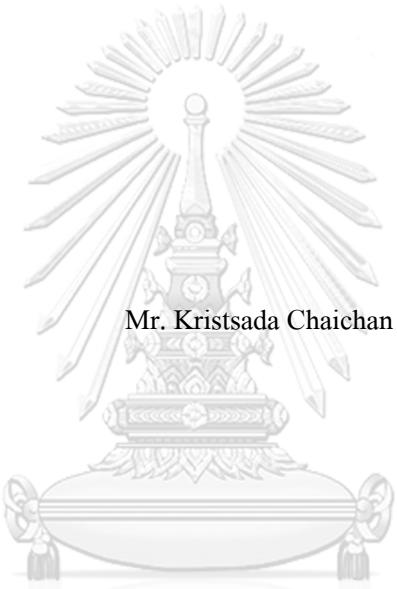
Physical and psychological factors associated with non-specific low back pain among female cleaners in academic settings

Mr. Kristsada Chaichan



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ปัจจัยทางกายและจิตใจที่สัมพันธ์กับอาการปวดหลังแบบไม่เฉพาะเจาะจงในพนักงานทำความสะอาดเพศหญิงในสถานศึกษา

นายกฤษฎา ไชยชาญ

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาวิทยาศาสตรมหาบัณฑิต
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Thesis Title	Physical and psychological factors associated with non-specific low back pain among female cleaners in academic settings
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Field of Study	Physical Therapy
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วัตถุประสงค์ของงานวิจัยนี้จัดทำขึ้นเพื่อศึกษาปัจจัยทางกายและจิตใจที่สัมพันธ์กับอาการปวดหลังแบบไม่เฉพาะเจาะจงในพนักงานทำความสะอาดเพศหญิงในสถานศึกษา พนักงานทำความสะอาดเพศหญิงในสถานศึกษาจำนวน 199 คน อายุระหว่าง 18-60 ปี ได้รับคัดเลือกให้ตอบแบบสอบถามที่เกี่ยวข้องกับข้อมูลส่วนตัว ปัจจัยที่เกี่ยวข้องกับการทำงาน คำถามที่เกี่ยวข้องกับคุณภาพชีวิต และการเก็บข้อมูลความชุกของอาการปวดหลังส่วนล่างผ่าน Nordic body map สถิติ binomial logistic regression analysis ถูกใช้เพื่อหาปัจจัยทางกายและและจิตใจที่สัมพันธ์กับอาการปวดหลังส่วนล่างแบบไม่เฉพาะเจาะจง ผลของงานวิจัยแสดงให้เห็นว่าความชุกของอาการบาดเจ็บทางกระดูกและกล้ามเนื้อในช่วงสามเดือนและ ณ ขณะทำแบบสอบถาม คือ 66.92% และ 43.23% ตามลำดับ โดยอาการปวดหลังส่วนล่างมีตามชุกสูงสุดที่ 30.24% ในช่วงสามเดือนที่ผ่านมา และ 18.08% ณ ขณะที่ทำแบบสอบถาม รวมถึงพบว่ามีปัจจัยที่สัมพันธ์กับอาการปวดหลังส่วนล่าง โดยปัจจัยที่เป็นปัจจัยเสี่ยงให้เกิดอาการปวดหลังเพิ่มขึ้นประกอบด้วย การทำการย่อหรือคุกเข่าขณะทำความสะอาดน้อยลง (AOR: 3.297; 95% CI: 1.066-10.194), และ ความรู้สึกเหนื่อยล้าหลังทำงาน (AOR: 4.518; 95% CI: 1.037-19.692) ส่วนปัจจัยที่เป็นปัจจัยป้องกันอาการบาดเจ็บประกอบด้วย คะแนนของแบบสอบถามคุณภาพชีวิตในกลุ่มปัจจัยทางกายที่เพิ่มขึ้น (AOR: 0.787; 95% CI: 0.698-0.886), การก้มตัวไปด้านหน้าน้อยลงขณะทำงาน (AOR: 0.334; 95% CI: 0.137-0.814), และความไม่พึงพอใจต่องานที่ทำ (AOR: 0.64; 95%CI: 0.018-0.228) โดยสรุปอาการปวดหลังส่วนล่างมีความชุกสูงในกลุ่มพนักงานทำความสะอาดเพศหญิงในสถานศึกษา ปัจจัยทางกายคือ ท่าทางในการทำงานและปัจจัยทางด้านจิตใจคือความเหนื่อยล้า สามารถส่งผลให้พนักงานทำความสะอาดมีอาการปวดหลังส่วนล่างได้

สาขาวิชา กายภาพบำบัด ลายมือชื่อนิสิต .....

ปีการศึกษา 2566 ลายมือชื่อ อ.ที่ปรึกษาหลัก .....

6270003037 : MAJOR PHYSICAL THERAPY

KEYWORD: Prevalance, Low back pain, Cleaners, Physical factors, Psychological factors, Musculoskeletal disorder

Kristsada Chaichan : Physical and psychological factors associated with non-specific low back pain among female cleaners in academic settings. Advisor: Assoc. Prof. PRANEET PENSRI, PT, PhD, DPT

The objective of this study was to determine the association between physical and psychological variables and the presence of NSLBP among female cleaners working in an academic setting. One hundred and ninety-nine female cleaners aged between 18 and 60 years old with and without LBP were asked to complete a set of self-reported questionnaires related to individual, work-related variables, quality of life, and the prevalence of NSLBP among cleaners. The binomial logistic regression analyses were used to determine the association between physical and psychological factors and the presence or of absence NSLBP. The results showed that the overall prevalence of MSDs among cleaners was 66.92% in the last 3 months and 43.23% at the present time. The majority of MSDs were NSLBP, with 30.24% in the last 3 months and 18.08% at the present time, respectively. There was a significant association between NSLBP and the WHOQOL physical health domain (AOR: 0.787; 95% CI: 0.698-0.886), the frequency of bending forward during work (AOR: 0.334; 95% CI: 0.137-0.814), the frequency of squatting or kneeling during work (AOR: 3.297; 95% CI: 1.066-10.194), feeling exhausted after working hours (AOR: 4.518; 95% CI: 1.037-19.692), and job dissatisfaction (AOR: 0.64; 95%CI: 0.018-0.228). In conclusion, NSLBP was the most commonly reported work-related MSD among cleaners in the academic settings. Physical factors including having good or bad working postures, as well as psychological factors including mental exhaustion were significantly associated with the existence of NSLBP in cleaners.

Field of Study:	Physical Therapy	Student's Signature .....
Academic Year:	2023	Advisor's Signature .....

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CHAPTER 1

INRODUCTION

1.1 Background and rationale

Musculoskeletal disorders (MSDs) have been defined as health problems that are related to injury or dysfunction of the locomotor system, including pinched nerve, herniated disc, meniscus tear, sprains, strains, pain, swelling, numbness, degenerative joint disease, and connective tissue disorders (1, 2). Approximately 1.71 billion individuals around the world have musculoskeletal conditions and people of all ages can be affected. MSD contributes to the burden of economic costs, healthcare needs, and social problems due to the associated functional disability (3). MSDs can be caused by mechanical workload applied to tasks (e.g., sports, housework) (1). According to the World Health Organization (WHO), work and the circumstances of its performance are the causes of MSDs. Several studies have indicated the relationship between physical exertion at work and work-related musculoskeletal disorders (WMSDs).

WMSDs have been defined as workload and work environment that cause MSDs and aggravate the severity of MSDs (1, 2). MSDs among workers involve several factors, including work-related, physical, and psychosocial factors. The work-related factors include physical exertion during work and work organization. Physical exertion consists of repetitive movements, prolonged working postures with static and dynamic muscular activities and awkward movements (4). Work organization is identified with several dimensions of the work process, such as physical demand, psychological demand, worker roles, and the social working environment. The concept of work organization has been used for the health and safety of workers (5). The physical factors consist of high body mass index (BMI), age, education level, quality of sleep, muscle strength and muscle endurance(6, 7). Psychosocial factors involve stress due to a heavy workload and a lack of leisure time (6). Moreover, a previous study found that having pressure during routine activity, working more than 8 hours per day, having work experience less than 6 months, maintaining

awkward postures, and working more than 2 hours in a sustained position were significantly associated with MSDs in workers (8).

Cleaning is a common occupation throughout the world. The majority of cleaners are older, unskilled women with low education levels and poor social support (9). There were over 3 million cleaners in European countries and the United States (10, 11). Cleaners are essential service occupations that work in many different environments, including industries, businesses, and general communities. Cleaning tasks such as moving or lifting furniture and equipment, sweeping, mopping, swabbing, vacuuming, and buffing are commonly labor intensive, which can become an important risk for MSDs (4, 6, 8).

Several epidemiological studies have reported the high prevalence rates of MSDs in cleaners, especially back pain (6, 8, 12-16). Cleaning tasks such as floor mopping (14), mirror/glass polishing, sink/tub cleaning (17), or moving/lifting furniture (4) usually require back movements in various directions that can cause stress overload in the lower back region and may subsequently contribute to the occurrence and chronicity of back pain (17, 18).

Non-specific low back pain (NLBP) is a diagnosis of a low back pain symptom that has an unidentified pathoanatomical cause and no sign of serious medical conditions (19-21). NLBP affects most patients, while only about 10% have a specific LBP diagnosis (22). In 2012, an epidemiological study reviewing 165 studies from 54 countries reported that the mean point prevalence of LBP was estimated to be 18.3%, and the 1-month prevalence was 30.8% (23). Another study studied the worldwide prevalence of chronic LBP according to age and sex by reviewing 28 studies and showed that the prevalence was 4.2% in individuals aged between 24 and 39 years old and 19.2% in those aged between 20 and 59 years old. Evidently, chronic LBP prevalence increases linearly from the third decade of life on until 60 years of age (24). Additionally, this study found that the prevalence of LBP in females was higher than males (24).

Several factors are associated with chronic NLBP. Risk factors can be categorized into two major categories, including individual and activity-related (work and leisure) factors (25). Individual factors involve demographic, anthropometric, physical, and psychosocial factors.

Demographic and anthropometric factors are low cost and education (13, 15), obesity, body height, and age (26). Physical factors include physical structures and their related functions such as, poor core stabilizer muscles (27), weakness of the gluteus medius muscle (28), thoracic kyphosis and lumbar lordotic curve (29), sacroiliac joint dysfunction (30), and decreased hip and lumbar range of motions (31). Psychosocial factors, including physical distress, depression, and fear-avoidance behaviors, can be a prognosis of LBP (25). Activity-related factors involve occupational and workplace factors such as less leisure time (32), heavy work, lifting, bending, and twisting (33), as well as job dissatisfaction (34).

Psychosocial factors also play an important role in the development and persistence of chronic LBP. Several studies found a relationship between psychosocial factors and LBP. In 2008, Mok et al. investigated the level of anxiety, depression, and pain intensity in patients with LBP and found that higher levels of anxiety and depression were significantly correlated with pain intensity and fear avoidance beliefs in this patient population(35). Trinderup et al. investigated the association between fear avoidance beliefs at baseline and the outcomes of sick leave, disability, and pain in patients with LBP. They found that high fear avoidance beliefs about work at baseline were significantly associated with still being on sick leave, and there was no reduction in pain and disability after 12 months with pain. This study suggested that fear avoidance belief could be a prognostic factor for LBP patients (36).

As aforementioned, cleaners are important service workers that work in many different places. A university is an academic setting that consists of a lot of buildings and people and needs to have cleaners for the work of cleaning. Clean work areas will help to increase worker/customer feelings of health and well-being and then enhance organizational performance and productivity. Conversely, unclean work areas may lead to accidents and unhealthy conditions. Thus, cleaning plays an important role in the maintenance of hygienic work and the public environment of the university. Similar to other types of staff in the university, it is necessary for the university as an employer to promote cleaners to have a good health status for maintaining their work capacity and preventing work loss. Previously, a few studies investigated the prevalence of MSDs among

cleaners in universities. Melese et al. studied the prevalence and factors associated with musculoskeletal disorder among cleaners at Mekelle University, Ethiopia. There were 270 cleaners in this study. The result showed the prevalence of MSDs during the last month; 52.3% reported a history of MSDs. Among nine parts of the body, LBP was the most common painful region among cleaners (34.8%), followed by wrist and upper back pain (17%), elbow and shoulder pain (14%), knee pain (12.5%), neck and ankle/foot pain (9.5%), and hip/thigh pain (3.8%) (8). While Jaidee et al. studied the prevalence and factors associated with musculoskeletal disorders among cleaners at Thammasat University, Thailand. There were 220 cleaners in this study. The result showed the prevalence of MSDs during the last month; 88.64% reported a history of MSDs. Divided into nine parts of the body, the cleaners reported having problems with neck pain (15.91%), shoulder pain (13.64%), elbow pain (0.91%), wrist/hand pain (5.91%), upper back pain (12.73%), LBP (24.09%), hip/thigh (17.73%), knee (36.36%), and ankle/foot pain (14.09%), respectively (12).

From the review of the literature, cleaning tasks are strenuous physically demanded and often performed in awkward posture, especially in prolonged forward bending. The prevalence of LBP has been reported to be high in cleaners. Although several studies explained the source of the symptoms of LBP in cleaners, they showed only the aspect of work activities-related factors. There is a lack of study to identify the aspects of physical and psychological factors among cleaners. Therefore, this study aimed to investigate the physical and psychological factors associated with NLBP in cleaners.

1.2 Research question

Were there any physical and psychological variables associated with NLBP among female cleaners?

1.3 Objective of this study

This study aimed to determine the association between physical and psychological variables and the presence of NLBP among female cleaners.

1.4 Hypothesis of this study

There would be a significant association between physical and psychological variables and the presence of NLBP among female cleaners.

