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Physical and Psychological Factors Associated with Non-specific Low Back Pain among Female Cleaners in Academic Settings

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ABSTRACT

Introduction: Low back pain (LBP) is the most common musculoskeletal disorder (MSD). Cleaning professions are strenuous and physically demanding jobs that often require cleaners to perform awkward movements during cleaning tasks. Although several studies have reported a high prevalence of LBP in cleaners, few studies have identified the physical and psychological factors associated with non-specific LBP (NSLBP) in this population. The study aimed to determine the associations between physical and psychological variables and the presence of NSLBP in female cleaners working in an academic setting.

Methods: One hundred and ninety-nine female cleaners aged 18 to 60 years old with and without LBP were asked to complete a set of self-reported questionnaires to determine individual and work-related variables and quality of life and a Nordic body map to identify NSLBP. Binomial logistic regression analyses were used to determine associations between physical and psychological factors and the presence or absence of NSLBP.

Results: The overall prevalence of MSDs among cleaners was 66.92% in the last 3 months and 43.23% time at present. NSLBP accounted for the majority of MSDs, with a prevalence of 30.24% in the last 3 months and 18.08% time at present. There was a significant association between NSLBP and the WHOQOL physical health domain (AOR= 0.78; 95% CI= 0.69–0.88), the frequency of bending forward during work (AOR= 0.33; 95% CI= 0.13–0.81), the frequency of squatting or kneeling during work (AOR=3.29; 95% CI= 1.06–10.19), feeling exhausted after work (AOR= 4.51; 95% CI= 1.03–19.69), and job dissatisfaction (AOR=0.64; 95%CI= 0.01–0.22).

Conclusion: NSLBP was the most commonly reported work-related MSD among cleaners in an academic setting. Physical factors, including good or bad working postures, and psychological factors, including mental exhaustion, were significantly associated with the existence of NSLBP in cleaners.

Keywords: Prevalence, Back pain, Cleaners, Physical factors, Psychological factors, Musculoskeletal disorders

Introduction

Musculoskeletal disorders (MSDs) are defined as health conditions that are related to injury or dysfunction of the locomotor system and include compressed nerves, herniated discs, meniscus tears, sprains, strains, pain, swelling, numbness, degenerative joint disease, and connective tissue disorders [1, 2]. Approximately 1.71 billion individuals of all ages worldwide are affected by an MSD, causing MSDs to carry a high burden in terms of economic costs, healthcare needs, and social challenges due to their associated functional disability [3]. MSDs can be caused by the mechanical workload applied when performing daily tasks (e.g., sports, and housework) [1]. According to the World Health Organization (WHO), work and the circumstance of its

performance are causes of MSDs [1], an assertion supported by several studies that have indicated a relationship between physical exertion at work and work-related MSDs (WMSDs).

WMSDs have been defined as MSDs that are caused and aggravated by an individual's workload and work environment [1, 2]. MSDs among workers are impacted by several factors, including work-related, physical, and psychosocial factors. Work-related factors include physical exertion during work and work organization, which may involve repetitive movements, prolonged working postures with static and dynamic muscular activities, and awkward movements [4].

Low back pain (LBP) is the most common MSD. A diagnosis of LBP of unidentified pathoanatomical cause with no sign of serious medical conditions is termed non-specific LBP (NSLBP) [5-7]. NSLBP is the most common form of LBP, with only approximately 10% of patients having a specific LBP diagnosis [8]. In 2012, an epidemiological review of 165 studies from 54 countries reported a mean point prevalence of LBP of 18.30% and a 1-month prevalence of 30.80% [9]. Several risk factors have been associated with NSLBP and can be categorized into two primary categories: individual factors and activity-related (work and leisure) factors [10]. Individual factors involve demographic, anthropometric, physical, and psychosocial characteristics [11-13] while activity-related factors include occupational and workplace attributes such as inadequate leisure time [14], performance of heavy work tasks requiring lifting, bending, and twisting [15], and job dissatisfaction [16].

