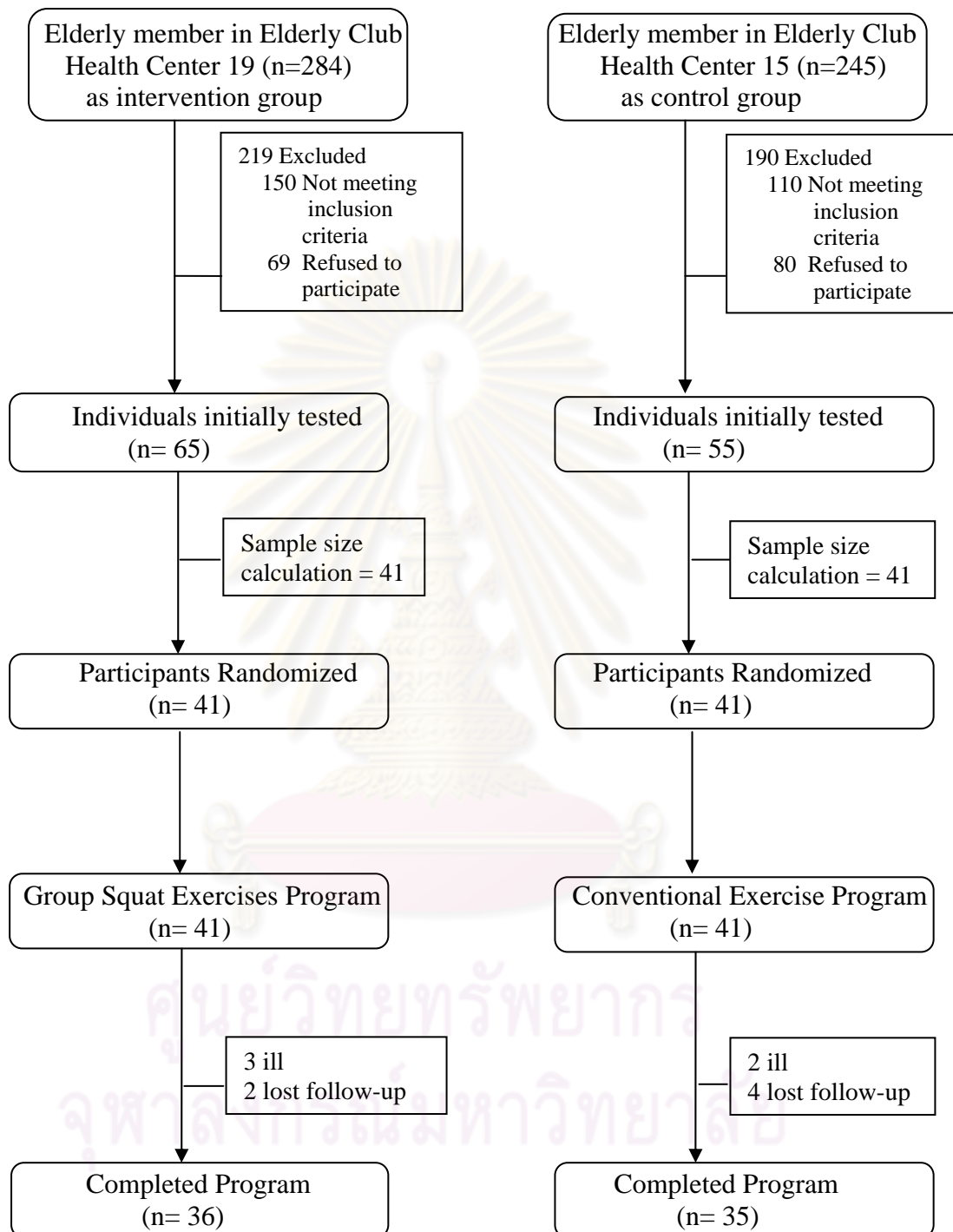


Figure 3.1 Participant breakdown

3.3.2 Sample size calculation

1. The formula for sample size calculation is

$$n = \frac{2 (Z_{\alpha/2} + Z_{\beta})^2 \sigma^2}{\Delta^2}$$

2. Power and Sample Size Calculation Program (PS) was used for calculation the sample size as follows in detail (Dupont and Plummer, 1990):

The researcher was planning a study of independent cases and controls with one control(s) per case. The researcher anticipates failure rate among controls to 99%, as there is no intervention in the control group. A difference in success rate of 25% (Suriyawongpaisal, Chariyalertsak and Wanvarie, 2003) was considered significant for intervention group. The researcher needed 37 experimental subjects and 37 control subjects to be able to reject the null hypothesis that the failure rates for experimental and control subjects are equal with probability (power) 0.9. The Type I error probability associated with this test of this null hypothesis is 0.05. Finally, the researcher added 10% for prevention dropout rate; hence, total number of participant were 41 elderly persons in each arm.

3.4 Research instrument testing

3.4.1 The researcher studied many local and international documents, books, concepts, theory, and research papers to incorporate all knowledge and experiences in doing the research for planning scope and content of interview.

3.4.2 Item development, set scoring criteria and submit the questionnaires to three experts for content validity. Then the questionnaire was revised and pre-tested in 30 older adults who had similar characteristics as those in the main study.

3.4.3 Analysis using Cronbach's alpha coefficient to test the reliability of the questionnaire. Acceptable reliability for ADL score was 0.88 and perceived self efficacy of exercise was 0.96.

3.4.4 Research assistants (8 persons—internships students in health education program of Srinakharinwirot University; 2 males and 6 females) were also utilized for this part and were trained in the same manner as research assistants for the actual data collection.

3.5 Measurement Tools

3.5.1 The questionnaire was divided into 5 parts. There are details as the follows:

Part 1: Socio-demographic characteristics of the sample, consisting of gender, age, education level, marital status, BMI, WHR and house living place.

Part 2: Questions assessing previous 7 days of exercise. Questions were about practice of exercise in previous 7 days or not. Then, if they practiced, they were asked about the frequency, intensity and time. The questionnaires were adopted from Kusnitz and Fine (1995).

Part 3: Questions assessing activity of daily living (ADL), questionnaire was be adopted by Mohoney and Barthel (1965). Barthel index of ADL assesses the ability of participants to perform 10 ADL: eating, grooming, transfer, toilet use, dressing, stairs, bathing, mobility, bowels, and bladder. Eating and grooming were grades as “dependent or need help someone care” and “independent”. While transfer and mobility were grads as “unable or immobile”, “needs major help”, “need minor help”, and “independent”. Other ADLs were grades as “dependent”, “need help”, and “independent”. Summation of item scores yields a total score ranging from 0 to 20. Zero means totally dependent in all aspects and 20 means totally independent in all aspects. Acceptable reliability of 0.88 was reported in the essay. In the study, a cut of point activity of daily living was classified as:

0 scores = Dependence

≥ 1 scores = Independence

Part 4: Questions assessing perceived self efficacy of exercise. The questionnaire was adopted from Theppipit (2003) and Sriposhang (2005), consisting of 13 questions on ability for health exercise in which the elderly felt confidence: having skill for participating by themselves, ability in self-assessment and giving support to social healthcare as the issue connect with the exercise program. The questions were positive questions and each question was ranged in a three-point rating scale asking the respondents to indicate their degree of agreement (1, no; 2, uncertain; 3, yes). Acceptable reliability of 0.96 was reported in the essay. In the study, a cut of point perceived self efficacy of exercise was based on divide equally into 3 classified as:

Score of 1.00 – 1.66 classified as low level

Score of 1.67 – 2.33 classified as moderate level

Score of 2.34 – 3.00 classified as high level

Part 5: Satisfaction questionnaire toward squat exercises program. The questionnaire was adopted from Theppipit (2003). There were consisting of 10 positive questions and each question was ranged in a five-point rating scale to indicate the degree of agreement (1, lowest satisfaction; 2, low satisfaction, 3, middle satisfaction; 4, high satisfaction; 5, highest satisfaction). In the study, a cut of point satisfaction with squat exercises program was based on divide equally into 3 classified as:

Score of 1.00 – 2.32 classified as low level

Score of 2.32 – 3.67 classified as moderate level

Score of 3.68 – 5.00 classified as high level

3.5.2 Physical independence testing composed by three tests:

a) The timed “Get-up-and-go Test” is an assessment that should be conducted as part of a routine evaluation when dealing with older persons. It is measuring walking speed, agility and balance while moving. This test was administered using the procedures of Podsiadlo and Richardson (1991). Briefly, the subject was seated in an armless chair. The tester said, “ready, set, go” and, on the word “go”, the subject was instructed to stand and walk as quickly as she or he could to a point 8 foot from the chair, turn and walk quickly back and sit down. When the buttocks were fully in contact with the chair, the test was complete and the time was recorded. Subjects completed two trials: the first was a practice trial and the completion time for the second trial was recorded. In the study, a cut of point timed “Get-up-and-go test” was classified as (Garber et al., 2010):

Normal: completes task in < 8.23 seconds.

Pre-clinical physical function limitation: completes task in 8.23-14 seconds.

Physical function limitation: completes task in >14 seconds

Low scores correlate with good functional independence; high scores correlate with poor functional independence and higher risk of falls.

b) Chair Stand Test is a physical performance test used to assess lower-extremity function. Lower-extremity function has been shown to predict subsequent development of disability because it reflects the effects of chronic disease, coexisting

conditions, and overall physiologic decline. This test was adopted from Jones and Rikli (2002). The score is the number of completed chair stands in 30 seconds. Below is a table showing the recommended ranges for this test based on age groups (from Jones and Rikli, 2002).

Men's Results

Age	below average	average	above average
60-64	< 14	14 to 19	> 19
65-69	< 12	12 to 18	> 18
70-74	< 12	12 to 17	> 17
75-79	< 11	11 to 17	> 17
80-84	< 10	10 to 15	> 15
85-89	< 8	8 to 14	> 14
90-94	< 7	7 to 12	> 12

Women's Results

Age	below average	average	above average
60-64	< 12	12 to 17	> 17
65-69	< 11	11 to 16	> 16
70-74	< 10	10 to 15	> 15
75-79	< 10	10 to 15	> 15
80-84	< 9	9 to 14	> 14
85-89	< 8	8 to 13	> 13
90-94	< 4	4 to 11	> 11

c) Standing Balance Test is the measurement of functional balance by presenting the maintenance of a position that is the person stands on one leg for as long as possible. This test was adopted from Bohannon, Larkin, Cook, Gear and Singer (1984). The cut of point standing balance is time the total length of time person can stay in the balance position and classified as:

Status	Score (seconds)
Excellent	> 50
Good	40 - 50
Average	25- 39
Fair	10 - 24
Poor	< 10

3.6 Data collection

The data collection process of this research was conducted as follows:

1. The researcher submitted letters of request from the Dean of the College of Public Health, Chulalongkorn University, to the director of health department, Bangkok Metropolitan Administration for permission to collect data.

2. A letter from the College of Public Health Science, Chulalongkorn University was submitted to director of health department, Bangkok Metropolitan Administration to collect data from elderly club, Health Center 15 and 19 and secure cooperation.

3. Coordination with officials who were responsible for elderly club, Health Center 15 and 19 to explain the objectives of the study and to get full cooperation for program implementation.

4. Researcher recruited the samples by advertising the group squat exercise program by leaflet, brochure and loudspeaker inside of the Elderly Club, Health Center 19.

5. Researcher was first screening elderly people who applied to join the squat exercises program by phone and was asking questions based on inclusive and exclusive criteria, then simple random by way of lottery.

6. Researcher informed the candidates (41 elderly persons) in the intervention group—elderly people of Health Center 19—on the details of the group squat exercises program and asked for the signature via the Informed Consent Form. Besides, the researcher asked the candidates (41 elderly persons) in control group—elderly people of Health Center 15—for the signature via the Informed Consent Form as well.

7. Researcher has trained the leaders from Elderly Club, Health Centre 19 (8 persons—2 males and 6 females) and explained steps and procedures of the group squat exercises program.

8. Researcher has trained the assistance researchers (8 persons—internships students in health education program of Srinakharinwirot University; 2 males and 6 females) to collect data from elderly people and explain steps and procedures of questionnaire and physical independence testing including the record of the results from the test.

9. Researcher prepared questionnaire and equipment for the experiment place and activities.

10. The researcher and assistance researchers then collected the data from the respondents in Health Centre 15 and 19 by physical independence testing and using the questionnaire for interviewing them about socio-demographic, previous 7 days of exercise behavior, perceiving self efficacy for exercise and activity of daily living on the first day of program. The researcher checked the completeness of the questionnaires after each interview and physical independence testing.