1.5 Conceptual framework

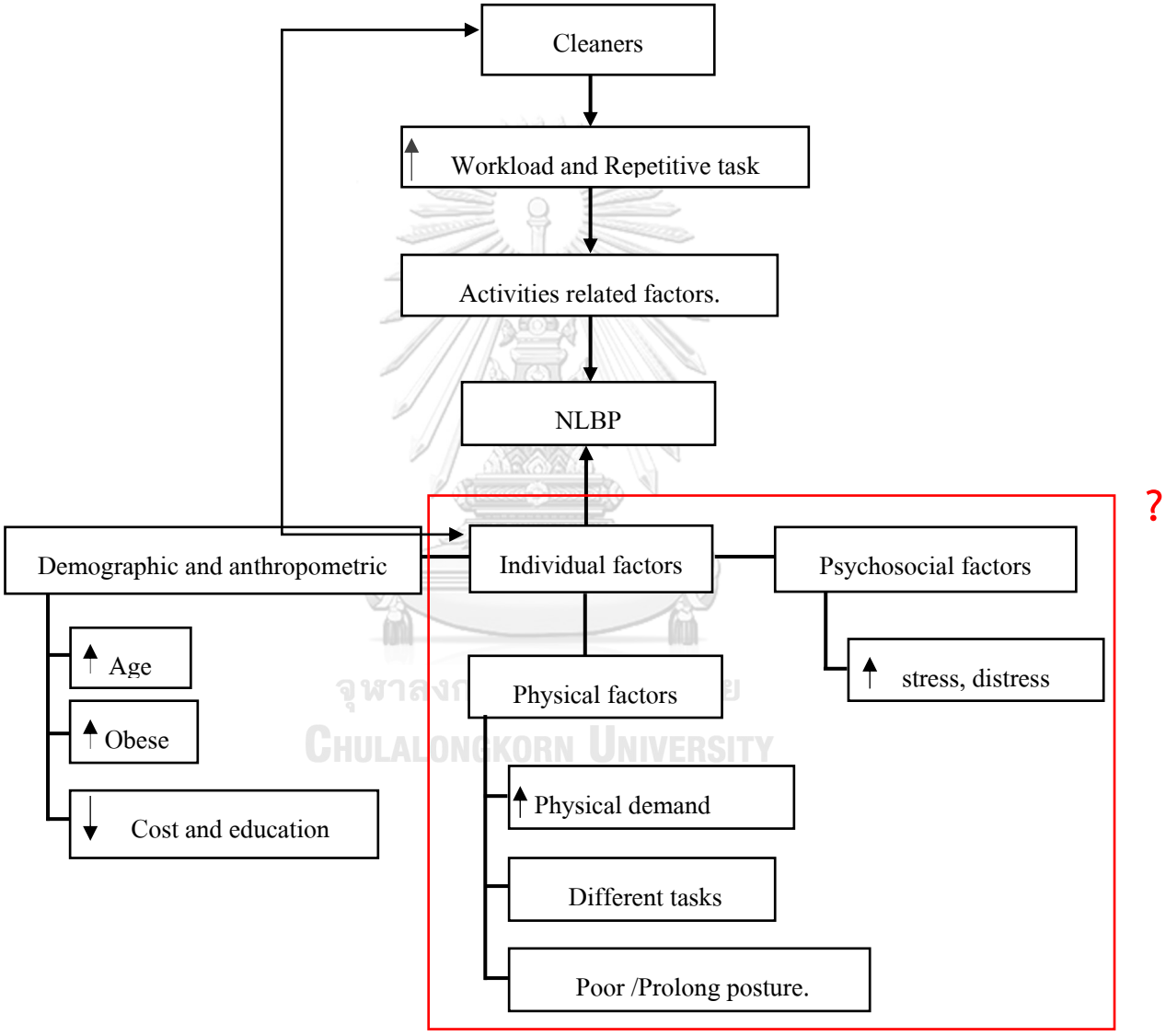


Figure 1 : Conceptual framework

1.6 Scope of this study

A research study investigated the association of physical and psychological factors between cleaners with and without NLBP. Female cleaners aged between 18 and 60 years were recruited. All participants were asked to complete a set of self-reported questionnaires, including a general information questionnaire and a history of the current episode of LBP, the numeric rating scale (NRS), and a set of questionnaires relating to physical and psychological factors that affect back performance. To control for the working environment and characteristics of work tasks and cleaning equipment, potential participants were invited from cleaners who were currently working as full-time cleaners at Chulalongkorn University during the period of data collection. Chulalongkorn University consists of 20 faculties, 23 colleges and research institutes, and 8,138 faculty members. Currently, there are 42 buildings and over 35,000 students at the university; therefore, it was necessary to hire a lot of cleaners from outsource to be responsible for clean work areas and environments. Up to date, there was no work-related health information of cleaners working at Chulalongkorn University. It was thus difficult to develop a preventive program to reduce the risk of MSDs in such a population.

1.7 Expected benefits and applications

The result of this study would provide the information about the risk and protective factors between NLBP and physical and psychological factors among Thai female cleaners. This result might further assist researchers and clinicians in designing more appropriate preventive and treatment approaches for cleaners with LBP. Additionally, the findings might help employers with the proper management of the work organization to reduce the presence of work-related LBP and then increase the quality of life for Thai cleaners.

CHAPTER 2

LITERATURE REVIEW

2.1 MSDs definition

According to World Health Organization (WHO), MSDs have been defined to the health problem that related to injuries or dysfunctions affecting the locomotor system. MSDs include cases where the nature of the injury or illness is pinched nerve, herniated disc, meniscus tear, sprains, strains, tears, hernia (traumatic and nontraumatic), pain, swelling, numbness, Carpal/Tarsal tunnel syndrome, musculoskeletal system and connective tissue diseases and disorders. MSDs can affect all aspects of quality of life ranging from light to irreversible injury or disability (1). The causes of injury of illness can be contributed by overexertion and bodily reaction involving repetitive movement, strenuous physical workload, and vibration. Moreover, the conditions are supposed to be aggravated by biomechanical workload that applied to tasks including various housework or sport activities. Occupational or work- related is the common cause of MSDs from performing repetitive motion, maintaining static motion, and circumstance of its performance (1). A recent study of Global Burden Disease in 2019 showed that approximately 1.71 billion among globally adults aged between 15-64 years had musculoskeletal conditions. LBP was the main contributor to the overall burden of musculoskeletal conditions with 568 million individuals (3).

2.2 Work-related MSDs (WMSDs)

WMSDs among workers have been assumed to be linked to physical load consequences from occupational activities. Musculoskeletal factors are supposed to be the main aspect that influence WMSDs such as exertion of high-intensity force, repetitive motions and prolonged period of task, postural and muscular effort, as well as environment and psychosocial factors (1, 4). Furthermore, work organization which is identified as a several dimension of work process (such as physical demand, psychological demand, worker roles, work relationship) also contributes to the illness and injury due to occupational activities (5). The European Agency for safety and Health at Work has shown that around 60% of all workers with health problems had

MSDs as their serious conditions (37). Workers with MSDs tended to be absent from work and decreased work performance when compared to workers with good health. For example, a previous study showed that cleaners were at high risk of developing MSDs (6, 8, 38). Approximately thirty to forty percent of work-related problems among cleaners were WMSDs (38).

2.3 Work-related MSDs among cleaners

Cleaners are primary and essential service occupations that work in many different environments including industries, business, and general communities (4, 6, 8). Cleaning is a common work task throughout the world. There are approximately 3 million full and part time cleaners in the European union (EU)(10) and over 4 million cleaners in the United State (11). In Thailand, there was over 250,000 cleaners who worked in private household with employed persons (National Statistical Office Thailand, 2005). Cleaning tasks are physically demanding and labor-intensive work (38). Cleaners operate various types of cleaning tasks per day such as moving or lifting furniture and equipment, sweeping, mopping, swabbing, vacuuming, and buffing. Unavoidably, cleaners may continuously work with abnormal body mechanisms which probably lead them to develop musculoskeletal disorder over time (39). Moreover, cleaners often confront many ergonomic risk factors associated with cleaning tasks including awkward working posture, lifting, and carrying loads, maintaining static or strenuous workload, repetitive manual handling, doing the same task frequently. Other work-related factors also influence the development of WMSDs among cleaners include speed and intensity of work, lack of involvement and participation in the design of work arrangements, low appreciation, and weak work organization. Examples of unsatisfactory work organization of such occupation are lack of risk assessment, inappropriate reporting system, and inadequate training (4, 6, 8, 9).

2.4 Prevalence of low back pain in cleaners

Cleaners are occupation with high prevalence of LBP (13, 15). Several epidemiological studies have shown the prevalence of LBP in cleaners.

Woods and Buckle studied musculoskeletal ill health among cleaners in the UK. There were 1,216 cleaners who responded to a self-reported musculoskeletal pain and discomfort questionnaire, 74% of the cleaners reported the history of muscle aches, pain, and discomfort in the past 12 months. The main body areas of concern were low back (46%). Additionally, 53% reported pain and discomfort for the last week with 24% of them suffering from LBP (16).

Jorgensen et. al. studied the difference of health status between Danish and immigrant cleaners. There were 166 Danish cleaners and 167 immigrant cleaners. The results showed the prevalence of MSDs for the last 12 months, 27.8% of Danish cleaners and 29.8% of immigrant cleaners reported a prevalence of LBP that last less than 30 days, while 10% of Danish cleaners and 21.2% of immigrant cleaners reported to have LBP symptoms daily (13).

Melese et al. studied the prevalence and factors associated with MSDs among Ethiopia cleaners. Among 270 cleaners participating in this study, 52.3% reported a prevalence of MSDs in the past 12 months. The highest prevalence of MSDs in the Ethiopia cleaners was on the low back (34.8%) (8).

Naik et. al. studied the prevalence of MSDs and risks posture assessment in 132 professional cleaners involving floor mopping tasks. The result showed that the highest prevalence of MSDs for one year was on low back (26.5%). Similarly, the pain perception rating scale demonstrated that the high level of pain was on the lower back (86.4%) (14).

Chang et. al. studied the prevalence and ergonomic risk factors in 180 Taiwan cleaners. The result showed that 37.8% of the Taiwanese cleaners reported the history of MSDs in lower back in the last 12 months (6).

In Thailand, the prevalence of MSDs in cleaners also investigated. In 2017, Jaidee et. al. studied the prevalence of musculoskeletal disorders in 220 cleaners working in a university setting. The result showed that the prevalence of MSDs in the last 12 months was 88.64%. Moreover, 24.04% reported the history of LBP (12).

Evidently, the high prevalence of musculoskeletal pain and discomfort among cleaners has been globally reported. Specifically, LBP seems to occur with high prevalence in this population group. According to the fact that cleaning tasks such as floor mopping (14), mirror/glass polishing, sink/tub cleaning (17), or moving and lifting furniture (4) usually require prolonged repetitive back motions leading to the overload or stress in lower back region and then can cause LBP problem (17, 18).

2.5 Characteristic of non-specific low back pain (NLBP)

NLBP is the most common type of LBP (40). It is the most common problem among the general population worldwide and the major cause of disability. Individuals with NLBP decrease their performance at work and well-being (26). LBP can be identified based on duration of symptoms as acute LBP when the period of pain for less than 6 weeks, sub-acute LBP when pain remains between 6 weeks and 3 months, and chronic LBP when pain persists longer than 3 months (21).

2.5.1 Sign and symptoms

Most patients with NLBP have pain in the lower back region. The diagnosis of NLBP is applied to the patient when a pathoanatomical cause cannot be identified. Clearly, other specific medical problems including specific disorders which can affect lumbar spine such as epidural abscess, compression fracture, spondyloarthropathy, malignancy, cauda equina syndrome, radicular pain, radiculopathy, spinal canal stenosis, and problems occurring closely to lumbar area (e.g., leaking aortic, aneurysm) will be excluded (19). Patients with NLBP generally have mechanical pain in their lower back, increased muscle tension and stiffness, limitation of joint motion, or referred pain (41). Physical factors, psychosocial factors, or the combination of both factors can contribute to the occurrence of acute NLBP and increase the severity of NLBP (20).

2.5.2 Prevalence

In 2015, Meucci et. al. determined the global prevalence of chronic LBP according to age sex, prevalence of chronic LBP according to age and sex; the authors reviewed 28 studies and

showed that the prevalence of chronic LBP was 4.2% in individuals aged between 24 and 39 years, and 19.2% in those aged between 20 and 59 years. They concluded that the chronic LBP prevalence increased linearly from third decade of life on, until 60 years of age, and higher prevalence was found in female than male (24). Particularly, LBP was highly associated with individuals in the occupational group with low cost and education and high physical workload. Cleaners is one of the occupational groups that fits in this aspect and have the highest prevalence of LBP (13, 15).

2.5.3 Risk factors of NLBP

Risk factors of NLBP can be divided into two major categories including individual and activity-related (work and leisure) factors (25).

2.5.3.1 Individual factors

Individual factors involve demographic, anthropometric, physical, and psychosocial factors. Demographic and anthropometric are low cost and education (13, 15), obesity, body height, and age (26). Physical factors include physical structures such as prolong standing, high physical workload, twisting or bending trunk (42), prolong sitting and working in static posture (43). Psychosocial factors involve physical distress, depression, and fear- avoidance behavior as prognostic factors of LBP (25).

Physical demand during activity or work is one important physical factor related to LBP. Several studies have reported that the high physical workload can contribute to LBP. Xu et. al. studied the association between the prevalence of LBP and occupational activities through 5940 Danish people, a total 15 variables have been analyzed in this study. They found that vibration affecting whole body, physically hard work, frequently twisting and bending, standing up, and concentration demand increased the risk of LBP (42). The finding was in line with study by Pensri et. al. They reported association factors of LBP among 1189 Thai saleswoman were working for > 10 hours/day, standing/walking for > 5 hours/day without rest breaks, frequent

working in static postures, and pushing or pulling objects placed in high positions during work (43).