According to a review of the literature, the tasks required for cleaning are strenuous, physically demanding, and often performed in awkward positions. A few studies have investigated the prevalence and factors associated with MSDs among workers employed in cleaning professions in academic settings. Melese et al evaluated the prevalence and factors associated with MSDs among 270 cleaners at Mekelle University, Ethiopia, and reported a prevalence of MSDs during the last month of 52.30%. Of nine possible body regions, the low back was the most common painful region reported by the cleaners (34.80%), followed by the wrist and upper back (17.00%), elbow and shoulder (14.00%), knee (12.50%), neck and ankle/foot (9.50%), and hip/thigh (3.80%). MSDs were found to be significantly associated with time pressure, work experience ≥ 6 months, feeling exhausted, working ≥ 8 hours per day, work tasks requiring awkward postures, and spending > 2 hours in a sustained position [17]. Jaidee et al similarly studied the prevalence and factors associated with MSDs among 220 cleaners at Thammasat University, Thailand. Their results showed a prevalence of MSDs during the last month of 88.64%, with participants reporting 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 pain (17.73%), knee pain (36.36%), and ankle/foot pain (14.09%). MSDs were shown to be significantly associated with work experience, grip strength, and stress. Although several studies have identified a high prevalence of LBP and have clarified factors associated with MSDs in cleaners, the evidence thus far has focused solely on activity-related factors affecting WMSDs [18], and there is a lack of knowledge regarding the physical and psychological factors affecting LBP among cleaners. This study therefore aimed to investigate the physical and psychological factors associated with NSLBP in cleaners.

Methodology

Study Design

This study employed a cross-sectional survey research design. The study population included 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).

Participants

All female cleaners working in the housekeeping units of 20 faculties and 23 colleges and research institutes at Chulalongkorn University were invited to participate in the study by the primary researcher. A convenience sampling method was used for subject selection. The criteria for inclusion in the study were female cleaners aged 18–60 years [3] who had worked in the same department for at least 6 months with a work schedule of at least 6 hours/day [17] and could listen, speak, read, and write in the Thai language without difficulty. Potential participants were excluded from the study if any of the following criteria were present: 1) history of specific LBP, 2) history of sciatica with lower limb numbness and weakness, and 3) history of kidney disease, tumor, or cancer [10].

The sample size was calculated based on the previous study by Jaidee et al, who investigated the prevalence and factors associated with MSDs among cleaners at Thammasat University [18]. Using their result of a 24.09% LBP prevalence, a 95% CI, and a precision of 0.05, the calculated sample size was 180. After a 10% participant dropout rate was added, the sample size of this study was set at a total of 198 cleaners.

Instruments

A screening questionnaire was used to determine eligibility to participate in the study. The questionnaire gathered data on gender, age, work schedule, ability to communicate in the Thai language, memory function, and history of specific LBP over the last 3 months.

A set of self-reported questionnaires was completed by all participating cleaners and consisted of three parts. The first part collected general information (e.g., height, body weight, education level), work-related factors (e.g., work experience, work duration, types of tasks or physical activities performed during work, frequency of performing each work posture), other activities of daily living, frequency of rest breaks at work, feelings of exhaustion and job dissatisfaction, and performance of repetitive work activities [19]. The second part collected information on quality of life using the Thai version of the WHOQOL-BREF. The WHOQOL-BREF has a total of 26 questions, which are divided into four domains—physical health (seven items), psychological (six items), social relationship (three items), and environment (eight items)—plus two independent items related to overall quality of life and health status [20]. Each item is scored on a scale of 1 to 5, with higher scores indicating better quality of life. Total scores range from 26 to 130. Total score ranges within each domain are 7–35 for the physical health domain, 6–30 for the psychological domain, 3–15 for the social relationship domain, and 8–40 for the environment domain. The third part of the questionnaire gathered information on the history of MSDs over the last 3 months, the location of the painful area on the Nordic body map, and pain intensity based on the Numeric Rating Scale (NRS) [21]. Participants rated their pain on a defined scale of NRS. Scores range from 0-10, with higher scores indicating higher pain intensity [22]. The questionnaire additionally gathered information regarding the duration and onset of the current LBP episode, any treatment being currently received, and time lost from work due to LBP. All instruments were pretested on a pilot group of 10 female cleaners prior to the initiation of the data collection phase to ensure the suitability of the questionnaires. When evaluating inter-rater agreement, an intraclass correlation coefficient of 0.96–1.00 indicated excellent reliability for continuous data [23], while a Kappa statistic (K-value) of 0.64–1.00 indicated good to excellent reliability for ordinal and categorical data [24].