11. When the group squat exercises program was finished, the researcher and assistance researchers collected the data from the respondents in both of Health Centre, 15 and 19, by physical independence testing and using the questionnaire for interviewing them about socio-demographic, previous 7 days of exercise behavior, perceiving self efficacy for exercise and activity of daily living. Including interviewed about the satisfaction toward the group squat exercises program, but only at Health Centre 19.

3.7 Data Analysis

After reviewing the data for completeness, the data were then encoded and processed for statistical analysis using SPSS version 17. Data analysis was performed as follows:

1. Descriptive statistics of frequency, percentage, mean, and standard deviation was be calculated to analyze data regarding socio-demographic, perceived self-efficacy for exercise and satisfaction level toward group squat exercise program.

2. Independence t-test was used to compare the activity of daily living (ADL), physical independence, and perceived self-efficacy for exercise between the intervention group and control group.

3. Pair t-test was used to compare the ADL scores, physical independence testing, and perceived self-efficacy for exercise of subjects before and after the program of the intervention and control group.

4. Comparison of the ADL score and physical independence between the experimental and control groups, before and after the program, was tested by using Factorial ANOVA. The data were analyzed by using level of significance at 0.05.

3.8 Ethical Consideration

The experimental protocol was approved by the committee on human rights related to human experimentation of Chulalongkorn University No 126.1/53 on January 18, 2011 (See Appendix D). Informed consent for intervention and control group had to be signed by subjects prior to the study (See Appendix E).

3.9 Limitation

The limitations for this study were:

1. The degree subjects responded to and answered their questionnaires correctly and the ability of physical tests.
2. The study employed a cross-sectional design to assess effects of modified squat practice to perform activity of daily living (ADL) in elderly people, Health Center 19, Bangkok Metropolis.



ศูนย์วิทยทรัพยากร
จุฬาลงกรณ์มหาวิทยาลัย

CHAPTER IV

RESULTS

This research study was conducted as a quasi program research with pretest-posttest design on intervention and control group. The intervention group were elderly people from Health Center 19 whereas the control group were elderly people from Health Center 15. The study used simple random sampling by lottery without replacement to select the participants in both groups. Research was carried out for on 8 weeks from 24th January to 18th March, 2011. The results of data analysis are presented in the following order:

4.1 General characteristic of sample

4.2 Comparisons mean and standard deviation for activity of daily living (ADL) and physical independence between the intervention group and control group at base line

4.3 Comparisons mean score on perceiving self-efficacy for exercise between the intervention and control group

4.4 Comparisons mean and standard deviation for ADL and physical independence between the intervention group and control group after the program

4.5 Compare the ADL scores and physical independence testing before and after the program between the intervention and control group

4.6 Satisfaction of participating in group squat exercises in the intervention group after the program

4.1 General characteristic of sample

The presentation of the general characteristics are divided in two groups, (a) intervention group—elderly people in Health Center 19, and (b) control group—elderly people in Health Center 15 (see table 4.1):

(a) Intervention group—elderly people in Health Center 19

As shown in the table 4.1, the elderly in this group (86.1%) were predominantly female. Most of them were in the age group 65-69 (44.4%). The average age of intervention group is 69.9 (SD=5.4). The majority of elderly in the intervention group (47.2%) were married. Regarding the level of education, most of them (27.8%)

completed the primary school. In addition, the majority of elderly in this group (55.6%) live in two floors a house. In term of Body Mass Index—BMI, fifteen elderly people (41.7%) had scores normal and the average of BMI was 23.64 (SD=2.71). Moreover, in term of Waist-to-hip ratio—WHR, the elderly in this group (58.3%) had predominantly normal waist.

For previous exercises, the majority of elderly in intervention groups (97.2%) had frequency practiced exercise ≥ 3 times per week and most of them in this groups (94.4%) had duration practiced exercise ≥ 30 minutes per time. Whereas the majority of elderly in this group had intensity practiced exercises in level of little change in pulse from resting level (36.1%). Therefore, when assess the practiced exercise index (Kusnitz and Fine, 1995) by multiplying the frequency, the intensity, and the duration, most of this group practiced exercise at lowest level (41.7%).

(b) Control group—elderly people in Health Center 15

As shown in the table 4.1, the elderly in the control group (85.7%) were predominantly female. Most of them were in the age group 60-64 (28.6%). The average age of control group is 68.2 (SD=5.7). The majority of elderly in the control group (65.7%) were married. Most completed the primary school (51.4%). Moreover, the majority of elderly in the control group (37.1%) live in two floors a house.

In term of Body Mass Index—BMI, fifteen elderly people in the control group (42.9%) had scores normal and the average of BMI was 23.69 (SD=3.81). Regarding Waist-to-hip ratio—WHR, the elderly (48.5%) had predominantly normal waist. For previous exercise, the majority of elderly in control groups (82.8%) had frequency practiced exercise ≥ 3 times per week and most of them (57.1%) had duration practiced exercise ≥ 30 minutes per time. Besides, the majority of elderly in this group had intensity practiced exercises in level of slight increase in pulse and breathing (34.3%). Therefore, when assess the practiced exercise index (Kusnitz and Fine, 1995) by multiplying the frequency, the intensity, and the duration, most of this group practiced exercise at lowest level (54.2%).

Table 4.1 Distribution of general Characteristics of intervention and control group

General Characteristics	Intervention (n=36)	Control (n=35)
	n (%)	n (%)
Gender		
-Male	5(13.9)	5(14.3)
-Female	31(86.1)	30(85.7)
Age		
- 60-64 years	3(8.3)	10(28.6)
- 65-69 years	16(44.4)	9(25.7)
- 70-74 years	15(41.7)	9(25.7)
- 75-79 years	0(0.0)	6(17.1)
- 80 years up	2(5.6)	1(2.9)
Average age (years)	69.8	68.2
Standard deviation	5.4	5.7
Marital status		
-Single	2(5.6)	4(11.4)
-Married	17(47.2)	23(65.7)
-Widowed	14(38.9)	7(20.0)
-Divorced	2(5.6)	0(0.0)
-Separated	1(2.8)	1(2.9)
Education level		
-Less than primary school	1(2.8)	3(8.6)
-Primary school	10(27.8)	18(51.4)
-Secondary school	5(13.9)	5(14.3)
-High school or diploma	9(25.0)	5(14.3)
-Undergraduate	8(22.2)	2(5.7)
-Higher undergraduate	3(8.3)	2(5.7)
House Living place		
- housing with no floor	3(8.3)	5(14.3)
- housing with two floor	20(55.6)	13(37.1)
- brick house with three floor	9(25.0)	11(34.4)
- brick house with more than three floors	4(11.1)	6(17.1)
BMI (kg/m²)		
-Under weight (≤ 18.4)	1(2.8)	2(5.7)
-Normal weight (18.5-22.9)	15(41.7)	15(42.9)
-Over weight (23.0-24.9)	11(30.6)	6(17.1)
-Fat (≥ 25.0)	9(25.0)	12(34.3)
Average BMI (kg/m ²)	23.64	23.69
Standard deviation	2.71	3.81

Table 4.1 Distribution of general Characteristics of intervention and control group

(Continue)

General Characteristics	Intervention (n=36)	Control (n=35)
	n (%)	n (%)
WHR (Gw / Gh)		
-Small waist	7(33.4)	10(28.6)
-Normal waist	26(58.3)	17(48.5)
-Big waist	3(8.3)	8(22.9)
-Fat	0(0.0)	0(0.0)
Frequency		
1 time / week	1(2.8)	3(8.6)
2 times / week	0(0.0)	3(8.6)
3 times / week	23(63.9)	10(28.6)
4 times / week	2(5.6)	5(14.3)
≥ 5 times / week	10(27.7)	14(39.9)
Duration		
< 5 minutes / time	0(0.0)	3(8.6)
5-14 minutes / time	0(0.0)	4(11.4)
13-29 minutes / time	2(5.6)	8(22.9)
30-44 minutes / time	5(13.9)	14(39.9)
45-59 minutes / time	15(41.7)	0(0.0)
≥ 60 minutes / time	14(38.8)	6(17.2)
Intensity		
-No change in pulse resting	10(27.8)	8(22.9)
-Little change in pulse from resting	13(36.1)	9(25.7)
-Slight increase in pulse and breathing	9(24.9)	12(34.3)
-Moderate increase in pulse and breathing	2(5.6)	2(5.7)
-Intermittent heavy breathing and sweating	2(5.6)	4(11.4)
-Sustained heavy breathing and sweating	0(0.0)	0(0.0)
Level of exercise for health		
-Lowest	15(41.7)	19(54.2)
-Low	10(27.8)	7(20.0)
-Moderate	8(22.2)	7(20.0)
-High	3(8.3)	1(2.9)
-Highest	0(0.0)	1(2.9)

4.2 Comparisons mean and standard deviation for activity of daily living (ADL) and physical independence between intervention group and control group at base line

Mohoney and Barthel (1965) index of ADL assesses the ability of participants to perform 10 ADLs such as eating, grooming, transfer, toilet use, stairs, bathing, mobility, bowels, and bladder. Eating and grooming were grades as “dependent or need help someone care” and “independent”. While transfer and mobility were grads as “unable or immobile”, “needs major help”, “need minor help”, and “independent”. Other ADLs were grades as “dependent”, “need help”, and “independent”. Summation of item scores yields a total score ranging from 0 to 20. Zero means totally dependent in all aspects and 20 means totally independent in all aspects.

The results revealed that the Barthel index of ADL was suitable for describing physical disability in relatively elderly people, but was not appropriate in this setting, since most of elderly people were totally independent. At the base line, there was a trend for better health status for participants in the control group compared with intervention group since the ADL score were lower (better) for the control participants than for the intervention (Mean ADL score in intervention group = 18.75, SD=1.87; Mean ADL score in control group = 19.02, SD= 1.63) as shown in table 4.2.

Moreover, the results showed that majority of each ADL of elderly in the intervention group with dependent is Mobility (41.7%), Bladder control (19.4%), Stairs (13.9%) respectively. While the majority of each ADL of elderly in the control group with dependent is Transfer (22.9%), following by grooming, toilet use, dressing, stairs, mobility, bowel control and bladder control (8.6%), and eating and bathing (2.9%) respectively.

Regarding the physical independence—Timed Get-up-and-go test (TUG test), Chair Stand test (CS test) and Standing Balance test (SB test) in right leg and left leg—it revealed that mean of TUG test in the intervention and control group was a bit different (Mean intervention group= 10.05, SD=1.90; Mean control group = 10.04, SD=0.37), while CS test and SB test, the mean score of intervention group was higher than in control group, as depicted in table 4.2.

Table 4.2 Distribution of ADL and physical independence between the intervention group and control group at base line by Independence t-test

Activity of daily living (ADL)	Intervention(n=36)	Control (n=35)	Independence t-test	p-value
	n (%)	n (%)		
-Eating				
Independence	33(91.7)	34(97.1)		
Dependence	3(8.3)	1(2.9)		
<i>Mean±SD</i>	<i>1.92±0.28</i>	<i>1.97±0.17</i>	0.993	.324
-Grooming				
Independence	34(94.4)	32(91.4)		
Dependence	2(5.6)	3(5.6)		
<i>Mean±SD</i>	<i>0.94±0.23</i>	<i>0.91±0.28</i>	0.490	.625
-Transfer				
Independence	32(88.9)	27(77.1)		
Dependence	4(11.1)	8(22.9)		
<i>Mean±SD</i>	<i>2.89±0.32</i>	<i>2.77±0.43</i>	1.313	.194
-Toilet use				
Independence	33(91.7)	32(91.4)		
Dependence	3(8.3)	3(8.6)		
<i>Mean±SD</i>	<i>1.92±0.28</i>	<i>1.91±0.28</i>	0.036	.972
-Dressing				
Independence	35(97.2)	32(91.4)		
Dependence	1(2.8)	3(8.6)		
<i>Mean±SD</i>	<i>1.97±1.67</i>	<i>1.89±0.32</i>	1.413	.164
-Stairs				
Independence	31(86.1)	32(91.4)		
Dependence	5(13.9)	3(8.6)		
<i>Mean±SD</i>	<i>1.86±0.35</i>	<i>1.91±0.28</i>	0.701	.486
-Bathing				
Independence	34(94.4)	34(97.1)		
Dependence	2(5.6)	1(2.9)		
<i>Mean±SD</i>	<i>0.94±0.23</i>	<i>0.97±0.17</i>	0.558	.578
-Mobility				
Independence	21(58.3)	32(91.4)		
Dependence	15(41.7)	3(8.6)		
<i>Mean±SD</i>	<i>2.58±0.50</i>	<i>2.89±0.32</i>	3.036*	.004
-Bowel control				
Independence	33(91.7)	32(91.4)		
Dependence	3(8.3)	3(8.6)		
<i>Mean±SD</i>	<i>1.92±0.28</i>	<i>1.89±0.32</i>	0.432	.667
-Bladder control				
Independence	29(80.6)	32(91.4)		
Dependence	7(19.4)	3(8.6)		
<i>Mean±SD</i>	<i>1.81±0.40</i>	<i>1.91±0.28</i>	1.320	.191
Total ADL score	18.75±1.87	19.02±1.63	0.767	.446