Wang et al. investigated posture during cleaning task including 12 school cleaning tasks, OWAS method was used to analyze the awkward posture during working. They found that twisted trunk and bent forward were the major awkward posture for cleaners (44). Prolonged/or repetitive forward bending could produce a microtrauma to a spinal structure and increased the risk of LBP (45). Active tissues (the contractile component of muscle) and passive tissues (non-contractile tissue, discs, bone, ligaments) were two types of tissue in human spine (46). During trunk bending tasks at peak flexion, they found that back extensor muscle quickly decreased activity during performed fully trunk flexion in a termed of flexion relaxation phenomenal (47, 48). this phenomenal, transferred load form lumbar active tissues to lumbar passive tissues (49, 50).

Previous studies found the relationship between psychosocial factors and LBP. In 2008, Mok et. al. studied level of anxiety, depression, and pain intensity in 102 patients with LBP. The outcome measurements were the Hospital Anxiety and Depression Scale (HADS) and 11-point numeric rating scale (NRS). The result showed that patients with LBP had an average anxiety and depression level (19.46) higher than the normal level. Furthermore, the levels of anxiety and depression were significantly, positively correlated with pain intensity, and they were recognized as the significant predictors of pain intensity (35).

Likewise, fear-avoidance belief is associated with the prognosis of LBP. Trinderup et. al. studied the association between fear avoidance beliefs at baseline and the sick leave outcome, disability, and pain in 559 patients with LBP. The result showed that high fear avoidance beliefs about work at baseline were significantly associated with still being on sick leave, and no reduction in pain and disability after 12 months with pain (36). The study suggested the use of fear avoidance belief as a prognostic factor of LBP patients similar to the study of Wertli et. al.

The later reviewed and analyzed the role of fear avoidance beliefs as a prognostic factor in patients with NLBP. There were 21 studies included in this systematic review. The significant finding was that fear-avoidance beliefs was a prognostic factor for work-related outcome with sub-acute LBP (4 weeks-3 months of LBP)(51). This review has confirmed the knowledge of fear avoidance model that pain-related fear is intervening between recovery and disability, as seen in Figure 2. (52)

Figure 2: Fear avoidance model

2.5.3.2 Activities-related factors

Activities-related factors involve the occupational and workplace factors. The factors consist of less leisure time (32), heavy work, lifting, bending, and twisting(33), as well as job dissatisfaction (34). Macfaelene et. al. conducted a cohort study to investigate the influence of physical work as a predictor of LBP. There were 1,412 new workers without a history of LBP participating in the study. The medical history was recorded for 1-year follow-up. The result showed that an increased risk of LBP was associated with jobs involving lifting, pulling, or pushing objects of at least 25 pounds, or jobs with prolonged periods of standing and walking (53).

2.6 World Health Organization Quality of life (WHOQOL)

Quality of life is defined by WHO as individuals' perception of their position in life context of the culture and value systems in which they live and in relation to their goals, expectations, standards, and concerns. This concept is related to individual physical health, psychological state, level of independence, social relationships, personal belief, and environment. WHO have developed the WHOQOL-100, a self-reported outcome measure that is universal and reflects quality of life, into a subjective evaluation. Although the WHOQOL-100 can be used for assessment of individual aspects related to quality of life, it may be too lengthy for practical use (54). Therefore, the WHOQOL-BREF has been developed to provide a shorter form of quality-of-life assessment that is proper for practical use. The WHOQOL-BREF has four domains including physical health, psychological, social relationship, and environment; it contains a total of 26 questions. The score for each statement varies from 1-5. The total possible range from 26-130 points. The scores are scaled in a positive direction (higher scores mean higher quality of life). In Thailand, Mahatnirunkul et. al. measured the reliability of WHOQOL-BREF Thai version and showed the acceptable internal consistency with the Cronbach's alpha of 0.8107 (55).

CHAPTER 3

METHODOLOGY

3.1 Research design

A cross-sectional survey study was carried out. The study population involved all female cleaners working at Chulalongkorn University from August 1, 2022, to November 30, 2022. The study protocol was approved by the Research Ethic Review Committee for Research Involving Human Research Participants, Group 1, Chulalongkorn University, Thailand (No. 113/65) (Appendix A).

3.2 Subjects

Female cleaners working in the housekeeping unit of 20 faculties, 23 colleges, and research institutes located at Chulalongkorn University were invited to participate in the current study by the main researcher. A convenience sampling method was used for subject selection.

The inclusion criteria for cleaners were described as the following:

- Female cleaners aged between 18 and 60 years old.
- Work at the same place for at least 6 months, with a working period of at least 6 hours/day.
- Able to listen, speak, read, and write in Thai language without difficulty.

The exclusion criteria were described as the following. Participants were excluded from the study if at least one item of these criteria was found:

- Having history of specific LBP
- Having history of sciatica with numbness and weakness in lower limb
- Having history of memory disease/ Alzheimer
- Having history of kidney disease, tumor, or cancer
- Currently being pregnant

3.3 Sample size

The sample size was calculated using the formula in Figure 3 (56). Based on the previous study of Jaidee et al. (12), they investigated the prevalence and factors associated with MSDs among cleaners at Thammasat University. Using the result of the prevalence of LBP at 25% (P), the level of confidence (Z) was set at a 95% confidence interval, and the amount of precision was set at 0.05 (d). The calculated sample size was 180; a 10% drop out rate of participants was then added. Therefore, the sample size of this study was set at a total of 198 cleaners.

$$n = \frac{Z^2 P(1 - P)}{d^2}$$

Figure 3: Formula for sample size calculation

3.4 Measurement tools

3.4.1 A screening questionnaire

A screening questionnaire (Appendix C) was used with the cleaners currently working at Chulalongkorn University to determine if individuals could potentially participate in the study. The questionnaire consisted of gender, age, working period, ability to communicate in Thai language, memory function, and history of specific LBP during the last 3 months.

3.4.2 A set of self-reported questionnaires for collecting information on individual, work-related variables, pain, and quality of life.

A set of self-reported questionnaires was completed by the studied cleaners. The questionnaires consisted of three parts: the first part collected general information (e.g., height, body weight, education level, and work experience) and physical activities during cleaning (Appendix D). Regarding physical activities, the questionnaire collected data on the amount of time (minutes/day or hours/day) spent by a cleaner in each cleaning task including sweeping or mopping, bathroom cleaning, wiping glass, and cleaning tools. Furthermore, the questionnaire collected data on the frequency of performing posture during work. Nine different postures were

investigated including forward bending, pushing or pulling heavy object, twisting body in narrow space, backward bending, squat sitting/kneeling, lifting moderate to heavy objects from floor, static posture, and using heavy tools, as shown in Figure 4. A multiple-choice question (often, occasionally, almost never) was used to collect the frequency of performing postures. An "Often" option was defined as a cleaner repeatedly performing the posture for 1 - 2 working hours. An "Occasionally" option was defined as a cleaner sometimes or intermittently performed the posture at work. An "almost never" option was defined as a cleaner seldom or not at all performed the posture at work.

Figure 4: Physical activities during cleaning task

A. Forward bending during mopping/sweeping

B. Forward bending, squatting during bathroom cleaning

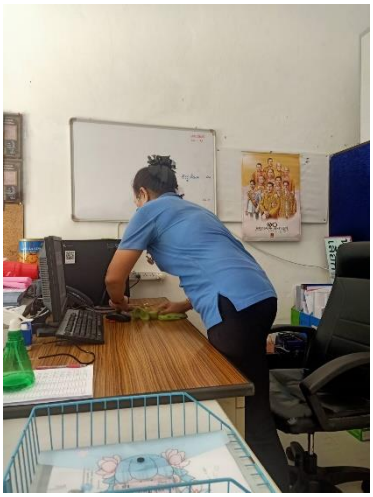

C. Backward bending during wiping glass


D. Climbing Up/downstair

E. Pulling/pushing an object


F. Lifting moderate to heavy an object


G. Twisting body in narrow space

H. Cleaning tools/furniture/working surface

The second part of the self-reported questionnaire collected information on quality of life through the WHOQOL-BREF Thai version (Appendix E). The WHOQOL-BREF had a total of 26 questions, divided into four domains, including physical health (Q3, Q4, Q10, Q15, Q16, Q17, Q18), psychological (Q5, Q6, Q7, Q11, Q19, Q26), social relationship (Q20, Q21, Q22), and environment (Q8, Q9, Q12, Q13, Q14, Q23, Q24, Q25). The score for each statement varies from 1 to 5 (except Q3, Q4, Q26 were scored negatively). The scores were scaled in a positive direction (higher scores mean a higher quality of life). The total score range could be 26-130. A total score range in each domain could be 7-35 for the physical health domain, 6-30 for the psychological domain, 3-15 for social relationship, and 8-40 for the environment domain. The third part gathered information on the history of MSDs for the last three months, location of painful area, and related pain intensity using Nordic body map and Numeric Rating Scale (NRS) (Appendix F). Moreover, this final part asked about duration and onset of the current episode of LBP, treatment currently received, and time lost from work.

3.5 Research procedure

Prior to collecting data, a pilot study was conducted. A set of self-reported questionnaires was completed by 10 female cleaners to ensure that the questionnaires had acceptable reliability for collecting data. The inter-rater agreement in each factor of the questionnaire was evaluated by the intraclass correlation coefficient (ICC) for continuous data and the Kappa (K) statistic for ordinal and categorical data (57). The level of agreement was considered at the values of ICC, if the value was less than 0.5 as poor reliability, between 0.5-0.75 as moderate reliability, more than 0.75 as good reliability, and more than 0.9 as excellent reliability, while the level of agreement was considered at the value of K, if the value was less than 0.4 as poor, between 0.4-0.6 as moderate, between 0.6-0.8 as substantial, and more than 0.8 as excellent reliability (58). The pilot data was presented in Appendix G. Regarding the recruitment process, the main researcher contacted the chief of the housekeeping unit of each faculty at Chulalongkorn University. In a total of 43 academic settings, there were 20 faculties, 23 colleges and research institutes that

employed full-time cleaners from various private cleaning companies. There were 14 out of 43 academic settings that permitted their employed cleaners to participate in the study. A total of 210 female cleaners agreed to participate in the study and signed the consent form (Appendix B). The participants were recruited as potential participants through a screening questionnaire (Appendix C). Eleven cleaners were excluded from the study because they did not meet the inclusion criteria of being aged between 18 and 60 years old (n = 5) and having specific LBP (n = 6). Therefore, 199 participants were asked to complete a set of self-reported questionnaires related to individual and work-related variables (Appendix D and Appendix E). The main researcher was available while each participant completed the questionnaires in order to assist those who did not understand the question. It was found that each participant could complete the self-reported questionnaire within 30 minutes. Using data from the completed questionnaires, the 199 cleaners were divided into two groups (LBP and without LBP groups). The self-reported pain intensity via NRS was used as a cut-off point. Participants who reported having current pain intensity equal to or greater than 3/10 of NRS were considered to have LBP (25), and those who indicated having current pain intensity equal to or lower than 2/10 of NRS or currently not having LBP symptoms were identified as participants without LBP. Figure 5 demonstrates the research procedure of the present study.

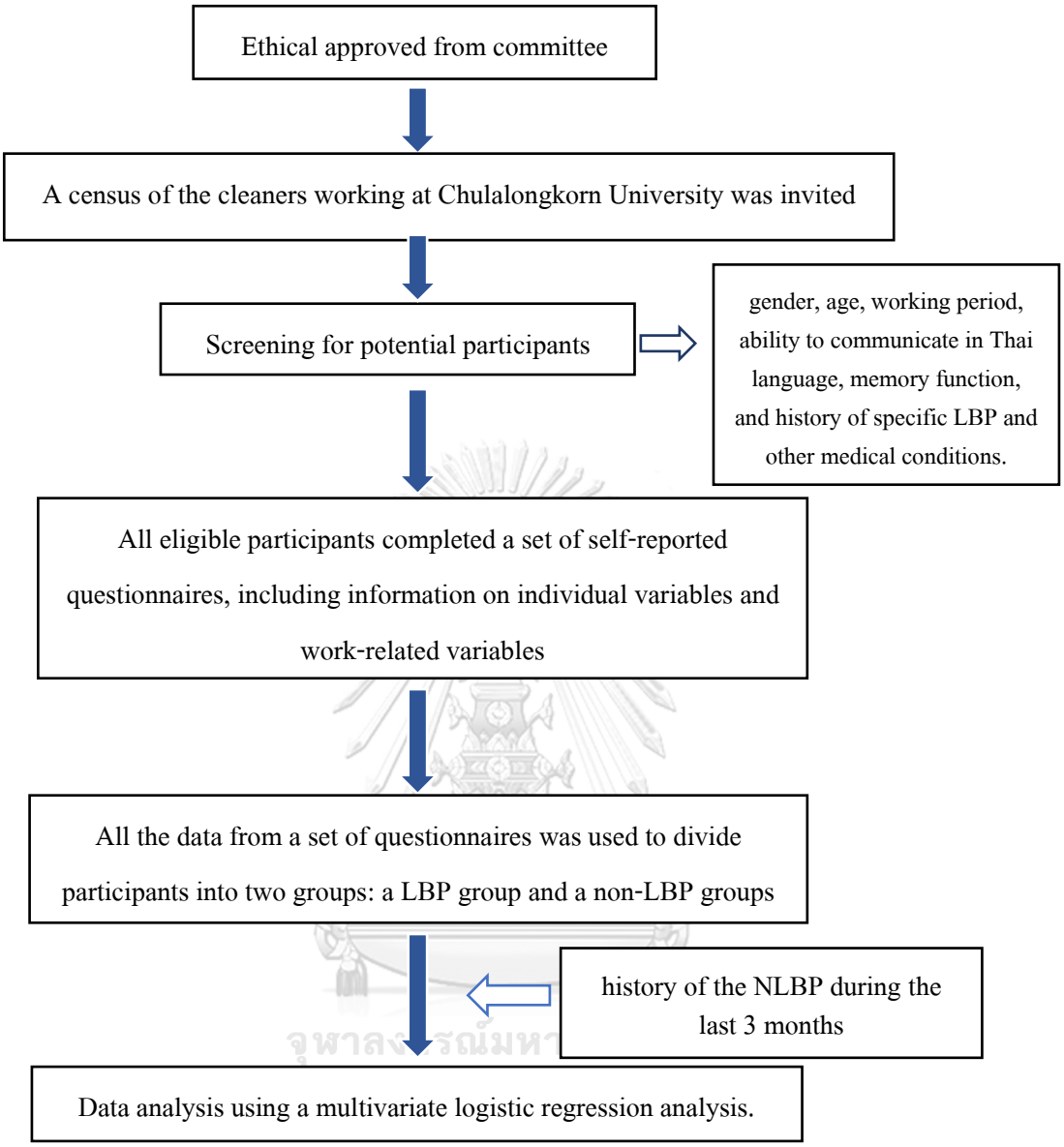


Figure 5: Research procedure of the present study

3.6 Outcome measurement

3.6.1 Independent variables

Two groups of cleaners consisting of a LBP and a non-LBP groups

3.6.2 Dependent variables

Physical and psychosocial variables reported in the self-reported questionnaires.