Research Procedure

To recruit study participants, the primary researcher visited each workplace and asked the chief of the housekeeper unit for permission to collect data from the unit's cleaners. After obtaining permission, the researcher approached individual cleaners and explained the study's objectives and methods. Cleaners who agreed to participate in the study signed the consent form and completed the screening questionnaire. Any cleaners who met the eligibility criteria were subsequently asked to complete the set of self-reported questionnaires. The data collection process for each participant took approximately 30 minutes.

Statistical Analysis

After completing the self-reported questionnaires, the participants were divided into two sample groups, the LBP group, and the non-LBP group, for statistical analysis. Participants' self-reported pain intensity per the NRS was used to delineate the two groups. Participants who reported a current pain intensity equal to or greater than 3/10 on the NRS were placed in the LBP group, and participants with a current pain intensity equal to or less than 2/10 on the NRS were placed in the non-LBP group [10].

After all data were edited, SPSS software version 22.0 was used for quantitative data analysis. Descriptive statistics were used to describe participants' demographic characteristics, which were expressed as means and standard deviation (SD) for numerical data and percentages for categorical data. Binomial logistic regression analyses were performed to determine the association between physical and psychological factors and the presence or absence of NSLBP. The researcher adjusted some independent factors from continuous data to categorical data before calculating the univariate associations between factors. The factors with bivariate associations ($p < 0.05$) were entered into the binomial logistic regression, and the Wald backward stepwise method was employed to select variables for the model. The stepwise method employed an entry threshold of 0.05 and a removal threshold of 0.10 to explore associations between multiple variables. Crude odds ratios with 95% CI were reported. The level of significance was set at $\alpha = 0.05$ for all statistical analyses.

Results

A total of 43 academic settings comprising 20 faculties and 23 colleges and research institutes at Chulalongkorn University employ cleaners. Fourteen of the 43 workplaces participated in the study, and a total of 210 cleaners currently working in the 14 workplaces completed the screening questionnaire. Eleven potential participants were excluded from the study due to not being between 18 and 60 years of age (n = 5) and having a specific LBP diagnosis (n = 6), giving a response rate of 94%. Thus, 199 female cleaners with and without LBP were included in this study (Table 1).

The participants were divided into LBP and non-LBP groups. The LBP group included 52 (26.12%) participants with LBP and 4 (2.02%) participants with LBP and other MSDs, while the non-LBP group included 106 (53.27%) healthy participants and 37 (18.59%) participants with MSDs other than LBP. The participants with LBP reported moderate pain intensity, with a mean NRS score of 5.12 (SD: 2.09; range: 3–10), while those without LBP reported a mean NRS score of 0.51 (SD: 0.71; range: 0–2). The mean age, height, and weight of the participants were 49 years, 155.20 centimeters, and 60.60 kilograms, respectively. The participants had a workload of 5.60 days per week and 8.60 hours per day and reported spending an average of 5.40 hours per workday standing and sitting with rest breaks and 2.90 hours without rest breaks (Table 2).