* level of statistical signification at 0.05

Table 4.2 Distribution of ADL and physical independence between the intervention group and control group at base line by Independence t-test(continue)

Physical independence	Intervention (n=36) n (%)	Control (n=35) n (%)	Independence t-test	p-value
-Timed-Get-up-and-go test				
Normal	5(13.9)	4(11.4)		
Pre-clinical function limitation	30(83.3)	30(85.7)		
Physical function limitation	1(2.8)	1(2.9)		
<i>Mean±SD</i>	<i>10.05±1.90</i>	<i>10.04±0.976</i>	0.031	.976
-Chair Stand test				
Below average	12(33.3)	15(42.8)		
Average	15(41.7)	19(54.3)		
Above average	9(25.0)	1(2.9)		
<i>Mean±SD</i>	<i>15.22±5.84</i>	<i>11.88±0.055</i>	2.928	.055
-Standing Balance test				
Right leg				
Excellent	1(2.8)	2(5.7)		
Good	1(2.8)	2(5.7)		
Average	16(44.4)	15(42.8)		
Fair	12(33.3)	10(28.5)		
Poor	6(16.7)	6(17.3)		
<i>Mean±SD</i>	<i>22.38±12.83</i>	<i>18.31±14.40</i>	1.259	.212
-Standing Balance test				
Left leg				
Excellent	3(8.4)	2(5.7)		
Good	2(5.6)	1(2.9)		
Average	12(33.3)	14(39.8)		
Fair	11(30.5)	12(34.3)		
Poor	8(22.2)	6(17.3)		
<i>Mean±SD</i>	<i>24.00±15.51</i>	<i>19.94±14.33</i>	1.144	.257

4.3 Comparisons mean score of perceiving self-efficacy for exercise between the intervention and control group

According to Independent t-test, there was no significant difference on perceiving self-efficacy for exercise between the intervention and control group ($p = 0.552$) at base line, as shown in table 4.3. But after the program, the intervention group had higher mean score than the control group (Mean intervention group = 24.11, SD=3.50; Mean control group = 21.91, SD = 4.01; $p < 0.05$).

Table 4.3 Distribution of mean score on perceiving self-efficacy for exercise between the intervention and control group by Independence t-test

Perceiving self-efficacy for exercise	Intervention(n=36)		Control (n=35)		Independence t-test	p-value
	n (%)		n (%)			
Before the program						
Low	13(36.1)		13(37.1)			
Moderate	23(63.4)		22(62.9)			
High	0(0.0)		0(0.0)			
<i>Mean±SD</i>	<i>22.00±3.99</i>		<i>20.97±5.31</i>		0.598	.552
After the program						
Low	6(16.7)		11(31.4)			
Moderate	30(83.3)		24(68.6)			
High	0(0.0)		0(0.0)			
<i>Mean±SD</i>	<i>24.11±3.50</i>		<i>21.91±4.01</i>		3.121*	.003

* level of statistical signification at 0.05

Mean differences on perceiving self-efficacy for exercise within each group after the program were assessed using Paired t-test. The results from analysis showed that the intervention group had higher mean score than before the program ($p < 0.05$). As shown in table 4.4, the control group had no significant differences on perceiving self-efficacy for exercise ($p = 0.337$).

Table 4.4 Distribution of mean score on perceiving self-efficacy for exercise before and after the program between the intervention and control group by Pair t-test

Perceiving self-efficacy for exercise	Before		After		Pair t-test	p-value
	Mean	SD	Mean	SD		
Intervention group (n=36)	22.00	3.99	24.11	3.50	3.183*	.003
Control group (n=35)	20.97	5.31	21.91	4.01	0.973	.337

* level of statistical signification at 0.05

As shown in table 4.5, according to Factorial ANOVA revealed that before the program, the intervention group had no significant difference on perceiving self-efficacy for exercise mean score with control group ($p=0.783$). However, after the program, the intervention group had higher perceiving self-efficacy for exercise mean score than the control group ($P<.05$).

Table 4.5 Distribution of mean and standard deviation of perceiving self-efficacy for exercise between the intervention and control group by using Factorial ANOVA

Measurement	Intervention Mean \pm SD	Control Mean \pm SD	Sum of Square	Mean Square	F	p-value
Perceiving self-efficacy for exercise						
Before the program	22.00 \pm 3.99	20.97 \pm 5.31	1.407	0.128	0.638	.783
After the program	24.11 \pm 3.50	21.91 \pm 4.01	7.093	0.788	3.930*	.002
Error			6.217	0.201		

* level of statistical signification at 0.05

4.4 Comparisons mean and standard deviation for ADL and physical independence between the intervention group and control group after the program

After the program, there was a trend for better health status for participants in the intervention group compared with control group since the ADL score were higher for the intervention participants than for the control (Mean ADL score in intervention group = 19.91, SD=0.28; Mean ADL score in control group = 19.37, SD= 0.77) as shown in table 4.6.

Moreover, the results showed that majority of each ADL of elderly in the intervention group with dependent are Mobility (2.8%), Bladder control (2.8%), and Stairs (2.8%) respectively. While the majority of each ADL of elderly in the control group with dependent is Transfer (14.3%), following by toilet use and bladder control (8.6%), and stairs and bowel control (5.7%) respectively.

Regarding the physical independence—Timed Get-up-and-go test (TUG test), Chair Stand test (CS test) and Standing Balance test (SB test) in right leg and left leg—it revealed that mean of TUG test in the intervention had less than the control group (Mean intervention group= 6.16, SD=1.72; Mean control group = 8.75, SD=1.82), while CS test and SB test, the mean score of intervention group was higher than the control group, as depicted in table 4.6.

Table 4.6 Distribution of ADL and physical independence between the intervention group and control group after the program by Independence t-test

Activity of daily living (ADL)	Intervention(n=36)	Control (n=35)	Independence t-test	p-value
	n (%)	n (%)		
-Eating				
Independence	36(100.0)	35(100.0)		
Dependence	0(0.0)	0(0.0)		
<i>Mean±SD</i>	<i>2.00±0.00</i>	<i>2.00±0.00</i>	-	-
-Grooming				
Independence	36(100.0)	35(100.0)		
Dependence	0(0.0)	0(0.0)		
<i>Mean±SD</i>	<i>1.00±0.00</i>	<i>1.00±0.00</i>	-	-
-Transfer				
Independence	36(100.0)	30(85.7)		
Dependence	0(0.0)	5(14.3)		
<i>Mean±SD</i>	<i>3.00±0.00</i>	<i>2.86±0.36</i>	2.380*	.023
-Toilet use				
Independence	36(100.0)	32(91.4)		
Dependence	0(0.0)	3(8.6)		
<i>Mean±SD</i>	<i>2.00±0.00</i>	<i>1.91±0.28</i>	1.785	.083
-Dressing				
Independence	36(100.0)	35(100.0)		
Dependence	0(0.0)	0(0.0)		
<i>Mean±SD</i>	<i>2.00±0.00</i>	<i>2.00±0.00</i>	-	-
-Stairs				
Independence	35(97.2)	32(91.4)		
Dependence	1(2.8)	3(8.6)		
<i>Mean±SD</i>	<i>1.97±1.67</i>	<i>1.91±0.28</i>	.608	.545
-Bathing				
Independence	36(100.0)	35(100.0)		
Dependence	0(0.0)	0(0.0)		
<i>Mean±SD</i>	<i>1.00±0.00</i>	<i>1.00±0.00</i>	-	-
-Mobility				
Independence	35(97.2)	34(97.1)		
Dependence	1(2.8)	1(2.9)		
<i>Mean±SD</i>	<i>2.97±0.17</i>	<i>2.97±0.17</i>	.020	.984
-Bowel control				
Independence	36(100.0)	33(94.3)		
Dependence	0(0.0)	2(5.7)		
<i>Mean±SD</i>	<i>2.00±0.00</i>	<i>1.94±0.24</i>	1.435	.160
-Bladder control				
Independence	35(97.2)	32(91.4)		
Dependence	1(2.8)	3(8.6)		
<i>Mean±SD</i>	<i>1.97±1.67</i>	<i>1.91±0.28</i>	1.052	.297
Total ADL score	19.91±0.28	19.37±0.77	3.942**	<.001

* level of statistical signification at 0.05 ** level of statistical signification at 0.001

- Independence t-test cannot be computed because the standard deviations of both groups are 0.

Table 4.6 Distribution of ADL and physical independence between the intervention group and control group at base line by Independence t-test(continue)

Physical independence	Intervention(n=36) n (%)	Control (n=35) n (%)	Independence t-test	p-value
-Timed-Get-up-and-go test				
Normal	30(83.3)	9(25.7)		
Pre-clinical function limitation	6(16.7)	24(68.6)		
Physical function limitation	0(0.0)	2(2.7)		
<i>Mean±SD</i>	<i>6.16±1.72</i>	<i>8.75±1.82</i>	6.142**	<.001
-Chair Stand test				
Below average	5(13.9)	13(37.1)		
Average	8(22.2)	12(34.3)		
Above average	23(63.9)	10(28.6)		
<i>Mean±SD</i>	<i>19.97±6.31</i>	<i>14.37±4.81</i>	4.193**	<.001
-Standing Balance test				
Right leg				
Excellent	4(11.1)	2(5.7)		
Good	6(16.7)	1(2.9)		
Average	13(36.1)	12(34.3)		
Fair	9(25.0)	8(22.9)		
Poor	4(11.1)	12(34.3)		
<i>Mean±SD</i>	<i>29.72±16.16</i>	<i>21.00±14.76</i>	2.372*	.020
-Standing Balance test				
Left leg				
Excellent	7(19.4)	2(5.7)		
Good	13(36.1)	5(14.3)		
Average	4(11.1)	8(22.9)		
Fair	6(16.7)	9(25.7)		
Poor	6(16.7)	11(31.4)		
<i>Mean±SD</i>	<i>31.15±17.56</i>	<i>22.34±15.33</i>	2.249*	.028

* level of statistical signification at 0.05

** level of statistical signification at 0.001

4.5 Compare the ADL scores and physical independence testing before and after the program of intervention and control group by using Pair t-test

Comparison of the mean score on ADL and physical independence—Time-Get-up-and-go test (TUG test), Chair Stand test (CS test) and Standing Balance test (SB test) in right and left leg—within each group after the program was assessed by the Paired t-test. The results as shown in table 4.7 as follows:

The results from the Pair t-test analysis showed that there was a significant difference on ADL score within the intervention group (Mean before= 18.75, SD=1.87; Mean after = 19.91, SD=0.28; $P<0.01$) as well as there was a significant difference of those in the control group (Mean before= 19.02, SD=1.63; Mean after = 19.37, SD=0.77; $P<0.05$) as shown in table 4.7.

In addition, as shown in table 4.7, the results from the Pair t-test analysis illustrated that there was a significant difference on TUG test score within the intervention group (Mean before= 10.05, SD=1.90; Mean after = 6.16, SD=1.72; $P<0.001$) as well as with there was significant difference of those in the control group (Mean before= 10.04, SD=1.60; Mean after = 8.75, SD=1.82; $P<0.05$).

As shown in table 4.7, the results from the Pair t-test analysis revealed that there was a significant difference on CS test score within the intervention group (Mean before= 15.22, SD=5.84; Mean after = 19.97, SD=6.31; $P<0.001$) as well as a significant difference of those in the control group (Mean before= 11.88, SD=3.49; Mean after = 14.37, SD=4.81; $P<0.001$).

The results from the Pair t-test analysis showed that there was a significant difference on SB test with right leg score within the intervention group (Mean before= 22.38, SD=12.83; Mean after = 29.72, SD=16.16; $P<0.001$) as well as with a significant difference of those in the control group (Mean before= 18.31, SD=14.40; Mean after = 21.00, SD=14.76; $P<0.001$).

The results from the Pair t-test analysis showed that there was a significant difference on SB test with left leg score within the intervention group (Mean before= 24.00, SD=15.51; Mean after = 31.15, SD=17.56; $P<0.05$) as well as a significant difference of those in the control group (Mean before= 19.94, SD=14.33; Mean after = 22.34, SD=15.33; $P<0.001$).