3.7 Statistical analysis

The SPSS software version 22.0 was used for quantitative data analysis. The descriptive statistics were used to describe the participants' demographic data which were interpreted as mean and standard deviations for numerical data and percentages for categorical data. To determine the association between physical and psychological factors with the presence or absence NLBP, binomial logistic regression analysis was used. The researcher adjusted some independent factors that were continuous data into category data before calculating the univariate associations between factors. Then, the factors with univariate association ($p<0.05$) were entered into binomial logistic regression (backward stepwise (Wald) method to select variables into the equation. Probability for stepwise included entry: 0.05 and removal: 0.10 to explore association between multi-variables. A crude odds ratio with a 95.0% confidence interval (CI) was reported. The level of significance was set at $p<0.05$ for all statistical analyses.

CHAPTER 4

RESULTS

The current study collected data from female cleaners who were currently working in Chulalongkorn University, only one academic institute in order to ascertain that all participants working in the similar working environment. This might help to reduce the influence of difference in characteristics of cleaning tasks and cleaning instrument used on the occurrence of LBP. Employed cleaners in a total of 43 academic settings, including 20 faculties, 23 colleges, and research institutes located at Chulalongkorn University, were initially included. After the recruitment process, 199 female cleaners working in 14 workplaces conveniently participated in the study, and their data collected by the research questionnaires were analyzed. The detailed demographic characteristics of the cleaners included in this study are shown in Table 1. This study found that 26.12% (n = 52) of participants had LBP, while 2.02% (n = 4) had LBP with other MSDs. Whereas 53.27% (n = 106) of participants reported that they did not have LBP and 18.59% (n = 37) reported not having any MSDs. The cleaners with LBP in this study reported that they had a moderate level of pain intensity with an average NRS score of 5.12 (SD = 2.09, range = 3-10), whereas those without LBP indicated an average NRS score of 0.51 (SD = 0.71, range = 0-2). The average age, height, and weight of female cleaners were 49 years (SD = 9.6, range = 20-60), 155.2 centimeters (SD = 5.9, range = 140-173), and 60.6 kilograms (SD = 12.4, range = 32-104), respectively. The cleaners in this study worked with a weekly workload of 5.6 days per week (SD = 0.5, range = 5-6), and 8.6 hours per day (SD = 1.3, range = 2-13). In this study, cleaners spent, on average, 5.4 hours per day standing and sitting during work (SD = 2.2, range = 1-10), with rest breaks and 2.9 hours without rest breaks (SD = 1.7, range = 0.2-10).

Table 1. Characteristics of study population (n = 199)

Characteristics	Mean	±SD	Range
Age (years)	49.4	9.6	20-60
Height (cm)	155.2	5.9	140-173
Weight (kg)	60.6	12.4	32-104
Work experience (years)	6.1	5.9	1-49
Working days per week (days per week)	5.6	0.5	5-6
Working hours per day (hours per day)	8.6	1.3	2-13
Standing and walking hours per day with rest breaks (hours per day)	5.4	2.2	1-10
Standing and walking hours per day without rest breaks (hours per day)	2.9	1.7	0.2-10
Pain intensity (NRS)			
LBP (n=56)	5.12	2.09	3-10
Without LBP (n=143)	0.51	0.71	0-2

As shown in Table 2, the overall prevalence of MSDs included in this study was divided into nine parts of the body, including the neck, shoulders, elbows, wrist/hands, upper back, lower back, hips, knees, ankle/feet. This study found that the prevalence of MSDs among female cleaners in the last 3 months was lower back (28.64%, NRS: 5.12), knees (14.57%, NRS: 4.76), shoulders (5.02%, NRS: 6.10), hips (4.52%, NRS: 6.22), neck (4.02%, NRS: 6.25), ankle/feet (3.52%, NRS: 5.86), elbows (2.01%, NRS: 4.75), wrist/hands (2.01%, NRS: 5.00), and upper back (1.01%, NRS: 7.00), while the prevalence of MSDs among female cleaners at the present time was lower back (15.57%, NRS: 5.72), knees (11.06%, NRS: 5.32), shoulders (4.02%, NRS: 5.38), hips (3.52%, NRS: 4.42), upper back (2.01%, NRS: 4.50), elbows (1.51%, NRS: 6.33), neck (1.01%, NRS: 4.50), ankle/feet (1.01%, NRS: 3.00), and wrist/hands (1.01%, NRS: 3.00).

Table 2. Prevalence of self-reported musculoskeletal disorders in female cleaners during the previous 3 months and at the present time

Body regions	MSDs previous last 3 months		MSDs at the present time	
	n (%)	NRS	n (%)	NRS
Neck	8 (4.02)	6.25	2 (1.01)	4.50
Shoulders	10 (5.02)	6.10	8 (4.02)	5.38
Elbows	4 (2.01)	4.75	3 (1.51)	6.33
Wrist/hands	4 (2.01)	5.00	2 (1.01)	3.00
Upper back	2 (1.01)	7.00	4 (2.01)	4.50
Low back	57 (28.64)	5.12	31 (15.57)	5.72
Hips	9 (4.52)	6.22	7 (3.52)	4.42
Knees	29 (14.57)	4.76	22 (11.06)	5.32
Ankle/feet	7 (3.52)	5.86	2 (1.01)	3.00

Tables 3-4 compare the frequencies of cleaners performing various cleaning tasks between the LBP group (n = 56) and the non-LBP group (n = 143). As shown in Table 3, the distribution of the amount of time spent during cleaning tasks, sitting, and standing activities was investigated in this study. A present study found that 58.9% (n = 33) of cleaners with LBP spent more than 1 hour sweeping and mopping, bathroom cleaning 33.9% (n = 19), wiping glass 10.7% (n = 6), and cleaning tools 14.3% (n = 8), while cleaners without LBP spent more than 1 hour sweeping and mopping 42.0% (n = 60), bathroom cleaning 26.6% (n = 38), wiping glass 11.2% (n = 16), and cleaning tools 10.5% (n = 15). Apart from work during the workday, cleaners have to sit and walk for activities in their daily lives. The results showed that 60.7.5% (n = 34) of cleaners with LBP spent less than 30 minutes per day for walking and 62.5% (n = 35) spent more than 30 minutes per day for sitting, while 60.1% (n = 86) of cleaners without LBP spent less than 30 minutes per day for walking and 50.3% (n = 72) more than 30 minutes per day for sitting.

Table 3. Distribution of participants with and without LBP according to cleaning tasks, sitting, and standing apart from work (n = 199*)*

Factors	LBP (n=56)		Non-LBP (n=143)	
	n	%	n	%
Sweeping/mopping				
≤ 1 hours per day	23	41.1	83	58.0
> 1 hours per day	33	58.9	60	42.0
Bathroom cleaning				
≤ 1 hours per day	37	66.1	105	73.4
> 1 hours per day	19	33.9	38	26.6
Wiping glass				
≤ 1 hours per day	50	89.3	127	88.8
> 1 hours per day	6	10.7	16	11.2
Cleaning tools				
≤ 1 hours per day	48	85.9	128	89.5
> 1 hours per day	8	14.3	15	10.5
Walking time apart from work				
≤ 30 minutes per day	34	60.7	86	60.1
> 30 minutes per day	22	39.3	57	39.9
Sitting time apart from work				
≤ 30 minutes per day	21	37.5	71	49.7
> 30 minutes per day	35	62.5	72	50.3

As shown in Table 4, the distribution of participants with and without LBP according to frequency of posture during work was investigated in this study. The answer was divided into three ordinal scales, including often, occasionally, and almost never. This study found that

58.93% (n = 33) of cleaners with LBP often performed forward bending, followed by 35.71% (n = 20) of occasional and 5.36% (n = 3) of almost never. While a majority of cleaners without LBP occasionally performed forward bending (39.86%, n = 57), followed by 32.87% (n = 47) often performed the task, and 27.27% (n = 39) of almost never. For pushing and pulling heavy objects, the majority of cleaners with LBP (53.57%, n = 30) occasionally performed the task, followed by those of almost never (35.74%, n = 20), and 10.71% (n = 6) that often involved moving heavy objects on the floor. However, 47.55% (n = 68) of cleaners without LBP occasionally pushed and pulled heavy objects, followed by 44.76% (n = 64) of almost never and 7.69% (n = 11) of often. For working in a position that needed to twist body in a narrow space, the study showed that 51.79% (n = 26) of cleaners with LBP occasionally performed the task, followed by 26.79% (n = 15) of almost never, and 21.43% (n = 12) of often. Likewise, 44.06% (n = 63) of cleaners without LBP occasionally twisted their bodies in narrow spaces, followed by 39.86% (n = 57) of almost never, and 16.08% (n = 23) of often.

Similar to the abovementioned working tasks, the majority of cleaners in both groups occasionally performed high physically demanding works including backward bending (73.21% of cleaners with LBP, and 60.14% of those without LBP), squat sitting or kneeling (73.21% of cleaners with LBP, and 43.36% of those without LBP), lifting moderate to heavy objects from floor (76.79% of cleaners with LBP, and 54.55% of those without LBP), and using heavy tools for cleaning work (57.14% of cleaners with LBP, and 44.76% of those without LBP). It can be seen from Table 4 that there were lower percentages of cleaners in both groups who often performed high physically demanding works. Only 23.21% of cleaners with LBP and 18.18% of those without LBP often worked in back bending postures, and 16.7% of cleaners with LBP and 14.69% of those without LBP often worked in squat sitting or kneeling. Also, only 7.14% of cleaners with LBP and 6.99% of those without LBP often lifted moderate to heavy objects from floor, and 16.07% of cleaners with LBP and 9.79% of those without LBP often used heavy tools for their cleaning works.

Interestingly, cleaners in the current study seemed to spend most of their working time in static working postures such as sweeping and mopping. Most cleaners with LBP (69.64%, n = 39) reported that they often performed static posture during work, followed by 28.57% (n = 16) of occasional and only one cleaner indicating almost never performed the task. In the same way, most cleaners without LBP (43.36%, n = 62) reported that they often performed static posture during work, followed by 39.86% (n = 57) of occasional, and 16.78% (n = 24) of almost never. However, there was only one type of working task, i.e. walking up and downstairs, that the result was not in line with other tasks. It was shown that the majority of cleaners with LBP (46.43%, n=26) often performed this task, whereas the majority of cleaners without LBP (37.06%, n = 53) occasionally performed the task.

Table 4 Distribution of participants with and without LBP according to frequency of posture during work (n = 199)

Factors	LBP (n=56)		Non-LBP (n=143)	
	n	%	n	%
Frequency of forward bending during work				
Often	33	58.93	47	32.87
Occasionally	20	35.71	57	39.86
Almost never	3	5.36	39	27.27
Frequency of pushing or pulling heavy object during work				
Often	6	10.71	11	7.69
Occasionally	30	53.57	68	47.55
Almost never	20	35.71	64	44.76
Frequency of twisting body in a narrow space during work				
Often	12	21.43	23	16.08
Occasionally	29	51.79	63	44.06
Almost never	15	26.79	57	39.86
Frequency of backward bending during work				
Often	13	23.21	26	18.18
Occasionally	41	73.21	86	60.14

Factors	LBP (n=56)		Non-LBP (n=143)	
	n	%	n	%
Almost never	2	3.57	31	21.68
Frequency of squat sitting or kneeling during work				
Often	9	16.07	21	14.69
Occasionally	41	73.21	62	43.36
Almost never	6	10.71	60	41.96
Frequency of lifting moderate to heavy objects from floor during work				
Often	4	7.14	10	6.99
Occasionally	43	76.79	78	54.55
Almost never	9	16.07	55	38.46
Frequency of static posture during work				
Often	39	69.64	62	43.36
Occasionally	16	28.57	57	39.86
Almost never	1	1.79	24	16.78
Frequency of using heavy tools during work				
Often	9	16.07	14	9.79
Occasionally	32	57.14	64	44.76
Almost never	15	26.79	65	45.45
Frequency of walking up/downstairs during work				
Often	26	46.43	49	34.27
Occasionally	21	37.50	53	37.06
Almost never	9	16.07	41	28.67

Table 5 shows the distribution of participants according to their feeling during work. A set of questions included agree/disagree questions to describe their perspective on their work. This study found that 83.93% (n = 47) of cleaners with LBP felt exhausted during work, while 16.07% (n = 9) felt differently. About 56.64% (n = 81) of cleaners without LBP felt exhausted

during work, while 43.36% (n = 62) felt differently. Cleaners with LBP who were dissatisfied with their job were 76.79% (n = 43) and 23.21% (n = 13) satisfied with their job, while cleaners without LBP who were dissatisfied with their job were 24.48% (n = 35) and satisfied with their job 75.52% (n = 108). About 91.38% (n = 53) of cleaners with LBP felt repeatedly work, while 8.62% (n = 3) felt differently. While 81.41% (n = 125) of cleaners without LBP felt repeatedly work, while 18.59% (n = 18) felt differently.