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)			
Pain intensity (Numerical Pain Scale)	2.9	1.74	0.17-10
LBP (n=56)	5.12	2.09	3-10
Without LBP (n=143)	0.51	0.71	0-2

Table 1 Characteristics of study population (n=199)

The overall prevalence of MSDs was divided by body region to include the neck, shoulders, elbows, wrists/hands, upper back, lower back, hips, knees, and ankles/feet. The prevalence of MSDs among the female cleaners in the last 3 months was 30.24% in the lower back, 14.57% in the knees, 5.02% in the shoulders, 4.52% in the hips, 4.02% in the neck, 3.52% in the ankles/feet, 2.01% in the elbows, 2.01% in the wrists/hands, and 1.01% in the upper back. The prevalence of MSDs among the female cleaners at the present time was 18.08% in the lower back, 11.06% in the knees, 4.02% in the shoulders, 3.52% in the hips, 2.01% in the upper back, 1.51% in the elbows, 1.01% in the neck, 1.01% in the ankles/feet, and 1.01% in the wrists/hands (Table 2).

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

Body region	**MSDs previous last 3 months**	**MSD at the present time**
	n (%)	n (%)
Neck	8 (4.02)	2 (1.01)
Shoulders	10 (5.02)	8 (4.02)
Elbows	4 (2.01)	3 (1.51)
Wrist/hands	4 (2.01)	2 (1.01)
Upper back	2 (1.01)	4 (2.01)
Low back	62 (30.24)	36 (18.08)
Hips	9 (4.52)	7 (3.52)
Knees	29 (14.57)	22 (11.06)
Ankle/feet	7 (3.52)	2 (1.01)

**Include NSLBP and LBP with radicular symptoms*

Univariable analysis was used to evaluate the effect of each biopsychosocial factor on LBP. Significance results were found for the following biopsychosocial factors: 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 domain, WHOQOL total score, WHOQOL general health, WHOQOL quality of life, frequency of forward bending during work, frequency of backward bending during work, frequency of squatting or kneeling during work, frequency of lifting moderate to heavy objects from the floor during work, frequency of maintaining static postures during work, frequency of using heavy tools during work, feeling exhausted, and job dissatisfaction. Factors that were significant in univariate analysis were added to a binomial logistic regression model (Wald backward stepwise method) to eliminate confounding variables (Table 3).

Table 3 Univariate analysis of participants with and without LBP according to biopsychosocial factors (n=199)

Factors	OR	95% CI	p-value
Work experience	0.98	0.92-1.05	0.636
Working days per week	1.20	0.73-1.98	0.463
Working hours per day	1.28	0.99-1.65	0.057
Standing and walking hours per day with rest breaks	1.25	1.08-1.45	0.003*
Standing and walking hours per day without rest breaks	1.27	1.06-1.151	0.007*
Sweeping/mopping	1.00	0.99-1.00	0.190
Bathroom cleaning	1.00	0.99-1.01	0.095
Wiping glass	0.99	0.99-1.00	0.871
Cleaning tools	1.00	0.99-1.00	0.189
Walking time apart from work	1.00	0.99-1.00	0.569
Sitting time apart from work	1.00	0.99-1.01	0.245
WHOQOL physical health domain	0.80	0.72-0.87	<0.001*
WHOQOL psychological health domain	0.88	0.81-0.95	0.003*
WHOQOL social relationship domain	0.86	0.80-0.92	<0.001*
WHOQOL environment health domain	0.74	0.63-0.87	<0.001*
WHOQOL All	0.94	0.91-0.96	<0.001*
WHOQOL general health	0.36	0.24-0.56	<0.001*
WHOQOL quality of life	0.53	0.36-0.78	0.001*
Frequency of forward bending during work	0.11	0.03-0.38	<0.001*
Frequency of pushing or pulling heavy object during work	0.57	0.18-1.76	0.327
Frequency of twisting body in a narrow space during work	0.50	0.20-1.24	0.136
Frequency of backward bending during work	0.12	0.02-0.62	0.011*
Frequency of squat sitting or kneeling during work	0.23	0.07-0.73	<0.001*
Frequency of lifting moderate to heavy objects from floor during work	0.40	0.10-1.58	0.012*
Frequency of static posture during work	0.06	0.00-0.50	0.004*
Frequency of using heavy tools during work	0.35	0.13-0.98	0.05*
Frequency of walking up/downstairs during work	0.74	0.33-1.49	0.134
Frequency of rest breaks during work	0.92	0.15-5.50	0.532
Feeling exhausted	0.25	0.11-0.54	<0.001*
Job dissatisfaction	0.09	0.04-0.20	<0.001*
Repetitive work	0.39	0.111-1.39	0.148