Table 4.7 Distribution of ADL and physical independence testing mean score before and after the program of intervention and control group by using Pair t-test

Variable	Before the program		After the program		Pair t-test	p-value
	Mean	SD	Mean	SD		
Intervention Group						
ADL	18.75	1.87	19.91	0.28	3.765**	.001
Physical Independence						
-Time Get-up-and-go	10.05	1.90	6.16	1.72	12.246**	<.001
-Chair Stand	15.22	5.84	19.97	6.31	6.034**	<.001
-Standing Balance						
Right leg	22.38	12.83	29.72	16.16	3.550**	<.001
Left leg	24.00	15.51	31.15	17.56	3.062*	.004
Control Group						
ADL	19.02	1.63	19.37	0.77	1.457	.154
Physical Independence						
-Time Get-up-and-go	10.04	1.60	8.75	1.82	3.044*	.004
-Chair Stand	11.88	3.49	14.37	4.81	3.935**	<.001
-Standing Balance						
Right leg	18.31	14.40	21.00	14.76	4.623**	<.001
Left leg	19.94	14.33	22.34	15.33	3.588**	<.001

* Level of statistical signification at 0.05

** Level of statistical signification at 0.001

4.6 Compare the ADL scores and physical independence testing before and after the program between intervention and control group by using Factorial ANOVA

As shown in table 4.8, according to Factorial ANOVA revealed that the intervention group had no significant difference on ADL mean score before the program ($p=.505$). However, the intervention group had less ADL mean score than the control group after the program ($P<.05$).

In term of physical independence testing such as Time-Get-up-and-go test (TUG test), Chair Stand test (CS test) and Standing Balance test (SB test) in right and left leg. Factorial ANOVA test revealed as follows (table 4.8):

Timed-Get-up-and-go test (TUG test): it was found that the intervention and control group had no significant difference on TUG test before the program ($p=.471$). However, the intervention group had less mean score than the control group after the program ($P<.05$).

Chair Stand test (CS test): it found that the intervention and control group had no significant difference on CS test before the program ($p=.568$). However, the intervention group had more mean score than the control group after the program ($P<.05$).

Standing Balance test (SB test) in right leg: it revealed that the intervention and control group had no significant difference on SB test in right leg before the program ($p=.429$) as well as had no significant difference on SB test in right leg after the program ($P=.150$).

Standing Balance test (SB test) in left leg: it revealed that the intervention and control group had no significant difference on SB test in left leg before the program ($p=.431$) as well as had no significant difference on SB test in left leg after the program ($P=.482$).

Table 4.8 Distribution of mean and standard deviation of ADL and physical independence between the intervention and control groups by using Factorial ANOVA

Measurement	Intervention Mean±SD	Control Mean±SD	Sum of Square	Mean Square	F	p-value
ADL						
Before the program	18.75±1.87	19.02±1.63	1.115	.186	0.96	.505
After the program	19.91±0.28	19.37±0.77	2.550	1.275	5.98*	.004
Error			12.252	.208		
Physical Independence						
-Time Get-up-and-go						
Before the program	10.05±1.90	10.04±1.60	1.393	.155	0.99	.471
After the program	6.16±1.72	8.75±1.82	6.934	.433	2.77*	.009
Error			4.383	.157		
-Chair Stand						
Before the program	15.22±5.84	11.88±3.49	3.718	.219	0.93	.568
After the program	19.97±6.31	14.37±4.81	6.715	.320	1.35*	0.29
Error			2.833	.236		

* Level of statistical significance at 0.05

Table 4.8 Distribution of mean and standard deviation of ADL and physical independence between the intervention and control groups by using Factorial ANOVA(cont.)

Measurement	Intervention Mean±SD	Control Mean±SD	Sum of Square	Mean Square	F	p-value
-Standing Balance						
Right leg						
Before the program	22.38±12.83	18.31±14.40	1.393	.155	1.15	.429
After the program	29.72±16.16	21.00±14.76	6.934	.433	1.89	.150
Error			4.383	.157		
Left leg						
Before the program	24.00±15.51	19.94±14.33	6.417	.247	1.16	.431
After the program	31.15±17.56	22.34±15.33	5.967	.229	1.08	.482
Error			1.917	.213		

4.6 Satisfaction of participating in group squat exercises in the intervention group after the program

Regarding the satisfaction of elderly people intervention group, at the end program toward participating in group squat exercise, as shown in table 4.9, the average satisfaction of the elderly people of Health Center 19 was high (Mean = 4.20, SD = 0.67).

Table 4.9 Mean and standard deviation of satisfaction elderly people toward participating group squat exercises in the intervention group after the program

Item	Satisfaction (n=36)		
	Mean	SD	level
1. The group squat exercises were made elderly' muscular strength and more power on thigh, butt and hip muscles.	4.11	0.95	High
2. The group squat exercises was made elderly' muscular flexor on thigh, but and hip muscles.	4.14	0.80	High
3. The group squat exercises was increased the ability to perform important activities of daily living of elderly, such as rising from a chair or a toilet seat, agile walking and climbing stairs.	4.25	0.81	High
4. The group squat exercises was increased more adroit the ability to perform important activities of daily living of elderly.	4.22	0.79	High

Table 4.9 Mean and standard deviation of satisfaction elderly people toward participating group squat exercises in the intervention group after the program (cont.)

Item	Satisfaction (n=36)		
	Mean	SD	level
5. The group squat exercises were given elderly to have good excretory system and faint.	3.93	0.76	High
6. I feel safety during working time higher than before because of participation the group squat exercises program	4.05	0.71	High
7. The group squat exercises were given elderly happier lives.	4.22	0.72	High
8. The group squat exercises program was fight with stress, depression and anxiety.	4.30	0.70	High
9. The group squat exercises program was made enjoyable for me and brought me to meet with my friends.	4.44	0.74	High
10. I feel enjoy with group squat exercises so much and would like to ask friend to join with this program.	4.33	1.17	High
Total	4.20	0.67	High

CHAPTER V

CONCLUSIONS, DISCUSSIONS AND RECOMMENDATIONS

This chapter is the presentation of the conclusions and discussions based on the results in Chapter IV. Finally, the recommendations for elderly and future research are proposed.

5.1 Conclusions

In general, the results permit the conclusion that there was a trend for better performance on activities of daily living, ADL, in the eight week's intervention group compared to the control group, with a better ADL mean score ($P < .05$).

As well as in term of physical independence testing such as Timed-Get-up-and-go test, Chair Stand test, and Standing Balance test in right and left leg, there was a trend for enhanced performance on physical independence in the intervention group compared with the control group as follows:

Timed-Get-up-and-go test (TUG): No significant difference before the program ($p = .757$). After the program, the intervention group had lower (better) mean score than the control group ($P < .05$).

Chair Stand test (CS): No significant difference before the program ($p = .435$). After the program, the intervention group had higher (better) mean score than the control group ($P < .05$).

Standing Balance test (SB) in right and left leg: No significant difference before and after the program, but there was a trend of higher SB score in the intervention group compared to the control group.

For the perceiving self-efficacy for exercise in the intervention group compared to the control group, it was found that the intervention group had higher perceiving self-efficacy for exercise mean score than the control group after the program ($P < .05$).

Regarding the satisfaction of the elderly people who participated in group squat exercises (intervention group), it was found that the satisfaction level was high (mean: 4.20, SD: 0.67).

5.2 Discussion

Regular physical activity is a key ingredient to healthy aging. Of all groups, people who are elderly have the most to gain by being physically active. The risk of physical independence and the loss of the ability to perform activities of daily living (ADL) are decreased with regular physical activity. For elderly people, it is more important, for functional abilities and performing activity of daily living, to be maintained with physical activity. One type of exercise that may be greatly beneficial to elderly in multiple areas of health and activity of daily living (ADL) are squat exercises.

The researcher attempted to observe the effects of an acute bout of group squat exercises program on the ability to perform activities of daily living and physical independence in elderly, 60 years of age and older. Also, the researcher examined levels of perceived self-efficacy for exercise among those who regularly participated in group squat exercises or in conventional exercises to determine whether there were differences between those who choose to practice group squat exercises and those who practice conventional exercises on a regular basis. To date, there is no study that has undertaken the effects of acute bouts of group squat exercises in a cross-sectional study design on activity of daily living and physical independence among elderly in Thailand, age 60 and over.

In the present study, results indicate that a number of specific forms of squat exercises practice is more effective to perform activities of daily living and to gain physical independence in elderly people in Health Centre 19 compared to a control group with significant level at 0.05. The results add to previous research that suggests chair squat places greater demand on the hip extensors, whereas normal squat places greater demand on the knee extensors and ankle plantar flexors (Flanagan, et al., 2003). Hip and knee extensor, and ankle plantar flexors have been shown to be particularly important for the ability to perform physical activity of daily living, such as stair climbing, walking and rising from a chair (Roubenoff, 2003).

Comparisons of ability to perform activities of daily living and to gain physical independence in elderly people between those practicing group squat exercises and those conventional exercises have not been previously reported. However, there is evidence

that has shown that frequent practice of squat exercise improves physical independence function (Flanagan, et al., 2003, Iwamoto, et al., 2004, Ronnarithivichai, et al., 2009, Garber, et al., 2010).

The Timed Up and Go Test, a simple measure of physical independence function that involves lower extremity strength, dynamic balance, gait, and agility, was used to measure physical function. The significant decrease in time of TUG seen in the group squat exercises practitioners is supported by previous research that reported scores on the TUG to significantly decrease in time in community dwelling men and women, 60 years of age or older, from East Providence, Rhode Island and the surrounding area, participating in the Study of Exercise and Nutrition in Older Rhode Islanders (SENIOR) Project (Garber, et al., 2010). Decreases in time of TUG, as seen with a session of group squat exercises, may be probably based on the fact that the squat exercises are considered for increasing the strength and size of legs and buttocks, but also to increase knee extensor muscle strength (Iwamoto, et al, 2004).

Chair Stand test (CS) is a physical performance test used to assess leg strength and endurance. Research result suggested that there was no significant difference before the program ($p=.435$). After the program, the intervention group had higher (better) mean score than the control group ($P<.05$) in agreement with Ronnarithivichai, et al. (2009), an evaluation of physical fitness before and after 9-square-table aerobic excise and rubber ring stretching in the health promotion program for the elderly, faculty of nursing, Mahidol University. They found that muscle strength and endurance, muscle and joint flexibility, and cardio respiratory endurance after exercise program were significantly higher than before ($p<0.05$). In agreement with the study of Lovell, Cunco and Gass (2010), they revealed that strength training increased rate of force development, maximum bilateral isometric force, upper leg muscle mass and strength above pre-training values, respectively ($p <0.05$). Also, in most analyses, the group squat exercises showed greater improvement on all scales from pre to post session, compared with the control group.

Furthermore, research result suggested that Standing Balance test (SB) in right and left leg had no significant difference before and after the program in non-agreement with the previous research (Iwamoto, et al., 2004). This study have shown that squat

exercise could increase the ambulatory competence. That is the step length, maximum torque of the knee extensor muscle, and maximum standing time on one leg were found to have significantly increased by 4.5%, 6.8%, and 72.5%, respectively ($p < 0:001$). This study agreed with Vereeck, et al. (2008) who found that older women have longer TUG times and poorer standing balance compared with older men. It is possible that in this particular sample, the control group practiced forms of conventional exercises, which are extremely beneficial for balance as well. Probably a dynamic balance test instead of a static balance test would have shown another result. On the other hand, the reason for the increase in the SB remains uncertain. Basically, each stride during squat exercises practiced consists of the stance and swing phases. Thus, increased maximum standing time on one leg and knee extensor muscle strength can produce a more stable gait. That is, the more the stance phase of each leg was stabilized by training, the greater the swing of the other leg became, resulting in an increase in SB.

Results also show that group squat exercises practitioners perceived a greater amount of perceived self-efficacy of exercise than control group after the program, but had no significant difference on perceived self-efficacy of exercise mean score before the program when compared with the control group. It is possible that participants who practice group squat exercises enjoy being active or see the value of activity more than doing conventional exercises. It is also possible that participants who practice group squat exercises are more determined to participate in physical activity. Group squat exercises program were arranged to increase the perceived self-efficacy of exercise among elderly in three areas: (1) ability to exercise for health (2) ability to assess health, and (3) ability to give social support on health care. Finding showed that the researcher created activities to improve the perceived self-efficacy of exercise for elderly by group exercises. This study adapted the self-efficacy theory to promote exercise among elderly people in the intervention group by arranging activities, such as, model presentation, practicing exercise, invitation from friend, and prompts and reminder for exercise. The study agreed with Sriponhang (2005) who studied about the effectiveness of holistic exercise promotion program among the elderly in Thamacala municipality, Nakhonpathom province. The result suggested that the holistic exercise promotion program had significantly increased level of perceived self-efficacy ($P < .001$).