Table 5. Distribution of participants with and without LBP according to feeling during work (n = 199)

Factors	LBP (n=56)		Non-LBP (n=143)	
	n	%	n	%
Feeling exhausted				
Agree	47	83.93	81	56.64
Disagree	9	16.07	62	43.36
Job dissatisfaction				
Agree	43	76.79	35	24.48
Disagree	13	23.21	108	75.52
Repeatedly work				
Agree	53	91.38	125	81.41
Disagree	3	8.62	18	18.59

The distribution of participants according to the WHOQOL questionnaire is shown in Table 6. A set of questionnaires had four domains, including physical domain, psychological domain, social relationship domain, and environmental domain. Each domain had a different range of points; a higher point implied a higher quality of life for cleaners. This study found that physical health domains were good 30.36% (n = 17), moderate 66.07% (n = 37), and poor 3.57% (n = 2) in cleaners with LBP, respectively, while cleaners without LBP were good 56.64% (n = 81), moderate 43.36% (n = 62), and poor 0% (n = 0), respectively. Psychological health domains were good 57.17% (n = 32), moderate 41.07% (n = 23), and poor 1.79% (n = 1) in cleaners with

LBP, respectively, while cleaners without LBP were good 70.63% (n = 101), moderate 27.27% (n = 39), and poor 2.10% (n = 3), respectively. Social relationship domains were good 14.27% (n = 8), moderate 83.94% (n = 47), and poor 1.79% (n = 1) in cleaners with LBP, respectively, while cleaners without LBP were good 41.26% (n = 59), moderate 58.72% (n = 84), and poor 0.02% (n = 2), respectively. Environment health domains were good 14.27% (n = 8), moderate 82.16% (n = 46), and poor 3.57% (n = 2) in cleaners with LBP, respectively, while cleaners without LBP were good 41.26% (n = 59), moderate 55.94% (n = 80), and poor 2.08% (n = 4), respectively. The summary of all domains was good 22.64% (n = 12), moderate 75.57% (n = 43), and poor 1.79% (n = 1) in cleaners with LBP, respectively, while cleaners without LBP were good 56.64% (n = 81), moderate 416% (n = 59), and poor 2.10% (n = 3), respectively.

Table 6. Distribution of participants with and without LBP according to WHOQOL questionnaire. (n=199)

Factors	Mean (S.D.)			
	LBP		Non- LBP	
	n	%	n	%
WHOQOL Physical health domain				
Good (27-35 points)	17	30.36	81	56.64
Moderate (17-26 points)	37	66.07	62	43.36
Poor (7-16 points)	2	3.57	0	0
WHOQOL Psychological health domain				
Good (23-30 point)	32	57.14	101	70.63
Moderate (15-22 point)	23	41.07	39	27.27
Poor (6-14 point)	1	1.79	3	2.10
WHOQOL Social relationship domain				
Good (12-15 point)	8	14.27	59	41.26
Moderate (8-11 point)	47	83.94	84	58.72
Poor (3-7 point)	1	1.79	2	0.02

Factors	Mean (S.D.)			
	LBP		Non- LBP	
	n	%	n	%
WHOQOL Environment health domain				
Good (30-40 point)	8	14.27	59	41.26
Moderate (19-29 point)	46	82.16	80	55.94
Poor (8-18 point)	2	3.57	4	2.08
WHOQOL All				
Good (96-130 points)	12	22.64	81	56.64
Moderate (61-95 points)	43	75.57	59	41.26
Poor (26-60 points)	1	1.79	3	2.10

Univariate analysis was used to evaluate the association between each factor and the presence or absence of LBP in the studied cleaners. The significance result ($p<0.05$) occurred at the following factors including, standing and walking hours per day with and without rest breaks, WHOQOL physical health domain, WHOQOL psychological health domain, WHOQOL social relationship domain, WHOQOL environment health domain, WHOQOL All, WHOQOL general health, WHOQOL quality of life, frequency of forward bending during work, frequency of backward bending during work, frequency of squat sitting or kneeling during work, frequency of lifting moderate to heavy objects from the floor during work, frequency of static posture during work, frequency of using heavy tools during work, feeling exhausted, and job dissatisfaction. Factors that were found in univariate analysis were offered to a binomial logistic regression model (backward stepwise (Wald) method) to eliminate a confounding variable. The results are summarized in Table 7.

Table 7. Results of a univariate analysis of participants with and without LBP according to biopsychosocial factors

Factors	p-value	OR	95% CI
Age	0.891	1.002	0.970-1.036
Height (cm)	0.087	1.008	0.957-1.061
Weight (kg)	0.872	0.998	0.973-1.023
BMI	0.715	0.988	0.924-1.056
Work experience	0.636	0.984	0.922-1.051
Working days per week	0.463	1.205	0.732-1.983
Working hours per day	0.057	1.280	0.993-1.651
Standing and walking hours per day with rest breaks	0.003*	1.256	1.082-1.458
Standing and walking hours per day without rest breaks	0.007*	1.273	1.068-1.1517
Sweeping/mopping	0.190	1.003	0.998-1.008
Bathroom cleaning	0.095	1.006	0.999-1.014
Wiping glass	0.871	0.999	0.991-1.008
Cleaning tools	0.189	1.003	0.998-1.008
Walking time apart from work	0.569	1.002	0.995-1.009
Sitting time apart from work	0.245	1.004	0.997-1.011
WHOQOL physical health domain	<0.001*	0.800	0.729-0.878
WHOQOL psychological health domain	0.003*	0.884	0.815-0.958
WHOQOL social relationship domain	<0.001*	0.864	0.805-0.927
WHOQOL environment health domain	<0.001*	0.741	0.630-0.873
WHOQOL All	<0.001*	0.942	0.917-0.967

Factors	p-value	OR	95% CI
WHOQOL general health	<0.001*	0.368	0.240-0.564
WHOQOL quality of life	0.001*	0.536	0.364-0.787
Frequency of forward bending during work	<0.001*	0.110	0.031-0.385
Frequency of pushing or pulling heavy object during work	0.327	0.573	0.188-1.764
Frequency of twisting body in a narrow space during work	0.136	0.504	0.205-1.241
Frequency of backward bending during work	0.011*	0.129	0.027-0.625
Frequency of squat sitting or kneeling during work	<0.001*	0.233	0.074-0.734
Frequency of lifting moderate to heavy objects from floor during work	0.012*	0.409	0.105-1.589
Frequency of static posture during work	0.004*	0.066	0.009-0.509
Frequency of using heavy tools during work	0.05*	0.359	0.131-0.984
Frequency of walking up/downstairs during work	0.134	0.747	0.337-1.495
Frequency of rest breaks during work	0.532	0.927	0.156-5.509
Feeling exhausted	<0.001*	0.250	0.114-0.549
Job dissatisfaction	<0.001*	0.098	0.047-0.203
Repetitive work	0.148	0.393	0.111-1.391

According to the binomial regression analysis, NLBP was significantly associated with various physical and psychological factors, including the WHOQOL physical health domain, the frequency of forward bending during work, the frequency of squat sitting or kneeling during work, feeling exhausted, and job dissatisfaction. The final logistic regression model was

statistically significant with a chi-square value of 82.12 ($p<0.001$). All of the significant factors explained 48.6% (Nagelkerke R^2) of the variance in the presence of NLBP and correctly classified 84% of cases. The results demonstrated that every 1 score increase in the WHOQOL physical health domain decreased the odds of being in the LBP group by 0.786 (95% CI, 0.697-0.885). Regarding the frequency of forward bending during work, cleaners who occasionally performed forward bending posture would decrease the odds by 0.336 (95% CI, 0.138-0.818) compared with those who often worked in forward bending posture. On the other hand, cleaners who occasionally or less often performed squat sitting or kneeling during work increased the odds of having NLBP by 3.295 (95% CI, 1.066-10.182) compared with those who often worked in squat sitting or kneeling posture. Concerning the psychological factors, the study showed that individuals with mental exhaustion increased the probability of having work-related NLBP (odds ratio = 4.518, 95% CI, 1.037-19.692), whereas cleaners with job dissatisfaction were more likely to decrease the odds of suffering from NLBP (odds ratio = 0.063, 95% CI, 0.018-0.225).

Table 8. Results of the binomial logistic regression model for the association of variables attributed to low back pain.

Factors	p-value	AOR	95% CI
WHOQOL physical health domain	<0.001*	0.786	0.697-0.885
Frequency of forward bending during work			
Often	0.039	-	-
Occasionally	0.016*	0.336	0.138-0.818
Almost never	0.141	0.325	0.073-1.450
Frequency of squat sitting or kneeling during work			
Often	0.006	-	-
Occasionally	0.038*	3.295	1.066-10.182
Almost never	0.487	0.583	0.127-2.673
Feeling exhausted	0.045*	4.518	1.037-19.692
Job dissatisfaction	<0.001*	0.063	0.018-0.225

*Significance level at $P < 0.05$.

[a] Model chi-square test, $\chi 2 = 82.125$ ($P < 0.001$).

Overall percentage of correctly predicted = 83.9%, Nagelkerke $R^2 = 0.486$.

CHAPTER 5

DISCUSSION

Cleaning work is a labor-intensive job that requires higher loads of cardiopulmonary and musculoskeletal systems as well as both dynamic and static muscular work with the aid of various cleaning tools, all of which contribute to MSDs. In many countries, cleaning work is predominantly done by women, especially older women (4). This study aimed to find out the prevalence of NLBP among MSDs and investigate an association between NLBP and physical and psychological factors in female cleaners working in various academic settings at Chulalongkorn University, Thailand.

The findings showed that NLBP is the most prevalent condition among various MSDs in the last 3 months (30.14%) and in the present time (18.08%) among female cleaners in academic settings. According to the findings from the previous studies, the prevalence of NSLBP among cleaners ranged from 19.7% to 63% (6, 8, 12-14, 17, 32, 59). The results of the present study were comparable to the studies conducted in India (26.5%), Denmark (34.2%), and Taiwan (37.8%) (6, 14, 32). However, the findings obtained from this study were higher compared to other studies investigated in cleaners in Ethiopia (19.7%) and Danish (21%) while lower in the studies of Krause et al., Chuppawa and Aungudornpukdee, with 63% and 44.10%, respectively (8, 17, 32, 59). The variations in the prevalence values might be due to the differences in the individual pain level, outcomes, sample size, areas of cleaning location, cultural differences in working's characteristic, and participants' comprehension and response to questionnaires. Other possible reasons might be the differences in age and the time interval used to assess the history of NLBP. For instance, the mean age included in the study of Melese et al. was 21.94 ± 56, and the average age of 49.4 ± 56 years was involved in this study(8). In this present study, the researcher used the last 3 months and the present time to investigate the prevalence of NLBP among female cleaners, while most of the studies used the past 12 months, past one month, and last week as a duration to determine the frequency of NLBP (6, 8, 13, 14, 32, 59).

LBP is one of the most common MSDs and a prevalent multifactorial healthcare problem. The results from this study revealed that there was a significant association between NLBP and feeling exhausted, the frequency of squat sitting during work, job dissatisfaction, the frequency of forward bending, and WHOQOL physical domain. Binomial logistic regression analysis showed that feeling exhausted, the frequency of squat sitting during work were risk factors of LBP, whereas job dissatisfaction, the frequency of forward bending, and WHOQOL physical domain were preventive factors of LBP in the studied cleaners. According to the present results, some factors were not in line with what we expected for. It was difficult to explain or provide appropriate reasoning for a few unexpected results. For example, the result of the frequency of forward bending and squatting/kneeling during work. Although there was significant difference in the occurrence of LBP between the cleaners who occasionally performed postures compared to those often performed, no significant significance was found between the cleaners who almost never performed postures compared to those often performed. The obscured results might be due to the related questions in the studied questionnaire. The questions on the frequency of working posture might be unclear or difficult to correctly answer. This notion must be kept in mind when interpreting such findings. The significant factors found in the multivariate logistic model are orderly discussed based on their importance association with LBP as follows.

In the present study, cleaners who felt exhausted after working hours were found to be 4.3 times more likely to develop NLBP than those who did not feel exhausted. This finding was supported by a study conducted in Ethiopia (AOR = 2.7, 95% CI = 1.16–6.20), but this study focused more specifically on NLBP conditions than other MSDs. Employing intensive and repetitive movements in awkward postures, the demanding workload and fatigue associated with these movements during cleaning tasks can lead to NLBP and have a significant impact on the capacity to do the task (8). A recent study of Wilmar et al in 2020 suggested that exhaustion at work is the most vital aspect of burnout. Exhaustion involves severe tiredness, reduced ability to control cognitive and emotional processes, and mental distancing (60). They proposed that there were various aspects of exhaustion, for example physical, mental, and emotional exhaustion that should be measured and managed for the workers' health and safety (60).