According to the binomial regression analysis, NSLBP 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 squatting or kneeling during work, feeling exhausted, and having job dissatisfaction. The final logistic regression model was statistically significant, with a chi-square value of 82.12 (p-value< 0.001). All of the significant factors explained 48.60% (Nagelkerke R^2) of the variance in the presence of NSLBP and correctly classified 84.00% of cases. Every 1-point increase in the WHOQOL physical health domain decreased the odds of having LBP by 0.79 (95% CI= 0.69–0.89). Regarding the frequency of forward bending during work, sometimes performing forward bending during work decreased the odds of having LBP by 0.34 (95% CI= 0.14–0.82) compared to usually working in a forward-bent position. On the other hand, sometimes performing squatting or kneeling during work increased the odds of having LBP by 3.29 (95% CI= 1.07–10.18) compared to usually working in a squatting or kneeling position. Concerning psychological factors, having mental exhaustion increased the probability of having LBP (OR= 4.52; 95% CI= 1.04–19.69) while having job dissatisfaction decreased the odds of having LBP (OR= 0.063; 95% CI= 0.02–0.23) (Table 4).

Table 4 Multivariable logistic regression model for the association of variables attributed low back pain

Factor	AOR	95% CI	p-value
WHOQOL physical health domain	0.78	0.69-0.88	<0.001*
Frequency of forward bending during work			
Usually	1.00	1.00	
Sometimes	0.33	0.13-0.81	0.016*
Almost never	0.32	0.07-1.45	0.141
Frequency of squat sitting or kneeling during work			
Usually	1.00	1.00	
Sometimes	3.29	1.06-10.18	0.038*
Almost never	0.58	0.12-2.67	0.487
Feeling exhausted	4.51	1.03-19.69	0.045*
Job dissatisfaction	0.06	0.01-0.22	<0.001*

** 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 $R^2 = 0.486$.

Discussion

Cleaning professions are labor-intensive and require high cardiopulmonary and musculoskeletal loads as well as both dynamic and static muscular work with the aid of various cleaning tools, which altogether contribute to MSDs. In many countries, cleaning work is predominantly performed by females, particularly older women [4]. This study aimed to determine the prevalence of NSLBP among other MSDs and investigate the association between NSLBP and physical and psychological factors in female cleaners working in academic settings at Chulalongkorn University, Thailand.

The findings revealed NSLBP to be the most prevalent MSD in the last 3 months (30.14%) and at the present time (18.08%) in female cleaners in an academic setting. In previous studies, the prevalence of NSLBP among cleaners has ranged from 19.70% to 63.00% [11, 14, 17, 18, 25-28]. The results of the present study are comparable to the LBP prevalence findings of studies conducted in India (26.50%), Denmark (34.20%), and Taiwan (37.80%) (14, 26, 28). However, this study's findings are higher than the results of other studies conducted in Ethiopia (19.70%) and Denmark (21.00%) while lower than the studies by Krause et al in the United States (63%) and Chuppawa and Aungudornpukdee in Thailand (44.10%) [11, 17].