Furthermore, for the elderly, physical activities with good friends and in groups are an important motivation and a guarantee for providing benefits. They can communicate and share ideas within the same generation. They feel comfortable, favoring social and mental health as well. In addition, the experience has shown that for elderly people, exercise has to be moderate and less vigorous to avoid discomfort and injuries. Squats exercises can be performed in different ways, with or without weights. The chosen forms are very important when performing—especially for the elderly—to avoid injury. Squats can injure knees. Therefore, the choice of squat exercises without weights was the right decision for this study, based essentially on chair-squats, a form of exercises that can be organized easily and everywhere. The program was unanimously well accepted and appreciated, and no injury has been registered during the whole duration of this study.

Differences found between the group squat exercises and control groups may be explained by the form of exercise itself and by demographic factors. In the present study, the control group was significantly younger compared with the squat exercises group, which may be signification for their choice of exercise. Age-related decrease in ADL and the muscle strength is known to be much more marked in the lower extremities than in the upper extremities, and gait in the elderly is characterized by a decreased TUG (Berlau, Corrada, and Kawas, 2009; Garber, et al., 2010). Impairment of muscle strength of the lower extremities, balance/postural control, and gait has been found to be important risk factors for falls (Runge, Rehfeld, and Resnicek, 2000). While this present study found age-related impairment of TUG and CS in elderly of the intervention group, it could not detect any age-related changes in the body balance in these subjects, probably because the sample size in the study was small and younger older adults. Besides, population studies report more mobility limitations in older women compared with older men (Ahacic, Parker, and Thorslund, 2000; Yeom, Fleury, and Keller, 2008), but this present study did not take into consideration sex differences in the ability to in perform ADL and times on the TUG, CS, and SB. This is likely due to the small numbers of men in the study samples.

Despite the present study's ability to extend previous research, several limitations deserve attention. Limitations include small sample size (which likely influenced the lack of significant results) and comprised primarily women, and thus is not representative for the entire population. Last, researcher did not collect the health status of participants, and the extent to which this could have influenced results is unknown.

5.3 Recommendations

The following recommendations are made.

1. The results of this study allow the conclusion that the practice of specific squat exercises, on a regular base, for a duration as short as 10 to 15 minutes, has numerous benefits for elderly people, increasing not only thigh muscle strength but also self-esteem, and therefore plays an important role to master activities of daily living and to keep physical independence. Therefore, a few and easy squat exercises program should become an integral part of any physical activity program for elderly people. And even for the elderly it is never too late to start on the road of prevention to better take care of themselves and to engage successfully in common activities of life.

2. In the future, researchers may include investigation of the differences in the perceived barriers between squat exercises practitioners and the specific traits that enable squat exercises practitioners to overcome their barriers. When comparing squat exercises groups with control groups, one approach is to match participants on age, gender, and educational level.

3. Future researchers may include longitudinal and qualitative study designs. A longitudinal study design would help to clarify the extent to which squat exercises can improve psychosocial outcomes and determinants over a greater period of time. A qualitative study would be useful to better understand the true differences between squat exercises and other forms of conventional exercise by reducing variability between participants.

4. This study was limited to the Barthel Activity of Daily Living index (ADL). Future research should be undertaken by expanding with The Lawton Instrumental Activities of Daily Living (IADL). Scale assesses a person's ability to perform tasks such as using a telephone, doing laundry, and handling finances. Because IADL function is

usually lost before ADL function (such as bathing, eating, and using the toilet), assessment of IADLs may identify incipient decline—physical, cognitive, or both—in an older adult who might otherwise appear capable and healthy.

5. This study used a quasi-experiment research with pretest-posttest design on intervention and control group and was limited by two groups' sample of Elderly Club in Bangkok Metropolitan. Future research should be undertaken with only one weekly specific squat program in order to measure changes of the ADL score and physical capacity in elderly people.



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Appendices

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Appendix A

Administration and Time Schedule

Time period for this research is 11 months as the follows:

Month 1-4 : Review literature and make proposal thesis

Month 5-6 : Proposal exam, contact with elderly leader of elderly club for recruiting to exercise program, research tool, and approval for data collection from Health Centre

Month 7-8 : Ethic consideration from Chulalongkorn University

Month 9-10 : Data collection and data check

Month 10 : Data analysis and discussion report writing

Month 11 : Defense thesis and public to journal

Time Schedule of this research:

Project procedure	Time Frame (Month)											
	1	2	3	4	5	6	7	8	9	10	11	
Preparatory phase												
1. Literature review and write Thesis proposals	←————→											
2. Proposal exam and contact with elderly leader of elderly club for recruiting to exercise program				←————→								
3. Research tool (Set-up, content validity and Pre-test)					←————→							
4. Ethic consideration from Chulalongkorn University (CPHS)						←————→						
Implementation phase												
5. Group squat exercises Program								←————→				
6. Data collection								←————→				
7. Data Check								←————→				
8. Data analysis									←————→			
9. Discussion report writing										←————→		
10. Thesis defense and public to journal											←————→	

Appendix B

Budget

Item	Total budget (Baht)
1. Material topic	
1.1 Paper and printing 5 baht per page x 2,000 pages	10,000
1.2 Stationary 400 baht per set x 2 (control and intervention group)	800
Sub total	10,800
2. Accessory topic	
2.1 Photocopy for 3,000 pages (exclude photocopy thesis to graduate)	1,500
2.2 Food and drink for training elderly leaders and researcher assistants: 8 leaders and 8 staffs , 200 baht per day per person	3,200
2.3 Data entry cost , 5 baht per case x 200 papers	1,000
2.4 Transportation cost for researcher and assistant by taxi for try out Roundtrip from Chulalongkorn University to Health Center 8 , 14 k.m. 700 baht x 2	1,400
2.5 Transportation cost) for researcher and assistant by taxi for Pre-Post Roundtrip from Chulalongkorn University to Health Center 19, 20 k.m. 1,000 baht x 4	4,000
2.6 Transportation cost) for researcher and assistant by taxi Pre-Post Roundtrip from Chulalongkorn University to Health Center 15, 22 k.m. 1,200 baht x 4	4,800
2.7 Compensation leaders of squat exercises (2 person x 24 days x 200 ฿)	9,600
2.8 Binding Proposal for exam 50/set x 6	300
2.9 Binding thesis for exam 150/set x 6	900
2.10 Binding Proposal for submit 200/set x 6	1,200
Sub total	27,900
Grand total	38,700

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Appendix C

Measurement Tools

1) Questionnaire: the survey effect of group squat exercises to perform activity of daily living in elderly people

This general objective was to assess effects of group squat exercises to perform activity of daily living and physical independence in elderly people. It is expected that the findings of the study would be alternative exercise programs to better perform activity of daily living such as rising from a chair or a toilet seat, walking and climbing stairs among the elderly for other Health Centers. The results from this survey would be use only for doing thesis. The answer from you is not correct or wrong because everybody have own attitude and action with different. Thus, please answer following by your own fact. The researcher would keep your answer with secret and would not be damage to you.

Sununta Srisiri (M.P.H.) College of Public Health Science, Chulalongkorn University

Part I: Demographics information: Please (✓) the response that apply to you

1. Age.....years old
2. Gender Male Female
3. Level of Education

<input type="checkbox"/> Less than Primary School	<input type="checkbox"/> Primary School	<input type="checkbox"/> Secondary School
<input type="checkbox"/> High School or diploma	<input type="checkbox"/> Undergraduate	<input type="checkbox"/> Higher undergraduate
4. Marital Status

<input type="checkbox"/> Single	<input type="checkbox"/> Married	<input type="checkbox"/> Widowed	<input type="checkbox"/> Divorced	<input type="checkbox"/> Separated
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5. House living place

<input type="checkbox"/> housing with no floor	<input type="checkbox"/> housing with two floor
<input type="checkbox"/> brick house with three floor	<input type="checkbox"/> brick house with more than three floor
6. Present weight.....k.g. Present height.....centimeter
7. Circumference of the waist.....centimeter Circumference of the hips.....centimeter

Part II: Exercise behavior

Exercise behavior mean elder's behavior regarding body movement and walk that consumes high level of energy or muscle exercise. The exercise should be carried out about 30 minutes for 3-5 times a week. After an exercise session, one's heart beat rate should be around 100-120 times per minute. An elder should not feel dizziness or experience abnormal heartbeat during the exercise (National Statistical Office Thailand, 2008).

Please (✓) the best response those apply to you

1. Did you practice exercise in previous 7 days?

No (skill to Part III)

Yes

2. If you practiced, how often did you exercise?

1 time per week

2 times per week

3 times per week

4 times per week

≥ 5 times per week

3. If you practiced, how long did you exercise?

Less than 5 minutes

5-14 minutes

15-29 minutes

30-44 minutes

45-59 minutes

60 minutes or more

4. If you practiced, how hard did you exercise?

No change in pulse resting level

Little change in pulse from resting level

Slight increase in pulse and breathing

Moderate increase in pulse and breathing

Intermittent heavy breathing and sweating

Sustained heavy breathing and sweating

Part III: Activities of Daily living: Please (✓) the best response those apply to you

1) Can you groom the cloths by yourself?

needs help with personal care

independent face/hair/teeth/shaving (implements provided)

2) Can you bath by yourself?

dependent

independent (or in shower)

3) Can you dress and undress by yourself?

dependent

needs help, but can do about half unaided

independent (including buttons, zips, laces, etc.)

4) Can you move from chair to bed and return by yourself?

major help (one or two people, physical), can sit

minor help (verbal or physical)

independent

5) Can you ascend and descend stairs by yourself?

unable

needs help (verbal, physical, carrying aid)

independent up and down

6) Can you eat the food by yourself?

unable

needs help cutting, spreading butter, etc.

independent (food provided within reach)

7) Can you do personal toilet by yourself?

dependent

needs some help, can do something alone

independent (on and off, dressing, wiping)

- 8) Can you walk on level surface by yourself?
- immobile
 - wheelchair independent, including corners, etc.
 - walks with help of one person (verbal or physical)
 - independent (but may use any aid, e.g., stick)
- 9) Can you control bowel by yourself?
- incontinent (or needs to be given enemata)
 - occasional accident (once per week)
 - continent
- 10) Can you control bladder by yourself?
- incontinent, or catheterized and unable to manage
 - occasional accident (max. once per 24 hours)
 - continent (for over 7 days)

Part IV: perceive self-efficacy for exercise

The following questions concern your opinion regarding perceive self-efficacy for exercise. Please read each statement and ✓ the best response those apply to you.

Item	Perceive self-efficacy for exercise	Degree of opinion		
		No	Un certain	Yes
1	I am confident that I can practice exercise, even though I have obstructed.			
2	I am confident that I can practice exercise with proper.			
3	I am confident that I can arrange my schedule to practice exercise continually.			
4	I am confident that my body movement from practicing exercises.			
5	I am confident that practicing exercise was made my body flexible.			
6	I am confident that I can practice exercise with sustained heavy breathing and sweating.			
7	I am confident that I can protect injury from practicing exercise.			
8	I am confident that I can assess the bad feel before I start practicing exercise.			
9	I am confident that I can perceive the abnormal sign in order to stop practicing exercise.			
10	I am confident that I can practice exercise more at home.			
11	I am confident that I can motive friends to join the practicing exercise.			
12	I am confident that I can advise friend to join the practicing exercise.			
13	I am confident that I can join the practicing exercise with group always.			

Thank you for taking the time to complete this questionnaire

The Survey Satisfaction of Group Squat Exercises To Perform Activity of Daily Living Among Elderly People Who Participated In This Program At Elderly Club In Health Center 19, Bangkok Metropolis

The following questions concern your opinion regarding satisfaction of group squat exercises among elderly people who participated in this program at Elderly Club in Health Center 19, Bangkok Metropolis. Please read each statement and ✓ the best response those apply to you.