The current study showed that the risk of experiencing NLBP was higher for cleaners who reported a lower frequency of working in squat sitting or kneeling postures in comparison with those who often worked in the same manners. On the other hand, cleaners who less often worked with squat sitting or kneeling were presented with 3.295 times a greater opportunity to suffer from NSLBP. According to a previous study, they showed that awkward posture, including twisting back, forward bending, and lifting heavy objects, could increase the risk of NLBP among cleaners (16, 44). It is important that cleaners should be educated regarding how to correct or avoid awkward posture, and how to lift objects safely. The standard lifting techniques of stoop, squat, and semi-squat were described in previous literature (61). Healthcare providers frequently recommend workers about the squat technique for lifting objects (62).

There were different kinematic patterns for stoop, squat, and semi-squat techniques. The most obvious difference is that stoop lifting has the greatest trunk flexion, squat lifting has the greater tibiofemoral flexion, and semi-squat lifting is a blend of stoop and squat lifting (63). The spinal compression load during stoop lifting is associated with intervertebral disc injury. The highest percentage of herniation occurred in asymptomatic participants (64). Although stoop lifting might increase the risk of LBP, a few studies showed that there was no significant difference in spinal compressive loading (61, 64, 65). It depended on weighted objects and adaptive responses in biological tissue that could increase or decrease injury (66). There was conflicting evidence regarding lifting technique. However, healthcare providers need to educate patients on the proper lifting techniques, such as lifting with a suitable load and exercise to improve strength. According to the result of the present study, it is possible that cleaners performed squatting and kneeling instead of forward bending to avoid working with repetitive/prolonged improper spinal posture. By doing various movements during cleaning tasks, the risk of low back injuries could be reduced.

The study showed that cleaners who satisfied with their job would increase the risk of LBP with 93.7% compared to those who dissatisfied. The association between job dissatisfaction

and NLBP that occurred in this study was different from the results of previous studies (6, 67). Chang et al. (6) did not find a relationship between job dissatisfaction and low back discomfort among their studied cleaners, while Alie et. al showed that there was a significant association between job dissatisfaction and the prevalence of MSD in street cleaners. However, the results from this study showed a lower value (AOR: 0.64; 95% CI: 0.018–0.228) than the study conducted by Alie et al. (AOR: 2.66; 95% CI: 1.05–6.75). The cleaners working at different locations might be the possible reason for different values. The present study included cleaners working in the university area, but Alie et al recruited street cleaners whose job characteristics might involve cleaning tasks that required a greater physical workload than those working in academic settings. Work-related stress and a lack of influence over work conditions may result in job dissatisfaction, contributing to the occurrence of NLBP among cleaners (4, 6). It was interesting to find that cleaners in the present study who had job dissatisfaction were less likely to suffer from NLBP in comparison with those who did not have job dissatisfaction. This might be explained by the fact that the cleaners who were satisfied with their work and payments received, or other favorable factors, might work too hard, leading to the occurrence of LBP, whereas those with job dissatisfaction might not have the intention to do cleaning work and possibly search for a new job.

Cleaners frequently work with awkward postures that can increase the risk of MSDs, especially LBP (14, 44). When comparing cleaners who usually worked by bending forward and those who less often worked in a similar posture, the study indicated that the cleaners in the latter group had a lower possibility of back injuries. In other words, cleaners who often performed forward bending increasing risk of LBP with 67% compared to those who less performed forward bending. These results are consistent with the study conducted in hospital cleaners in Thailand (AOR: 2.81; 95% CI: 1.43-5.50) and university cleaners in Ethiopia (AOR: 15.7; 95% CI: 6.47-38.176) (8, 59). Wang et al. used the Ovako Working Posture Analysis System (OWAS) method to identify awkward posture of the cleaner during cleaning tasks (47). They found that bending

forward was the major cause of poor posture. During cleaning tasks such as sweeping/mopping floor or bathroom cleaning, cleaners usually perform repetitive/prolonged trunk bending. Previously, evidence was studied on association between the risk of LBP and mechanical loading on spinal tissue. Excessive loading from usually prolonged and/or forward bending might produce micro trauma to spinal tissue and increase the risk of LBP over a period of time (45, 46). While there was evidence investigating electromyography (EMG) among patients with and without LBP during trunk bending tasks at peak flexion, they found that back extensor muscle quickly decreased activity during fully trunk flexion in a termed of flexion relaxation phenomenal (47, 48) This phenomenal transferred load from lumbar active tissues to lumbar passive tissues and increased risk of LBP (49, 50). Therefore, this study supported the idea that a reduction in prolonged or repetitive forward bending at work was important in preventing or reducing low back injuries in cleaners. Moreover, the occurrence of NLBP in cleaners may depend on the repetitive use of various cleaning tasks, including twisting back and lifting objects, as well as the type of environment and equipment used. Workload differences might also increase the risk of lower back injuries (16, 44).

Chronic LBP symptoms can affect quality of life (QOL) through pain, functional disability, and psychological distress (68). Darzi et al. showed lower WHOQOL scores in LBP patients, especially physical health domain and environmental health domain (62). The result was similar to the present study. The result of binomial regression analysis showed preventive effects (AOR: 0.787; 95% CI: 0.697-0.885) on higher scores in the WHOQOL physical domain. In other words, the cleaners with lower score of WHOQOL physical domain increase risk of LBP 32% compared to those with higher. An increase in QOL, especially in the physical health domain, such as increased body well-being, improved physical functions, decreased physical pain, and enhanced access to health care services, would reduce the occurrence of LBP in cleaners. Moreover, a few studies showed a correlation between WHOQOL and the others questionnaire as a predictor of future outcomes or events among LBP patients. Alfalogy et al. (69) showed the

result of the regression analysis between the Oswestry Disability Index (ODI), WHOQOL, and Visual Analog Scale (VAS) score. The lower scores of WHOQOL and the higher scores of VAS predicted the severity of disability, while Horng et al. studied health-related QOL (HR-QOL) as a predictor of patients with LBP (64). The result showed that there was a significant predictor for HR-QOL, including the WHOQOL physical health domain, psychological health domain, pain intensity, and family income.

There are some limitations to this study. This study only investigated the association between the NLBP and some physical and psychological factors among female cleaners working in different sectors at Chulalongkorn University. The results can be generalized to the cleaners of a single public university. To ensure the generalizability of all cleaners, cleaners from other private companies and small enterprises should be recruited. Additionally, we did not assess the level of physical activity, which might be a confounder of the occurrence of NLBP. As this study collected data through self-reported questionnaires, some items in questionnaire needed to be revised to be more appropriate and understandable for answering. Objective examinations are required to provide better prediction factors in future studies. The variable of feeling exhausted had a various aspect of exhaustion such as physical, mental, and emotional exhaustion, further study should be investigated in various domain of exhaustion. Moreover, we recommend finding out the association between NLBP and other physical, psychological, and work-related factors such as age, BMI, task duration, cleaning distance per day, leisure time, stress level, and male population cleaners for future studies.

There are two clinical implications obtained from the study. Firstly, the study may help clinicians to design more appropriate preventive and treatment approach for cleaners with LBP. Secondly, it may assist the employers for the proper management of the work organization to reduce the presence of work-related LBP and then increase quality of life in their cleaners.

CHAPTER 6

CONCLUSION

This study found that there is a high prevalence of NLBP among other MSDs among female cleaners working at Chulalongkorn University. The significant associations between NLBP and some physical and psychological factors involving postures at work, quality of life, and job satisfaction were investigated. Decreasing the activities of forward bending, living physically active to get good QOL, and proposing a better strategy for performing their tasks to get job satisfaction have been identified as protective risk factors, while less squatting and kneeling during work as well as mental exhaustion have been identified as risk factors for NLBP in female cleaners. Hence, female cleaners are recommended to undergo ergonomic training and exercise prescriptions for the prevention of NLBP.

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APPENDIX

Appendix A

Certificate of approval of research ethics

The Research Ethics Review Committee for Reseach Involving Human Research Participants, Group I, Chulalongkorn University

Chamchuri 1 Building, 2nd Floor, 254 Phayathai Road, Pathumwan, Bangkok 10330 Thailand

Telephone: 02-218-3202, 02-218-3049 Email: eccu@chula.ac.th

COA No. 113/65

Certificate of Approval

Study Title No. 650051 : PHYSICAL AND PSYCHOLOGICAL FACTORS ASSOCIATED WITH NON-SPECIFIC LOW BACK PAIN AMONG FEMALE CLEANERS IN ACADEMIC SETTINGS

Principal Investigator : Mr. Kristsada Chaichan

Place of Proposed Study/institution : Faculty of Allied Health Sciences, Chulalongkorn University

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

Signature Prida Tasanapradit

(Associate Prof. Prida Tasanapradit)

Chairman

Signature Raveenan Mingpakanee

(Assistant Prof. Dr. Raveenan Mingpakanee)

Secretary

Date of Approval : 26 May 2022

Approval Expire date : 25 May 2023

The approval documents including:

1. Participant Information Sheet and Consent Form
2. Research proposal
3. Researcher
4. Research instruments/tools
5. Recruitment flyer

Conditions

The approved investigator must comply with the following conditions:

1. It's unethical to collect data of research participants before the project has been approved by the committee.

2. The research/project activities must end on the approval expired date. To renew the approval, it can be applied one month prior to the expired date with submission of progress report.

3. Strictly conduct the research/project activities as written in the proposal.

4. Using only the documents that bearing the RECCU's seal of approval: research tools, information sheet, consent form, invitation letter for research participation (if applicable).

5. Report to the RECCU for any serious adverse events within 5 working days.

6. Report to the RECCU for any amendment of the research project prior to conduct the research activities.

7. Report to the RECCU for termination of the research project within 2 weeks with reasons.

8. Final report (AF 01-15) and abstract is required for a one year (or less) research/project and report within 30 days after the completion of the research/project.

9. Research project with several phases; approval will be approved phase by phase, progress report and relevant documents for the next phase must be submitted for review.

10. The committee reserves the right to site visit to follow up how the research project being conducted.

11. For external research proposal the dean or head of department oversees how the research being conducted.

The Research Ethics Review Committee for Research Involving Human Research Participants

Study Title No. 650051
Date of Approval 26 May 2022
Approval Expire date 25 May 2023

Appendix B

Consent form

วันที่ ..... เดือน ..... พ.ศ.

.....

เลขที่ประชากรตัวอย่างหรือผู้มีส่วนร่วมในการวิจัย

.....

ข้าพเจ้า ซึ่งได้ลงนามท้ายหนังสือนี้ ขอแสดงความยินยอมเข้าร่วมโครงการวิจัย ปัจจัยทางกายและจิตใจที่สัมพันธ์กับอาการปวดหลังแบบไม่เฉพาะเจาะจงในพนักงานทำความสะอาดในจุฬาลงกรณ์มหาวิทยาลัย

ข้าพเจ้าได้รับทราบจากผู้วิจัย ชื่อนายกฤษฎา ไชยชาญ ที่อยู่ ภาควิชากายภาพบำบัด คณะสหเวชศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย เลขที่ 154 ถนนพระราม 1 แขวงวังใหม่ เขตปทุมวัน กรุงเทพฯ 10330 ซึ่งได้ลงนามด้านท้ายของหนังสือนี้ ถึงวัตถุประสงค์ ลักษณะ และขั้นตอนการศึกษา รวมทั้งทราบถึงผลดี ผลข้างเคียง และความเสี่ยงที่อาจเกิดขึ้น ข้าพเจ้าได้ซักถามเกี่ยวกับการศึกษาดังกล่าวนี้เป็นที่เรียบร้อยแล้ว

ข้าพเจ้าเข้าร่วมการศึกษาวิจัยครั้งนี้โดยสมัครใจ โดยการตอบแบบสอบถามจำนวน 1 ครั้ง รวมเวลาตอบแบบสอบถามประมาณ 20 นาทีเพื่อเป็นประโยชน์ต่อการศึกษาและมีสิทธิที่จะปฏิเสธจากการเข้าร่วมการวิจัยได้ตามต้องการ โดยไม่จำเป็นต้องแจ้งเหตุผล ซึ่งจะไม่มีผลใดๆต่อข้าพเจ้า

ข้าพเจ้าได้รับการรับรองจากผู้วิจัยว่าข้อมูลของข้าพเจ้าจะถูกเก็บรักษาเป็นความลับ และข้อมูลจะถูกเก็บไว้ในที่ที่ปลอดภัย โดยจะนำเสนอข้อมูลการวิจัยจะกระทำเพื่อประโยชน์ทางวิชาการเท่านั้น ไม่มีข้อมูลใดในรายงานที่จะนำไปสู่การระบุตัวตนของข้าพเจ้า

ข้าพเจ้ายินดีเข้าร่วมการศึกษาวิจัยครั้งนี้ ภายใต้เงื่อนไขที่ระบุไว้แล้วข้างต้น

…… …….

สถานที่ / วันที่ (……...…….)

ผู้มีส่วนร่วมในการวิจัย

…… ……

สถานที่ / วันที่ (นายกฤษฎา ไชยชาญ)

ผู้วิจัยหลัก

…… ……

สถานที่ / วันที่ (……...……)

พยาน

Appendix C

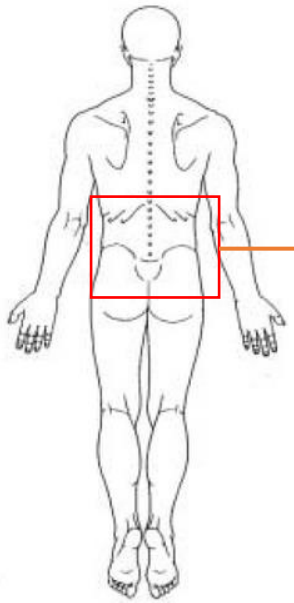
Screening questionnaire

Participant No.