Item	Degree of satisfaction				
	highest	high	Moderate	low	lowest
1. The group squat exercises were made elderly' muscular strength and more power on thigh, butt and hip muscles.					
2. The group squat exercises was made elderly' muscular flexor on thigh, but and hip muscles.					
3. The group squat exercises was increased the ability to perform important activities of daily living of elderly, such as rising from a chair or a toilet seat, agile walking and climbing stairs.					
4. The group squat exercises was increased more adroit the ability to perform important activities of daily living of elderly.					
5. The group squat exercises were given elderly to have good excretory system and faint.					
6. I feel safety during working time higher than before because of participation the group squat exercises program					
7. The group squat exercises were given elderly happier lives.					
8. The group squat exercises program was fight with stress, depression and anxiety.					
9. The group squat exercises program was made enjoyable for me and brought me to meet with my friends.					
10.I feel enjoy with group squat exercises so much and would like to ask friend to join with this program.					

Thank you for taking the time to complete this questionnaire

แบบสำรวจผลของการออกกำลังกายกลุ่มแบบสควอทที่มีต่อการปฏิบัติกิจวัตรของผู้สูงอายุ

แบบสอบถามฉบับนี้มีจุดมุ่งหมายเพื่อศึกษาผลของการออกกำลังกายกลุ่มแบบสควอทของผู้สูงอายุที่มีผลต่อการปฏิบัติกิจวัตรของผู้สูงอายุ และปัจจัยที่มีอิทธิพลต่อการปฏิบัติกิจวัตรประจำวันของผู้สูงอายุ เพื่อนำผลการศึกษามาเป็นแนวทางในการวางแผนส่งเสริมสุขภาพของผู้สูงอายุให้สามารถปฏิบัติกิจวัตรประจำวัน เช่น การซื้อของ การดูแลตนเอง การยืน การเดิน การลุกนั่ง เป็นต้น ได้ด้วยตนเองโดยปราศจากความเจ็บปวดทรมานเท่าานที่เป็นไปได้ ข้อมูลที่ได้จากการตอบแบบสอบถามนี้ จะนำไปใช้เพื่อประกอบการทำวิทยานิพนธ์เท่านั้น คำตอบของท่านไม่มีถูกหรือผิด เพราะแต่ละคนมีความคิดเห็น และการกระทำที่แตกต่างกัน ดังนั้นจึงใคร่ขอความกรุณาตอบแบบสอบถามตามความเป็นจริงให้มากที่สุด และตอบทุกข้อคำตอบของท่าน คณะผู้วิจัยจะเก็บรักษาไว้เป็นความลับ และจะไม่เกิดผลเสียต่อท่านแต่อย่างใด

สุนันทา ศรีศิริ นิสิตสาธาณสุขศาสตรมหาบัณฑิต

วิทยาลัยวิทยาศาสตร์สาธารณสุข จุฬาลงกรณ์มหาวิทยาลัย

ตอนที่ 1 ข้อมูลส่วนบุคคลทั่วไป

คำชี้แจง โปรดทำเครื่องหมาย ✓ และเติมคำในช่องว่าง ตามความเป็นจริงของท่าน

- อายุ ปี
- เพศ ชาย หญิง
- ระดับการศึกษาของท่าน

<input type="checkbox"/> ต่ำกว่าประถมศึกษา	<input type="checkbox"/> ประถมศึกษา	<input type="checkbox"/> มัธยมศึกษาตอนต้น
<input type="checkbox"/> มัธยมศึกษาตอนปลาย	<input type="checkbox"/> อนุปริญญาหรือเทียบเท่า.	<input type="checkbox"/> ปริญญาตรีหรือสูงกว่า
- สถานภาพสมรสของท่าน

<input type="checkbox"/> โสด	<input type="checkbox"/> คู่	<input type="checkbox"/> หม้าย	<input type="checkbox"/> หย่า	<input type="checkbox"/> แยกกันอยู่
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- ลักษณะบ้านของท่านที่อยู่อาศัยในปัจจุบัน

<input type="checkbox"/> บ้านชั้นเดียว	<input type="checkbox"/> บ้านสองชั้น	<input type="checkbox"/> บ้านสามชั้น	<input type="checkbox"/> ตึกแถวสี่ชั้น
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- น้ำหนักปัจจุบัน.....กิโลกรัม ส่วนสูงปัจจุบัน.....เซนติเมตร
- เส้นรอบเอว.....เซนติเมตร รอบสะโพก.....เซนติเมตร

ตอนที่ 2 พฤติกรรมการออกกำลังกาย

การออกกำลังกาย หมายถึง การกระทำใดๆที่ทำให้มีกิจกรรมการเคลื่อนไหวส่วนต่างๆของร่างกาย เพื่อการเสริมสร้างสุขภาพ ควรออกกำลังกายอย่างน้อย 30 นาที จำนวน 3-5 ครั้งต่อสัปดาห์ หลังจากออกกำลังกายควรมีอัตราการเต้นของหัวใจประมาณ 100-120 ครั้งต่อนาที และไม่ควรรู้สึกเหนื่อย ล้า หรือ ผิดปกติของอัตราการเต้นหัวใจในขณะที่ออกกำลังกาย (สำนักงานสถิติแห่งชาติ,2550)

คำชี้แจง กรุณาทำเครื่องหมาย ✓ ลงใน ที่ตรงกับความเป็นจริงของท่านมากที่สุด

- ในช่วง 7 วันที่ผ่านมา ท่านได้ออกกำลังกายบ้างหรือไม่

<input type="checkbox"/> ไม่ได้ออกกำลังกาย (ข้ามไปตอบ ตอนที่ 3)
<input type="checkbox"/> ออกกำลังกาย

2. กรณีที่ท่านออกกำลังกาย ท่านออกกำลังกายกี่ครั้งต่อสัปดาห์
- 1 ครั้งต่อสัปดาห์ 2 ครั้งต่อ สัปดาห์ 3 ครั้งต่อสัปดาห์
- 4 ครั้งต่อสัปดาห์ 5 ครั้งและมากกว่า 5 ครั้งต่อสัปดาห์
3. กรณีที่ท่านออกกำลังกาย ท่านออกกำลังกายแต่ละครั้งโดยเฉลี่ยใช้เวลาเท่าใด
- ออกกำลังกายน้อยกว่า 5 นาที ออกกำลังกาย 5-14 นาที
- ออกกำลังกาย 15-29 นาที ออกกำลังกาย 30-44 นาที
- ออกกำลังกาย 45-59 นาที ออกกำลังกาย 60 นาทีและมากกว่า
5. กรณีที่ท่านออกกำลังกาย ขณะที่ท่านออกกำลังกายท่านรู้สึกอย่างไร
- ไม่เหนื่อยเลย หัวใจเต้นปกติ ไม่เหนื่อย หัวใจเต้นเร็วขึ้นเล็กน้อย
- เหนื่อยเล็กน้อย หัวใจเต้นเร็วขึ้น ค่อนข้างเหนื่อย หัวใจเต้นเร็วขึ้น
- เหงื่อออก เหนื่อยมากแต่ไม่หอบ เหงื่อออก เหนื่อยมาก หายใจหอบ

ตอนที่ 3 ความสามารถในการปฏิบัติกิจวัตรประจำวัน

คำชี้แจง คำถาม 10 ข้อต่อไปนี้เกี่ยวข้องกับความสามารถในการปฏิบัติกิจวัตรประจำวันในปัจจุบัน กรุณาทำเครื่องหมาย ✓ ลงใน ที่ตรงกับความเป็นจริงของท่านมากที่สุด

- 1) ท่านล้างหน้า หวีผม แปรงฟันเองได้หรือไม่
- ไม่สามารถทำได้ ทำได้ด้วยตนเอง
- 2) ท่านอาบน้ำด้วยตนเองได้หรือไม่
- ต้องการคนช่วยหรือทำให้ อาบน้ำได้ด้วยตนเอง
- 3) ท่านสวมใส่และถอดเสื้อผ้าได้หรือไม่
- ทำด้วยตนเองได้น้อย ต้องมีคนสวมใส่และถอดเสื้อผ้าให้
- ทำด้วยตนเองได้บ้างบางครั้ง ต้องมีคนช่วย
- ทำด้วยตนเองได้ดี (รวมทั้งติดกระดุม รูดซิปได้เอง)
- 4) ท่านสามารถลุกขึ้นจากเก้าอี้และเตียงนอนด้วยตนเองหรือไม่
- ทำไม่ได้ ทำได้แต่ต้องการความช่วยเหลือบ้าง
- ทำได้ด้วยตนเอง โดยไม่ต้องมีคนช่วยเหลือ
- 5) ท่านสามารถขึ้นลงบันไดอย่างน้อย 1 ชั้นได้เองหรือไม่
- ไม่สามารถทำได้ ทำได้บ้างโดยมีคนช่วยดูแลใกล้ชิด
- ขึ้นลงได้เอง
- 6) ท่านสามารถรับประทานอาหารด้วยตนเองได้หรือไม่
- ทำไม่ได้ต้องมีคนป้อนให้ ทำได้แต่ต้องการความช่วยเหลือ เช่น ช่วยใช้ช้อน
- ทำได้ด้วยตนเองโดยไม่ต้องมีคนช่วยเหลือ
- 7) ท่านสามารถใช้ห้องสุขาได้ด้วยตนเองหรือไม่
- ทำไม่ได้ด้วยตนเอง
- ทำด้วยตนเองได้บ้าง (ทำความสะอาดตนเองได้หลังจากเสร็จธุระ แต่ต้องการความช่วยเหลือในบางสิ่ง)
- ทำด้วยตนเองได้ดี (ขึ้นนั่ง-ลงโกส้วมได้เอง ทำความสะอาดตัวเองได้หลังจากเสร็จธุระ)

- 8) ท่านสามารถเดินเคลื่อนที่ภายในบ้าน หรือ ห้องด้วยตนเองได้หรือไม่
 ทำไม่ได้ ทำได้แต่ต้องมีคนช่วยพยุงหรือคอยดูแล
 ทำได้ด้วยตนเอง (รวมทั้งที่ใช้เครื่องช่วยเดิน)
- 9) ท่านสามารถควบคุมการกลั้นปัสสาวะของตนเองได้หรือไม่
 กลั้นไม่ได้ กลั้นไม่ได้บางครั้ง (เป็นอย่างน้อยวันละ 1 ครั้ง)
 กลั้นได้เป็นปกติ
- 10) ท่านสามารถกลั้นการถ่ายอุจจาระของตนเองได้หรือไม่
 กลั้นไม่ได้ กลั้นไม่ได้บางครั้ง (เป็นอย่างน้อย 1 ครั้ง/สัปดาห์)
 กลั้นได้เป็นปกติ

ตอนที่ 4 การรับรู้ความสามารถแห่งตนในการออกกำลังกาย

คำชี้แจง กรุณาอ่านข้อความแต่ละข้อ และใช้มาตรวัดต่อไปนี้ในการบ่งชี้ถึงความสามารถที่ท่านจะทำตามข้อปฏิบัติด้านออกกำลังกาย โดยเติมเครื่องหมาย ✓ ลงในช่องท้ายข้อความที่ตรงกับความคิดเห็นของท่าน

ข้อ	ความมั่นใจในความสามารถแห่งตนในการออกกำลังกาย	ระดับความคิดเห็น		
		ทำได้	ไม่แน่ใจ	ทำไม่ได้
1	ท่านมั่นใจว่าท่านสามารถออกกำลังกาย ถึงแม้ว่าจะมีอุปสรรคขัดขวาง			
2	ท่านมั่นใจว่าท่านสามารถฝึกการออกกำลังกายได้อย่างถูกต้อง			
3	ท่านสามารถจัดเวลาออกกำลังกายได้เพียงพอเพื่อให้สามารถเข้าร่วมออกกำลังกายอย่างต่อเนื่อง			
4	ท่านสามารถออกกำลังกายโดยทุกส่วนของร่างกายได้เคลื่อนไหว			
5	ท่านมั่นใจว่าท่านสามารถออกกำลังกายแบบยืดเหยียดกล้ามเนื้อส่วนต่างๆได้ด้วยตนเอง			
6	ท่านมั่นใจว่าท่านสามารถออกกำลังกายจนรู้สึกเหนื่อย มีเหงื่อออก หัวใจเต้นเร็วได้			
7	ท่านมั่นใจว่าท่านสามารถป้องกันตนเองไม่ให้ได้รับอันตรายจากการออกกำลังกาย			
8	ท่านมั่นใจว่าท่านสามารถประเมินได้ว่าฉันรู้สึกไม่สบายใจ (เช่น ขาดสมาธิ วิดกกังวล เศร้าใจ ก่อนการออกกำลังกาย)			
9	ท่านมั่นใจว่าท่านสามารถรับรู้อาการผิดปกติที่สมควรหยุดออกกำลังกาย (เช่น เวียนศีรษะ เจ็บปวดตามข้อ)			
10	ท่านมั่นใจว่าท่านสามารถฝึกการออกกำลังกายเพิ่มเติมได้เองที่บ้านของท่าน			
11	ท่านมั่นใจว่าท่านสามารถกระตุ้นเตือนเพื่อนในการร่วมกิจกรรมออกกำลังกาย			
12	ท่านมั่นใจว่าสามารถแนะนำเพื่อนในการออกกำลังกายได้			
13	ท่านสามารถเข้าร่วมกิจกรรมออกกำลังกายกับคนอื่นอย่างสม่ำเสมอ			

****ขอขอบพระคุณที่ท่านให้ความร่วมมือในการตอบแบบสอบถามครั้งนี้****

**แบบสอบถามความพึงพอใจต่อการออกกำลังกายกลุ่มแบบสควอท
สำหรับผู้สูงอายุที่เข้าร่วมโปรแกรมศูนย์บริการสาธารณสุข 19 วงศ์สว่าง**

โปรดให้คะแนนความพึงพอใจในกิจกรรมออกกำลังกายกลุ่มแบบสควอท ตามระดับความคิดเห็นของท่าน โดยกรุณาทำเครื่องหมาย ✓ ลงในช่องข้อความที่ตรงกับระดับความคิดเห็นของท่าน

รายการ	ระดับความพึงพอใจ				
	มากที่สุด	มาก	ปานกลาง	น้อย	น้อยที่สุด
เมื่อท่านเข้าร่วมโปรแกรมการออกกำลังกายแล้ว ท่านมีความคิดเห็นในเรื่องต่อไปนี้ได้อย่างไร					
1. ออกกำลังกายกลุ่มแบบสควอทมีประโยชน์ทำให้กล้ามเนื้อบริเวณสะโพก หัวเข่า และข้อเท้า เคลื่อนไหวได้ดีขึ้น					
2. ออกกำลังกายกลุ่มแบบสควอทช่วยทำให้กล้ามเนื้อบริเวณสะโพก ข้อเข่า ข้อเท้า มีความยืดหยุ่นทำให้เคลื่อนไหวได้ดีขึ้น					
3. ออกกำลังกายกลุ่มแบบสควอทช่วยในการปฏิบัติกิจวัตรประจำวันให้ดีขึ้น (เช่น การเดิน การขึ้นบันได และการนั่งแล้วลุกขึ้นยืน)					
4. ออกกำลังกายกลุ่มแบบสควอททำให้มีความคล่องตัวคล่องแคล่วในการทำงานและสามารถทำกิจกรรมต่างๆในชีวิตประจำวันได้อย่างกระฉับกระเฉง					
5. ออกกำลังกายกลุ่มแบบสควอททำให้หายปวดเมื่อยตัวหรือกล้ามเนื้อ					
6. ท่านรู้สึกปลอดภัยในการทำงานมากขึ้นจากการออกกำลังกายกลุ่มแบบสควอท					
7. ออกกำลังกายกลุ่มแบบสควอททำให้รู้สึกสดชื่น แจ่มใส กระปรี้กระเปร่าขึ้น					
8. ออกกำลังกายกลุ่มแบบสควอททำให้ไม่เครียด ไม่มีอาการซึมเศร้า ไม่รู้สึกเบื่อหน่ายต่อชีวิต					
9. ออกกำลังกายกลุ่มแบบสควอททำให้ได้สังสรรค์กันในกลุ่มเพื่อน และคนอื่นๆ					
10. ท่านรู้สึกสนุกกับการออกกำลังกายกลุ่มแบบสควอทมากจนอยากชักชวนเพื่อนให้มาร่วมออกกำลังกายด้วย					

**ขอขอบพระคุณที่ท่านให้ความร่วมมือในการตอบแบบสอบถามครั้งนี้*

2) Physical independence testing

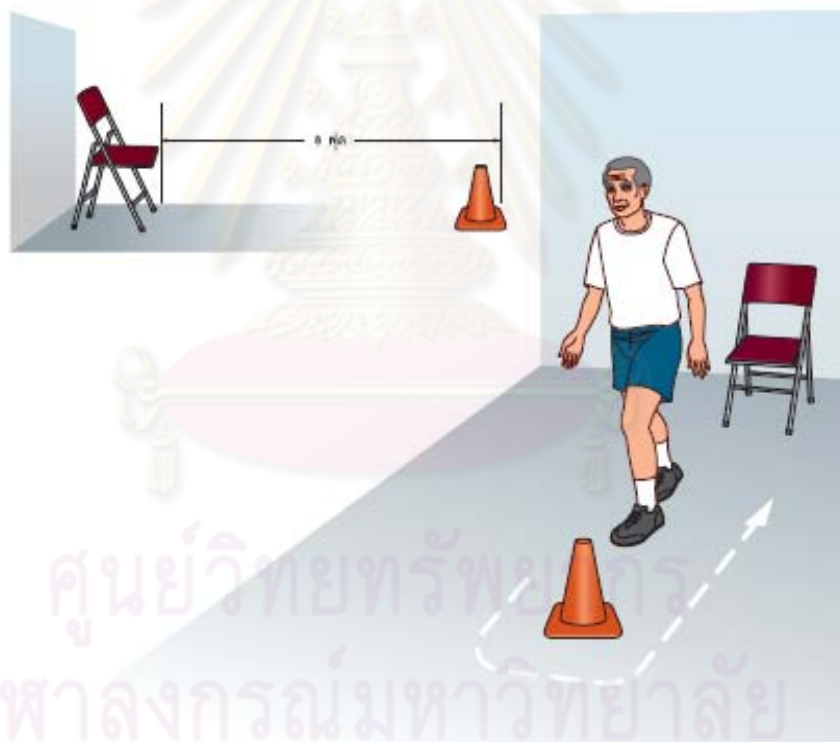
2.1 Timed Get Up And Go Test

This test is assessment walking speed, agility and balance while moving. This test was performed with elderly who wear regular footwear, using usual walking aid if needed, and sitting back in a chair with arm rest.

On the word, “Go”, the elderly is asked to do the following:

1. Stand up from the arm chair
2. Walk 8 foot (in a line)
3. Turn
4. Walk back to chair
5. Sit down

Observe patient for postural stability, step pace, stride length and sway.



Scoring (In this study, a cut of point timed was classified as (Garber, et al., 2010):

Normal: completes task in < 8.23 seconds.

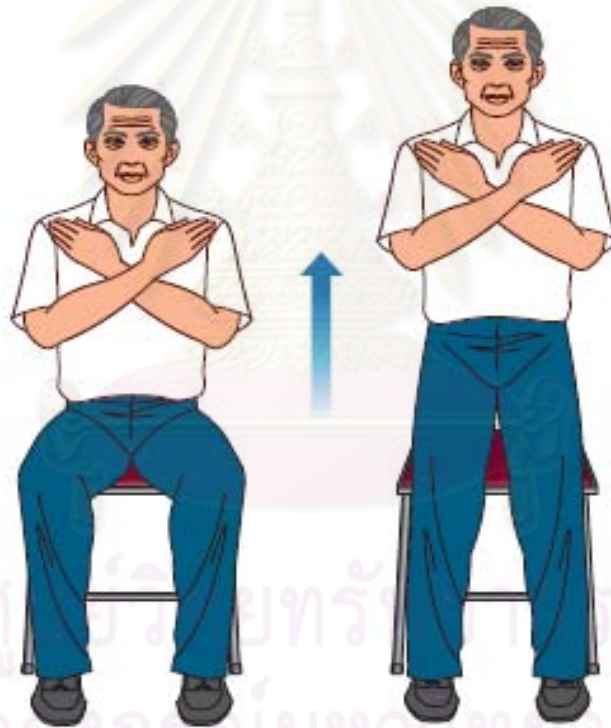
Pre-clinical physical function limitation: completes task in 8.23-14 seconds.

Physical function limitation: completes task in >14 seconds

Low scores correlate with good functional independence; high scores correlate with poor functional independence and higher risk of falls.

2.2 Chair Stand Test

- **equipment required:** a straight back or folding chair without arm rests (seat 17 inches/44 cm high), stopwatch.
- **procedure:** Place the chair against a wall, or otherwise stabilize it for safety. The subject sits in the middle of the seat, with their feet shoulder width apart, flat on the floor. The arms are to be crossed at the wrists and held close to the chest. From the sitting position, the subject stands completely up, then completely back down, and this is repeated for 30 seconds. Count the total number of complete chair stands (up and down equals one stand). If the subject has completed a full stand from the sitting position when the time is elapsed, the final stand is counted in the total.



- **scoring:** the score is the number of completed chair stands in 30 seconds. Below is a table showing the recommended ranges for this test based on age groups (from Jones and Rikli, 2002).

Men's Results

Age	below average	Average	above average
60-64	< 14	14 to 19	> 19
65-69	< 12	12 to 18	> 18
70-74	< 12	12 to 17	> 17
75-79	< 11	11 to 17	> 17
80-84	< 10	10 to 15	> 15
85-89	< 8	8 to 14	> 14
90-94	< 7	7 to 12	> 12

Women's Results

Age	below average	Average	above average
60-64	< 12	12 to 17	> 17
65-69	< 11	11 to 16	> 16
70-74	< 10	10 to 15	> 15
75-79	< 10	10 to 15	> 15
80-84	< 9	9 to 14	> 14
85-89	< 8	8 to 13	> 13
90-94	< 4	4 to 11	> 11

- **target population:** the aged population which may not be able to do traditional fitness tests.
- **advantages:** the equipment is readily available around any home
- **comments:** The arms may be used for assistance or for safety if need.

2.3 Standing Balance Test

This is a simple balance test that present the maintenance of a position stand on one leg for as long as possible.

- **equipment required:** flat, non-slip surface, stopwatch
- **procedure:** the elderly person stands on one leg for as long as possible. Give the subject a minute to practice their balancing before starting the test. The timing stops when the elevated foot touches the ground or the person hops or otherwise loses their balance position. The best of three attempts is recorded. Repeat the test on the other leg.



- **scoring:** time the total length of time person can stay in the balance position (Bohannon, Larkin, Cook, Gear, and Singer, 1984). The table below lists general ratings for this test.

Status	Score (seconds)
Excellent	> 50
Good	40 – 50
Average	25- 39
Fair	10 – 24
Poor	< 10

Appendix D

Approval Ethical consideration committee

AF 02-11



The Ethics Review Committee for Research Involving Human Research Subjects,
Health Science Group, Chulalongkorn University
Institute Building 2, 4 Floor, Soi Chulalongkorn 62, Phyat hai Rd., Bangkok 10330, Thailand,
Tel: 0-2218-8147 Fax: 0-2218-8147 E-mail: eccu@chula.ac.th

COA No. 016/2011

Certificate of Approval

Study Title No.126.1/53 : EFFECT OF GROUP SQUAT EXERCISES TO PERFORM
ACTIVITY OF DAILY LIVING (ADL) IN ELDERLY PEOPLE

Principle Investigator : MISS SUNUNTA SRISIRI

Place of Proposed Study/Institution : College of Public Health Sciences,
Chulalongkorn University

The Ethics Review Committee for Research Involving Human Research Subjects, Health Science Group, Chulalongkorn University, Thailand, has approved constituted in accordance with the International Conference on Harmonization – Good Clinical Practice (ICH-GCP) and/or Code of Conduct in Animal Use of NRCT version 2000.

Signature: Prida Tasanapradit, M.D. Signature: Nuntaree Chaichanawongsoroj
(Associate Professor Prida Tasanapradit, M.D.) (Assistant Professor Dr. Nuntaree Chaichanawongsoroj)
Chairman Secretary

Date of Approval : 18 January 2011 Approval Expire date : 17 January 2012

The approval documents including

- 1) Research proposal
- 2) Patient/Participant Information Sheet and Informed Consent Form
- 3) Researcher
- 4) Questionnaire



Protocol No. 126.1/53
Date of Approval 18 JAN 2011
Approval Expire Date 17 JAN 2012

The approved investigator must comply with the following conditions:

1. The research/project activities must end on the approval expired date of the Ethical Review Committee for Research Involving Human Research Subjects, Health Science Group, Chulalongkorn University (ECCU). In case the research/project is unable to complete within that date, the project extension can be applied one month prior to the ECCU approval expired date.
2. Strictly conduct the research/project activities as written in the proposal.
3. Using only the documents that bearing the ECCU's seal of approval with the subjects/volunteers (including subject information sheet, consent form, invitation letter for project/research participation (if available); and return the first subject's copy of the above documents to the ECCU.
4. Report to the ECCU for any serious adverse events within 5 working days
5. Report to the ECCU for any change of the research/project activities prior to conduct the activities.
6. Final report (AF 03-11) and abstract is required for a one year (or less) research/project and report within 30 days after the completion of the research/project. For thesis, abstract is required and report within 30 days after the completion of the research/project.
7. Annual progress report is needed for a two- year (or more) research/project and submit the progress report before the expire date of certificate. After the completion of the research/project processes as No. 6.