แบบสอบถามคัดกรองผู้เข้าร่วมวิจัย

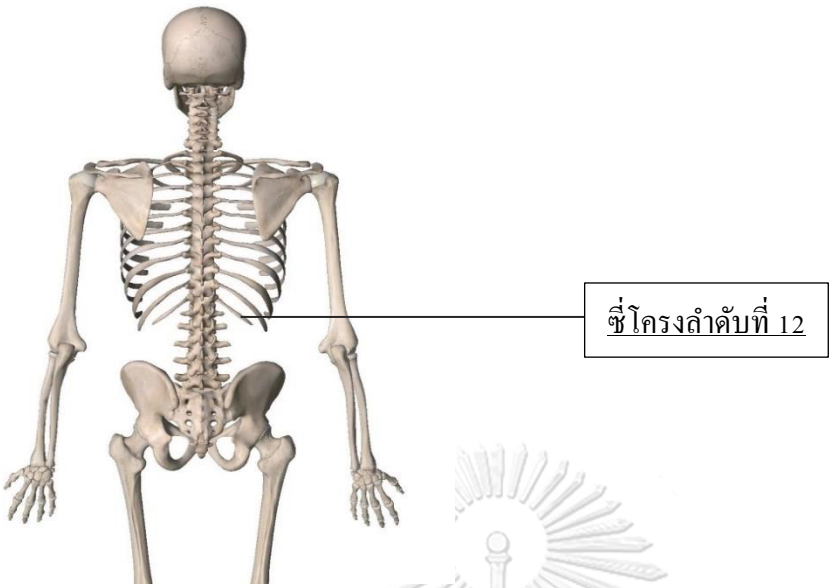
<u>คำชี้แจง</u> โปรดตอบคำถามโดยเติมข้อความลงในช่องว่าง หรือเลือกข้อมูลที่ตรงกับตัวท่านมากที่สุด

1. อายุ ..... ปี
2. ทำงานมาแล้วเป็นเวลา ❒ 6 เดือนหรือมากกว่า 6 เดือน ❒ น้อยกว่า 6 เดือน
3. จำนวนชั่วโมงการทำงานต่อวัน
   ❒ 6 ชั่วโมงต่อวันหรือมากกว่า ❒ น้อยกว่า 6 ชั่วโมงต่อวัน
4. ท่านสามารถ<u>พูด</u> อ่านและเขียนภาษาไทยได้อย่างถูกต้อง
   ❒ ใช่ ❒ ไม่ใช่
5. ในช่วง 3 เดือนที่ผ่านมาท่านมีอาการปวดหลังส่วนล่างบ้างหรือไม่
   ❒ ไม่มี <u>สิ้นสุดคำถาม</u>
   ❒ มี <u>โปรดตอบข้อต่อไป</u>



<u>คำอธิบาย</u>

อาการปวดหลังส่วนล่าง หมายถึง อาการปวดกล้ามเนื้อ ข้อต่อ หรือกระดูกที่อยู่ในบริเวณกระดูกซี่โครงลำดับที่ 12 ไปจนถึงขอบล่างของกระดูกกระเบนเหน็บ อาการปวดอาจจะกระจายไปบริเวณเชิงกราน โดยจะมีอาการที่ข้างขวา หรือข้างซ้ายของลำตัวด้านใดเพียงด้านเดียว หรือมีอาการทั้งสองด้านก็ได้ ดังรูป



6. ท่านปวดหลัง เคยพบแพทย์หรือไม่

☐ ไม่เคยพบ สิ้นสุดคำถาม

☐ พบ โปรดตอบข้อต่อไป

7. เมื่อพบแพทย์ แพทย์บอกสาเหตุได้หรือไม่

☐ บอกได้

☐ บอกไม่ได้

Appendix D

Self-reported questionnaire for collecting information on individual and work-related variables.

Participant No.

แบบสอบถามข้อมูลส่วนตัวและการทำงาน

<u>คำชี้แจง</u> โปรดตอบคำถามโดยเติมข้อความลงในช่องว่าง หรือเลือกข้อมูลที่ตรงกับตัวท่านมากที่สุดด้วยการใส่เครื่องหมาย √ ใน ( ) หน้าข้อความที่ท่านเลือก

1. น้ำหนัก ..... กิโลกรัม ส่วนสูง ..... เซนติเมตร
2. สถานะการจ้างงานในสถานที่ทำงานปัจจุบัน
   ( ) ลูกจ้างประจำ ( ) ลูกจ้างชั่วคราว ( ) ลูกจ้างบริษัทรับทำความสะอาดจากภายนอก
3. ท่านทำงานเป็นพนักงานทำความสะอาดอย่างต่อเนื่องกันมานานประมาณ.....ปี .....เดือน
4. ปัจจุบันท่านทำงานเป็นพนักงานทำความสะอาดสัปดาห์ละ.....วัน และทำงานวันละ .....ชั่วโมง
5. ในแต่ละวัน ท่านยืนและเดินทำงานรวมกันทั้งวันเป็นเวลาประมาณ ..... ชั่วโมง
6. ในแต่ละวัน หากมีช่วงเวลาที่ท่านต้องยืนและเดินทำงานติดต่อกันโดยไม่ได้นั่งพักเลย ช่วงเวลานั้นนานประมาณเท่าไร (โปรดตอบเป็นจำนวนนาทีหรือชั่วโมง).....
7. นอกจากการยืนและเดินที่ต้องทำแล้ว ในขณะทำงาน ท่านต้องกิจกรรมต่อไปนี้บ่อยแค่ไหน
   - ทำงานที่ต้องโน้มตัวไปข้างหน้านานๆ
     ( ) ทำบ่อยทุก 1-2 ชั่วโมง ( ) ทำบ้างแต่ไม่บ่อย ( ) ทำน้อยมาก
   - ทำงานที่ต้องผลักหรือดึงที่มีน้ำหนักมาก <u>(มากกว่า 10 กิโลกรัมขึ้นไป)</u>
     ( ) ทำบ่อยทุก 1-2 ชั่วโมง ( ) ทำบ้างแต่ไม่บ่อย ( ) ทำน้อยมาก

- ทำงานที่มีการบิดลำตัวในที่แคบๆ บ่อยๆ เช่น ห้องเก็บอุปกรณ์ทำความสะอาด

  ( ) ทำบ่อยทุก 1-2 ชั่วโมง ( ) ทำบ้างแต่ไม่บ่อย ( ) ทำน้อยมาก

- ทำงานที่มีการแอ่นหลัง เช่น ยกของขึ้นไปไว้ที่สูง/เช็ดกระจกที่อยู่สูง

  ( ) ทำบ่อยทุก 1-2 ชั่วโมง ( ) ทำบ้างแต่ไม่บ่อย ( ) ทำน้อยมาก

- ทำงานที่มีการนั่งยองหรือคุกเข่า

  ( ) ทำบ่อยทุก 1-2 ชั่วโมง ( ) ทำบ้างแต่ไม่บ่อย ( ) ทำน้อยมาก

- ยกของหนักปานกลางถึงหนักมากขึ้นจากพื้น

  ( ) ทำบ่อยทุก 1-2 ชั่วโมง ( ) ทำบ้างแต่ไม่บ่อย ( ) ทำน้อยมาก

- ทำงานในท่าทางเดิมซ้ำๆ ติดต่อกัน

  ( ) ทำบ่อยทุก 1-2 ชั่วโมง ( ) ทำบ้างแต่ไม่บ่อย ( ) ทำน้อยมาก

- ทำงานที่มีการใช้เครื่องมือทำความสะอาดที่มีน้ำหนักมาก

  ( ) ทำบ่อยทุก 1-2 ชั่วโมง ( ) ทำบ้างแต่ไม่บ่อย ( ) ทำน้อยมาก

- ขึ้น-ลงบันไดบ่อยๆ

  ( ) ทำบ่อยทุก 1-2 ชั่วโมง ( ) ทำบ้างแต่ไม่บ่อย ( ) ทำน้อยมาก

- อื่นๆ (โปรดระบุ)

  .....

  ( ) ทำบ่อยทุก 1-2 ชั่วโมง ( ) ทำบ้างแต่ไม่บ่อย ( ) ทำน้อยมาก

8. ในระหว่างช่วงเวลาการทำงาน 1 วัน ท่านใช้เวลาเท่าใดในการทำกิจกรรมต่อไปนี้ (โปรดตอบเป็นจำนวนนาทีหรือชั่วโมง)

   กวาดพื้น/ถูพื้น .....

   ล้างห้องน้ำ .....

   เช็ดกระจก .....

ทำความสะอาดเครื่องมือเครื่องใช้ต่างๆในอาคาร .....

อื่นๆ (โปรดระบุงานและเวลาที่ใช้).....

9. ในช่วงเวลาว่างจากการทำงาน ท่านมีการเดินในกิจกรรมอื่นๆ นอกเหนือจากการทำงาน (เช่น เดินเท้ามาทำงาน, เดินเท้าเพื่อขึ้นรถสาธารณะ เป็นต้น) อีกเป็นเวลาประมาณ (โปรดระบุเป็นจำนวนนาทีหรือชั่วโมง) .....
10. ในช่วงเวลาว่างจากการทำงาน ท่านมีกิจกรรมที่ต้องนั่ง (เช่น นั่งดูโทรทัศน์ นั่งอ่านหนังสือ เป็นต้น) ติดต่อกันเป็นเวลาประมาณ (โปรดระบุเป็นจำนวนนาทีหรือชั่วโมง .....)
11. ในระหว่างทำความสะอาดหรืองานอื่นที่เกี่ยวข้องกับหน้าที่พนักงานทำความสะอาด ท่านสามารถนั่งพักร่างกายจากการทำงานได้บ่อยเพียงไร
    - ( ) ไม่ได้เลย
    - ( ) นั่งพักได้บ่อยตามที่ต้องการ
    - ( ) นั่งพักได้บ้างแต่ไม่บ่อย โดยนั่งพักได้นานครั้งละประมาณ.....นาที
    - ( ) นั่งพักได้เฉพาะตอนพักรับประทานอาหารเท่านั้น
12. ท่านมีอาการเหนื่อยล้าหลังจากการทำงาน

    ( ) ใช่ ( ) ไม่ใช่
13. ท่านมีความไม่พึงพอใจในงานที่ทำ

    ( ) ใช่ ( ) ไม่ใช่
14. ท่านต้องทำงานรูปแบบเดิมซ้ำๆในทุกๆวัน

    ( ) ใช่ ( ) ไม่ใช่

Appendix E

WHOQOL - BREF – THAI

Participant No.

แบบสอบถามเกี่ยวกับคุณภาพชีวิต

เครื่องชี้วัดคุณภาพชีวิตขององค์การอนามัยโลกชุดย่อ ฉบับภาษาไทย

(WHOQOL-BREF-THAI)

คำชี้แจง ข้อคำถามต่อไปนี้จะถามถึงประสบการณ์อย่างใดอย่างหนึ่งของท่าน ในช่วง 2 สัปดาห์ที่ผ่านมาให้ท่านสำรวจตัวท่านเอง และประเมินเหตุการณ์หรือความรู้สึกของท่าน แล้วทำเครื่องหมาย✓ ในช่องคำตอบที่เหมาะสมและเป็นจริงกับตัวท่านมากที่สุด โดยคำตอบมี 5 ตัวเลือก คือ

ไม่เลย หมายถึง ท่านไม่มีความรู้สึกเช่นนั้นเลย รู้สึกไม่พอใจมาก หรือรู้สึกแย่มาก

เล็กน้อย หมายถึง ท่านมีความรู้สึกเชนนั้นนานๆครั้งรู้สึกเช่นนั้นเล็กน้อยรู้สึกไม่พอใจหรือรู้สึกแย่

ปานกลาง หมายถึง ท่านมีความรู้สึกเช่นนั้นปานกลาง รู้สึกพอใจระดับกลางๆหรือรู้สึกแย่ระดับกลางๆ

มาก หมายถึง ท่านมีความรู้สึกเช่นนั้นบ่อยๆ รู้สึกพอใจหรือรู้สึกดี

มากที่สุด หมายถึง ท่านมีความรู้สึกเช่นนั้นเสมอ รู้สึกเช่นนั้นมากที่สุด หรือรู้สึกว่า สมบูรณ์ รู้สึกพอใจมาก รู้สึกดีมาก

ข้อที่	ในช่วง 2 สัปดาห์ที่ผ่านมา	ไม่เลย	เล็กน้อย	ปานกลาง	มาก	มากที่สุด
1	ท่านพอใจกับสุขภาพของท่านในตอนนี้เพียงใด					
2	การเจ็บปวดตามร่างกาย เช่น ปวดหัว ปวดท้อง ปวดตามตัว ทำให้ท่านไม่สามารถทำในสิ่งที่ต้องการมากน้อยเพียงใด					

3	ท่านมีกำลังเพียงพอที่จะทำสิ่งต่างๆในแต่ละวันไหม (ทั้งเรื่องงาน หรือการดำเนินชีวิต)					
4	ท่านพอใจกับการนอนหลับของท่านมากน้อยเพียงใด					
5	ท่านรู้สึกพึงพอใจในชีวิต (เช่น มีความสุข ความสงบ มีความหวัง) มากน้อยเพียงใด					
6	ท่านมีสมาธิในการทำงานต่างๆดีเพียงใด					
7	ท่านรู้สึกพอใจในตนเองมากน้อยแค่ไหน					
8	ท่านยอมรับรูปร่างหน้าตาของตัวเองใช่ไหม					
9	ท่านมีความรู้สึกไม่ดี เช่น รู้สึกเหงา เศร้า หดหู่ สิ้นหวัง วิตกกังวล บ่อยแค่ไหน					
10	ท่านรู้สึกพอใจมากน้อยแค่ไหนที่สามารถทำอะไรๆผ่านไปได้ในแต่ละวัน					
11	ท่านจำเป็นต้องไปรับการรักษาพยาบาลมากน้อยเพียงใดเพื่อที่จะทำงานหรือมีชีวิตอยู่ไปได้ในแต่ละวัน					
12	ท่านพอใจกับความสามารถในการทำงานได้อย่างที่เคยทำมามากน้อยเพียงใด					
13	ท่านพอใจต่อการผูกมิตรหรือเข้ากับผู้อื่น อย่างที่ผ่านมาแค่ไหน					
14	ท่านพอใจกับการช่วยเหลือที่เคยได้รับจากเพื่อนๆแค่ไหน					
15	ท่านรู้สึกว่าชีวิตมีมั่นคงปลอดภัยดีไหมในแต่ละวัน					
16	ท่านพอใจกับสภาพบ้านเรือนที่อยู่ตอนนี้มากน้อยเพียงใด					
17	ท่านมีเงินพอใช้จ่ายตามความจำเป็นมากน้อยเพียงใด					
18	ท่านพอใจที่จะสามารถไปใช้บริการสาธารณสุขได้ตามความจำเป็นเพียงใด					
19	ท่านได้รู้เรื่องราวข่าวสารที่จำเป็นในชีวิตแต่ละ					

	วันมากน้อยเพียงใด					
20	ท่านมีโอกาสได้พักผ่อนคลายเครียดมากน้อยเพียงใด					
21	สภาพแวดล้อมดีต่อสุขภาพของท่านมากน้อยเพียงใด					
22	ท่านพอใจกับการเดินทางไปไหนมาไหนของท่าน(หมายถึงการคมนาคม)มากเพียงใด					
23	ท่านรู้สึกว่าชีวิตท่านมีความหมายมากน้อยแค่ไหน					
24	ท่านสามารถไปไหนมาไหนด้วยตัวเองได้ดีเพียงใด					
25	ท่านพอใจในการชีวิตทางเพศของท่านแค่ไหน (ชีวิตทางเพศ หมายถึง เมื่อเกิดความรู้สึกทางเพศขึ้นแล้วท่านมีวิธีจัดการทำให้ผ่อนคลายลงได้ รวมถึง การช่วยตัวเองหรือการมีเพศสัมพันธ์)					
26	ท่านคิดว่าท่านมีคุณภาพชีวิต(ชีวิตความเป็นอยู่)อยู่ในระดับใด					

Appendix F

Self-reported questionnaire for collecting information on history of musculoskeletal disorder.

Participant No.

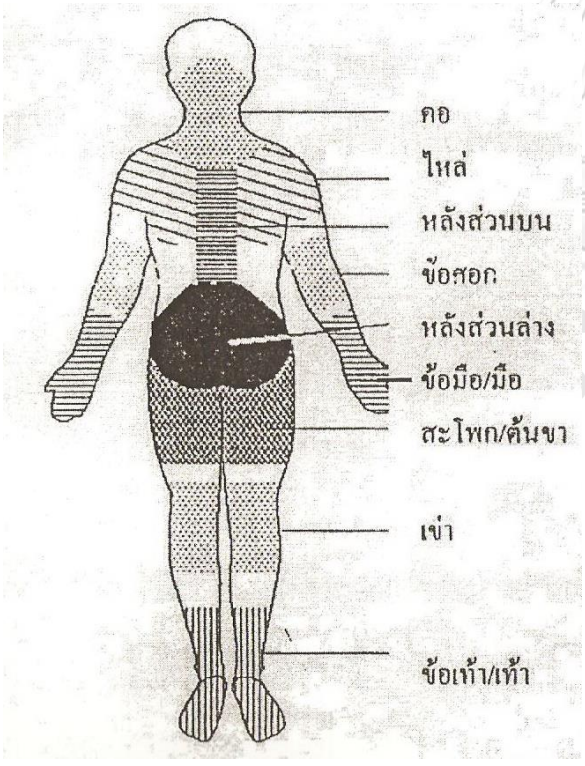
แบบสอบถามเกี่ยวกับอาการทางระบบกระดูกและกล้ามเนื้อในช่วง 3 เดือนที่ผ่านมา

<u>คำชี้แจง</u> กรุณาตอบคำถามทุกข้อให้ตรงกับอาการทางกระดูกและกล้ามเนื้อของท่าน

1. ภายในระยะ 3 เดือนที่ผ่านมา ท่าน**เคยมี**อาการปวดทางระบบกระดูกและกล้ามเนื้อบ้างหรือไม่

( ) 1. ไม่เคย

( ) 2. เคย **หากตอบว่า<u>เคย</u>** โปรดระบุว่าเคยมีอาการปวดที่ส่วนใดบ้าง โดยใช้ภาพข้างล่างนี้ประกอบการเรียกบริเวณที่มีอาการซึ่งแบ่งออกเป็น 9 พื้นที่ (ตอบได้มากกว่า 1 ข้อ)



ขอให้ท่านระบุบริเวณที่มีอาการปวด พร้อมทั้งทำเครื่องหมาย X ลงบนตัวเลข เพื่อแสดงระดับความปวดที่ท่านมี โดยหมายเลข 0 หมายถึง *ไม่มีอาการปวดเลย* และหมายเลข 10 หมายถึง *มีอาการปวดมากที่สุดจนทนไม่ได้* ยิ่งเครื่องหมาย X อยู่ทางขวายิ่งหมายถึงปวดมาก

( ) คอ

ไม่ปวดเลย	0	1	2	3	4	5	6	7	8	9	10	ปวดมากจนทนไม่ได้

( ) ไหล่

ไม่ปวดเลย | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | ปวดมากจนทนไม่ได้

( ) หลังส่วนบน

ไม่ปวดเลย | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | ปวดมากจนทนไม่ได้

( ) ข้อศอก

ไม่ปวดเลย | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | ปวดมากจนทนไม่ได้

( ) หลังส่วนล่าง

ไม่ปวดเลย | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | ปวดมากจนทนไม่ได้

( ) ข้อมือ / มือ

ไม่ปวดเลย | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | ปวดมากจนทนไม่ได้

( ) สะโพก / ต้นขา

ไม่ปวดเลย | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | ปวดมากจนทนไม่ได้

( ) เข่า

ไม่ปวดเลย | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | ปวดมากจนทนไม่ได้

( ) ข้อเท้า / เท้า

ไม่ปวดเลย | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | ปวดมากจนทนไม่ได้

2. วันนี้ ท่าน**กำลังมี**อาการปวดทางระบบกระดูกและกล้ามเนื้อบ้างหรือไม่

( ) 1. ไม่มี **หากตอบว่า ไม่มี** ท่านไม่ต้องทำข้อ 3-9

( ) 2. มี **หากตอบว่า มี** โปรดระบุว่ากำลังมีอาการปวดที่ส่วนใดบ้างและทำเครื่องหมาย X ลงบนตัวเลข เพื่อแสดงระดับความปวดที่ท่านมี (ตอบได้มากกว่า 1 ข้อ)

( ) คอ

ไม่ปวดเลย	0	1	2	3	4	5	6	7	8	9	10	ปวดมากจนทนไม่ได้

( ) ไหล่

ไม่ปวดเลย	0	1	2	3	4	5	6	7	8	9	10	ปวดมากจนทนไม่ได้

( ) หลังส่วนบน

ไม่ปวดเลย	0	1	2	3	4	5	6	7	8	9	10	ปวดมากจนทนไม่ได้

( ) ข้อศอก

ไม่ปวดเลย	0	1	2	3	4	5	6	7	8	9	10	ปวดมากจนทนไม่ได้

( ) หลังส่วนล่าง

ไม่ปวดเลย	0	1	2	3	4	5	6	7	8	9	10	ปวดมากจนทนไม่ได้

( ) ข้อมือ / มือ

ไม่ปวดเลย	0	1	2	3	4	5	6	7	8	9	10	ปวดมากจนทนไม่ได้

( ) สะโพก / ต้นขา

ไม่ปวดเลย	0	1	2	3	4	5	6	7	8	9	10	ปวดมากจนทนไม่ได้

( ) เข่า

ไม่ปวดเลย	0	1	2	3	4	5	6	7	8	9	10	ปวดมากจนทนไม่ได้

( ) ข้อเท้า / เท้า

ไม่ปวดเลย	0	1	2	3	4	5	6	7	8	9	10	ปวดมากจนทนไม่ได้

Appendix G

Pilot study

Table G.1 Result of Intraclass Correlation Coefficient. (n1 = first survey, n2 = second survey)

Participant	Q1		Q2		Q3		Q4		Q5		Q6		Q7		Q8	
	n1	n2	n1	n2	n1	n2	n1	n2	n1	n2	n1	n2	n1	n2	n1	n2
1	38	38	57	57	158	158	16	16	6	6	8	8	8	7	1	2
2	47	47	58	58	150	150	2	2	6	6	8	8	6	6	4	4
3	23	23	37	37	150	150	1	1	6	6	10	10	6	5	1	1
4	48	48	52	52	145	145	1	1	6	6	10	10	5	5	2	2
5	60	60	57	57	150	150	2	2	6	6	8	8	4	4	1	1
6	54	54	61	61	150	150	2	2	6	6	9	9	7	7	4	4
7	45	45	60	60	152	152	2	2	6	6	8	8	4	4	1	1
8	43	43	50	50	150	150	1	1	6	6	10	10	5	5	3	3
9	50	50	70	70	165	165	1	1	6	6	10	10	2	2	1	1
10	51	51	60	60	155	155	1	1	6	6	8	8	9	8	7	7
ICC	1.000		1.000		1.000		1.000		1.000		1.000		0.984		0.993	

Participant	Q9		Q10		Q11		Q12		Q13		Q14		Q15	
	n1	n2	n1	n2	n1	n2	n1	n2	n1	n2	n1	n2	n1	n2
1	60	60	20	30	20	30	20	10	20	20	30	30	115	109
2	60	60	60	60	60	60	0	0	60	60	120	120	116	111
3	60	60	30	30	10	30	30	40	30	30	60	60	106	103
4	60	60	30	30	0	0	20	30	30	30	30	30	126	126
5	60	60	60	60	30	30	60	60	60	60	120	120	116	117
6	120	120	180	180	60	60	30	30	30	30	30	30	96	99
7	30	30	30	30	0	0	0	0	0	0	120	120	112	112
8	120	120	20	0	5	10	20	20	5	5	20	20	83	85

9	20	20	60	60	0	0	60	60	20	20	30	30	79	74
10	60	60	120	120	20	20	30	30	120	120	30	30	80	80
ICC	1.000		0.990		0.957		0.964		1.000		1.000		0.982	

*Q1 = Age (years), Q2= Weight (kg), Q3 = Height (cm), Q4 = Work Experience (years), Q5 = Working days per week (day), Q6 = Working hours per day (hours per day)
, Q7 = Standing and walking hours per day with rest breaks (hours per day)
, Q8 = Standing and walking hours per day without rest breaks (hours per day)
, Q9 = Sweeping/mopping, Q10 = Bathroom cleaning, Q11 = Wiping glass, Q12 = Cleaning tools, Q13 = Walking time apart from work, Q14 = Sitting time apart from work and, Q15 = WHOQOL All

Table G.2 Result of Kappa statistic. (n1 = first survey, n2 = second survey)

Participant	Q1		Q2		Q3		Q4		Q5		Q6		Q7	
	n1	n2	n1	n2	n1	n2	n1	n2	n1	n2	n1	n2	n1	n2
1	1	1	1	1	0	0	1	1	1	1	1	1	0	0
2	0	0	1	1	0	0	1	1	1	1	1	1	0	0
3	0	0	1	1	1	1	1	1	1	1	1	1	0	0
4	0	0	1	1	1	1	1	1	1	1	1	1	0	0
5	1	1	2	1	2	2	1	1	2	2	2	2	1	1
6	0	1	1	1	1	1	1	1	1	1	1	1	0	1
7	2	2	2	2	2	1	1	2	1	1	1	1	1	1
8	1	1	2	2	1	1	1	1	1	1	1	1	1	1
9	0	0	2	2	1	1	1	1	1	1	1	1	0	0
10	0	0	0	0	0	0	1	1	1	1	0	1	0	0
K value	0.853		0.844		0.853		0.643		1.000		1.000		0.737	

Participant	Q8		Q9		Q10		Q11		Q12		Q13	
	n1	n2	n1	n2	n1	n2	n1	n2	n1	n2	n1	n2
1	1	1	0	0	1	1	0	0	0	0	0	0
2	1	1	0	0	1	1	0	0	0	0	0	0
3	1	1	0	0	1	1	0	0	1	1	0	0
4	1	1	1	1	2	2	0	0	1	1	0	0
5	2	2	1	1	2	2	1	1	1	1	0	0
6	1	1	0	0	2	2	0	0	0	0	0	0
7	2	1	1	1	2	2	0	0	0	0	0	0
8	1	1	1	1	2	2	0	0	0	0	0	0
9	1	1	1	1	2	2	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0
K value	0.773		1.000		1.000		1.000		1.000		1.000	

*Q1 = Frequency of forward bending during work, Q2 = Frequency of pushing or pulling heavy object during work ,Q3 = Frequency of twisting body in a narrow space during work, Q4 = Frequency of backward bending during work, Q5 = Frequency of squat sitting or kneeling during work,Q6 = Frequency of lifting moderate to heavy objects from floor during work, Q7 = Frequency of static posture during work, Q8 = Frequency of using heavy tools during work, Q9 = Frequency of walking up/downstairs during work, Q10 = Frequency of rest breaks during work, ,Q11 = Feeling exhausted, Q12 = Job dissatisfaction, and Q13 = Repetitive work

VITA

NAME

DATE OF BIRTH 6 October 1996

PLACE OF BIRTH Chachoengsao

HOME ADDRESS