Appendix E

Consent from

หนังสือแสดงความยินยอมเข้าร่วมการวิจัยสำหรับผู้ออกกำลังกายแบบสควอท

ทำที่ ชมรมผู้สูงอายุ, ศูนย์บริการสาธารณสุข

วันที่.....เดือน.....พ.ศ. 2554

เลขที่ ผู้มีส่วนร่วมในการวิจัย.....

ข้าพเจ้า ซึ่ง ได้ลงนามทำหนังสือนี้ ขอแสดงความยินยอมเข้าร่วมโครงการวิจัย เรื่อง ผลของการออกกำลังกายกลุ่มแบบสควอทที่มีต่อความสามารถในการปฏิบัติกิจวัตรของผู้สูงอายุของ นางสาวสุนันทา ศรีศิริ สถานที่ติดต่อผู้วิจัย (ที่ทำงาน) ภาควิชาสุขศึกษา มหาวิทยาลัยศรีนครินทรวิโรฒ 114 สุขุมวิท 23 เขตวัฒนา กรุงเทพมหานคร โทรศัพท์ (ที่ทำงาน) 02-669-5000 ต่อ 5764 โทรศัพท์มือถือ 081-459-2206 E-mail : sununts@yahoo.com

ข้าพเจ้า ได้รับทราบรายละเอียดเกี่ยวกับที่มาและวัตถุประสงค์ในการทำวิจัย รายละเอียดขั้นตอนต่างๆ ที่จะต้องปฏิบัติหรือได้รับการปฏิบัติ ความเสี่ยง/อันตราย และประโยชน์ซึ่งจะเกิดขึ้นจากการวิจัยเรื่องนี้ โดยได้อ่านรายละเอียดในเอกสารชี้แจงผู้เข้าร่วมการวิจัยโดยตลอด และได้รับคำอธิบายจากผู้วิจัย จนเข้าใจเป็นอย่างดีแล้ว

ข้าพเจ้าจึงสมัครใจเข้าร่วมในโครงการวิจัยนี้ ตามที่ระบุไว้ในเอกสารชี้แจงผู้เข้าร่วมการวิจัย โดยข้าพเจ้ายินยอมตอบแบบสอบถามเกี่ยวกับข้อมูลส่วนบุคคล พฤติกรรมการออกกำลังกายในสัปดาห์ที่ผ่านมา ความสามารถในการปฏิบัติกิจวัตรในชีวิตประจำวัน การรับรู้ความสามารถแห่งตนในการออกกำลังกาย และความพึงพอใจในการเข้าร่วมโครงการ และยินยอมเข้าร่วมโปรแกรมการออกกำลังกายกลุ่มแบบสควอทเป็นเวลา 8 สัปดาห์/ 3 ครั้งต่อสัปดาห์ รวมจำนวน 24 ครั้ง ตลอดจนยินยอมทดสอบสมรรถภาพทางกาย ซึ่งประกอบด้วย การลุกเดินจากเก้าอี้ไปและกลับ 16 ชุด ลุกขึ้นยืนจากเก้าอี้ 30 นาที และ ความสมดุลของการทรงตัว

ข้าพเจ้ามีสิทธิถอนตัวออกจากกรวิจัยเมื่อใดก็ได้ตามความประสงค์ โดยไม่ต้องแจ้งเหตุผล ซึ่งการถอนตัวออกจากกรวิจัยนั้น จะไม่มีผลกระทบในทางใดๆ ต่อข้าพเจ้าทั้งสิ้น

ข้าพเจ้าได้รับคำรับรองว่า ผู้วิจัยจะปฏิบัติต่อข้าพเจ้าตามข้อมูลที่ระบุไว้ในเอกสารชี้แจงผู้เข้าร่วมการวิจัย และข้อมูลใดๆ ที่เกี่ยวข้องกับข้าพเจ้า ผู้วิจัยจะเก็บรักษาเป็นความลับ โดยจะนำเสนอข้อมูลการวิจัยเป็นภาพรวมเท่านั้น ไม่มีข้อมูลใดในการรายงานที่จะนำไปสู่การระบุตัวข้าพเจ้า

หากข้าพเจ้าไม่ได้รับการปฏิบัติตรงตามที่ระบุไว้ในเอกสารชี้แจงผู้เข้าร่วมการวิจัย ข้าพเจ้าสามารถร้องเรียนได้ที่คณะกรรมการพิจารณาจริยธรรมการวิจัยในคน กลุ่มสหสถาบัน ชุดที่ 1 จุฬาลงกรณ์มหาวิทยาลัย ชั้น 4 อาคารสถาบัน 2 ซอยจุฬาลงกรณ์ 62 ถนนพญาไท เขตปทุมวัน กรุงเทพฯ 10330 โทรศัพท์ 0-2218-8147 โทรสาร 0-2218-8147 E-mail: eccu@chula.ac.th

ข้าพเจ้าได้ลงลายมือชื่อไว้เป็นสำคัญต่อหน้าพยาน ทั้งนี้ข้าพเจ้าได้รับสำเนาเอกสารชี้แจงผู้เข้าร่วมการวิจัย และสำเนาหนังสือแสดงความยินยอมไว้แล้ว

ลงชื่อ.....

(นางสาวสุนันทา ศรีศิริ)

ผู้วิจัยหลัก

ลงชื่อ.....

(.....)

ผู้มีส่วนร่วมในการวิจัย

ลงชื่อ.....

(.....)

พยาน

หนังสือแสดงความยินยอมเข้าร่วมการวิจัยสำหรับกลุ่มควบคุม

ทำที่ ชมรมผู้สูงอายุ, ศูนย์บริการสาธารณสุข

วันที่.....เดือน.....พ.ศ. 2554

เลขที่ ผู้มีส่วนร่วมในการวิจัย.....

ข้าพเจ้า ซึ่งได้ลงนามท้ายหนังสือนี้ ขอแสดงความยินยอมเข้าร่วมโครงการวิจัย เรื่อง ผลของการออกกำลังกายกลุ่มแบบสควอตที่มีต่อความสามารถในการปฏิบัติกิจวัตรของผู้สูงอายุของ นางสาวสุนันทา ศรีศิริ สถานที่ติดต่อผู้วิจัย (ที่ทำงาน) ภาควิชาสุขศึกษา มหาวิทยาลัยศรีนครินทรวิโรฒ 114 สุขุมวิท 23 เขตวัฒนา กรุงเทพมหานคร โทรศัพท์ (ที่ทำงาน) 02-669-5000 ต่อ 5764 โทรศัพท์มือถือ 081-459-2206 E-mail : sununts@yahoo.com

ข้าพเจ้า ได้รับทราบรายละเอียดเกี่ยวกับที่มาและวัตถุประสงค์ในการทำวิจัย รายละเอียดขั้นตอนต่างๆ ที่จะต้องปฏิบัติหรือได้รับการปฏิบัติ ความเสี่ยง/อันตราย และประโยชน์ซึ่งจะเกิดขึ้นจากการวิจัยเรื่องนี้ โดยได้อ่านรายละเอียดในเอกสารชี้แจงผู้เข้าร่วมการวิจัยโดยตลอด และได้รับคำอธิบายจากผู้วิจัย จนเข้าใจเป็นอย่างดีแล้ว

ข้าพเจ้าจึงสมัครใจเข้าร่วมในโครงการวิจัยนี้ ตามที่ระบุไว้ในเอกสารชี้แจงผู้เข้าร่วมการวิจัย ในฐานะกลุ่มควบคุม โดยข้าพเจ้ายินยอมตอบแบบสอบถามเกี่ยวกับข้อมูลส่วนบุคคล พฤติกรรมการออกกำลังกายในสัปดาห์ที่ผ่านมา ความสามารถในการปฏิบัติกิจวัตรในชีวิตประจำวัน การรับรู้ความสามารถแห่งตนในการออกกำลังกาย และความพึงพอใจในการเข้าร่วมโครงการ และ ยินยอมทดสอบสมรรถภาพทางกาย ซึ่งประกอบด้วย การลุกเดินจากเก้าอี้ไปและกลับ 16 ฟุต ลุกขึ้นยืนจากเก้าอี้ 30 นาที และ ความสมดุลของการทรงตัว

ข้าพเจ้ามีสิทธิถอนตัวออกจากกรวิจัยเมื่อใดก็ได้ตามความประสงค์ โดยไม่ต้องแจ้งเหตุผล ซึ่งการถอนตัวออกจากกรวิจัยนั้น จะไม่มีผลกระทบในทางใดๆ ต่อข้าพเจ้าทั้งสิ้น

ข้าพเจ้าได้รับคำรับรองว่า ผู้วิจัยจะปฏิบัติต่อข้าพเจ้าตามข้อมูลที่ระบุไว้ในเอกสารชี้แจงผู้เข้าร่วมการวิจัย และ ข้อมูลใดๆ ที่เกี่ยวข้องกับข้าพเจ้า ผู้วิจัยจะเก็บรักษาเป็นความลับ โดยจะนำเสนอข้อมูลการวิจัยเป็นภาพรวมเท่านั้น ไม่มีข้อมูลใดในการรายงานที่จะนำไปสู่การระบุตัวข้าพเจ้า

หากข้าพเจ้าไม่ได้รับการปฏิบัติตรงตามที่ได้ระบุไว้ในเอกสารชี้แจงผู้เข้าร่วมการวิจัย ข้าพเจ้าสามารถร้องเรียนได้ที่คณะกรรมการพิจารณาจริยธรรมการวิจัยในคน กลุ่มสหสถาบัน ชุดที่ 1 จุฬาลงกรณ์มหาวิทยาลัย ชั้น 4 อาคารสถาบัน 2 ซอยจุฬาลงกรณ์ 62 ถนนพญาไท เขตปทุมวัน กรุงเทพฯ 10330 โทรศัพท์ 0-2218-8147 โทรสาร 0-2218-8147 E-mail: eccu@chula.ac.th

ข้าพเจ้าได้ลงลายมือชื่อไว้เป็นสำคัญต่อหน้าพยาน ทั้งนี้ข้าพเจ้าได้รับสำเนาเอกสารชี้แจงผู้เข้าร่วมการวิจัย และ สำเนาหนังสือแสดงความยินยอมไว้แล้ว

ลงชื่อ.....

(นางสาวสุนันทา ศรีศิริ)

ผู้วิจัยหลัก

ลงชื่อ.....

(.....)

ผู้มีส่วนร่วมในการวิจัย

ลงชื่อ.....

(.....)

พยาน

Appendix F

Certification of Research inspection tools

After an inspection for suitability of the research questionnaire and Squat exercise program of Miss Sununta Srisiri, Student ID No. 5379109653, Master of Public Health, College of Public Health Sciences, Chulalongkorn University.

I, hereby, certified that this questionnaire and Squat exercise program has Content Validity that is suitable for the topic on “Effect of Group Squat Exercises to Perform Activity of Daily Living (ADL) In Elderly People”.



.....
(Prof. Karl J. Neeser, Ph.D.)

Specialist in Aging and Physical Education & Exercise Physiology
College of Public Health Sciences, Chulalongkorn University

Date.....28...../.....Jan...../.....2011.....

ศูนย์วิทยทรัพยากร
จุฬาลงกรณ์มหาวิทยาลัย

Certification of Research Inspection Tools

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Thada Wimonwatwatee

(Assoc.Prof. Thada Wimonwatwatee, Ph.D.)

Specialist in Aging and Health Education

Health Education department, Srinakharinwitrot University

Date: Jan 24 2011

ศูนย์วิทยทรัพยากร
จุฬาลงกรณ์มหาวิทยาลัย

Certification of Research Inspection Tools

After an inspection for suitability of the research questionnaire and Squat exercise program of Miss Sununta Srisiri, Student ID No. 5379109653, Master of Public Health, College of Public Health Sciences, Chulalongkorn University.

I, hereby, certified that this questionnaire and Squat exercise program has Content Validity that is suitable for the topic on “Effect of Group Squat Exercises to Perform Activity of Daily Living (ADL) In Elderly People”.



.....
(Assist.Prof. Kamonmarn Virutsetazin, Dr.P.H.)

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Health Education department, Srinakharinwitrot University

Date..... ๒4 / Jan / ๒๐11



ศูนย์วิทยทรัพยากร
จุฬาลงกรณ์มหาวิทยาลัย

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