The variability in prevalence values reported in the existing literature may be due to differences in individual pain levels, outcomes, sample size, occupational setting, culture, and participants' comprehension and response to questionnaires. Occupational settings may affect the prevalence of MSDs and LBP among cleaners due to differences in the work environment and tools available to assist in cleaning tasks. Alie et al revealed a high rate of MSDs among street cleaners, with cleaners who covered greater than 2 kilometers per day having 2.5 times the risk of reporting an MSD compared to those who covered a smaller distance [29]. Street cleaners may be required to work over a larger area than workers in other cleaning professions. Another previous study showed a similarly high prevalence of MSDs and LBP among hotel cleaners, who primarily performed mirror/glass polishing and sink/tub cleaning tasks [27]. Differences in setting thus cause differences in required cleaning tasks, which may affect the prevalence of MSDs and LBP. Cleaners in the United Kingdom were found to use different tools during their cleaning tasks, with their primary tasks being vacuuming and buffing [27], and the weight of the tools employed during cleaning tasks may further affect the prevalence of MSDs and LBP. Other possible reasons for the variability across studies in LBP prevalence are differences in participant age and the time period used to assess the history of NSLBP. For instance, the mean age of participants in the study by Melese et al was 21.94 ± 56 years while the mean age of participants in the present study was 49.40 ± 56 years [17]. In the present study, the last 3 months and the present time were used to investigate the prevalence of NSLBP among female cleaners, while most previous studies used the last 12 months, last 1 month, and last week to determine the frequency of NSLBP [11, 14, 17, 25, 26, 28].

LBP is one of the most common MSDs and constitutes a prevalent and multifactorial health care challenge. Our results revealed significant associations between NSLBP and the WHOQOL physical domain, the frequency of forward bending and squatting during work, feeling exhausted, and having job dissatisfaction. Chronic LBP can affect quality of life due to its associated pain, functional disability, and psychological distress [30, 31]. A few studies have investigated the quality of life of patients with LBP using the WHOQOL

and found patients with LBP to have a lower WHOQOL score than patients without LBP [30, 31]. In the present study, binomial regression analysis showed protective effects (AOR= 0.79; 95% CI= 0.69–0.89) of higher scores on the WHOQOL physical domain. An increase in quality of life, particularly physical quality of life, including increased physical well-being, improved physical function, decreased physical pain, and enhanced access to health care services, may reduce the occurrence of LBP in cleaners.

Cleaners frequently work in awkward positions that can increase the risk of MSDs, particularly LBP [28, 32]. When comparing cleaners who often worked in forward-bent positions with those who were less frequently required to perform forward bending, the study's results indicated that the cleaners in the latter group had a lower likelihood of experiencing LBP. These results are consistent with the findings of studies conducted among 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) [17, 20] and support the importance of reducing prolonged or repetitive forward bending at work in preventing low back injuries in cleaners. The occurrence of NSLBP in cleaners may depend on the repetitive performance of various cleaning tasks, including those that require twisting, forward bending, and lifting objects, as well as the work environment, equipment used, and workload [4, 17].

In contrast, to forward bending, the current study showed that the risk of experiencing NSLBP was elevated for cleaners who reported a lower frequency of working in squatting or kneeling positions compared to those who frequently worked in these positions. Performing squatting or kneeling, which develops greater hip and knee flexion mobility while maintaining a neutral spinal position, may constitute a strategy to avoid working in improper spinal positions such as forward bending and reduce the risk of low back injuries. Though the cleaners performed cleaning tasks that were located close to the floor, such as lifting heavy objects from the floor and cleaning the bathroom, those who less often worked in squatting or kneeling positions presented with a greater likelihood of experiencing NSLBP.

Previous studies have reported that awkward positions during cleaning tasks are associated with the presence of MSDs. Woods and Buckle investigated task and postural requirements in cleaners in the United Kingdom and found mopping, vacuuming, and buffing to be cleaners' primary cleaning tasks, which usually require prolonged trunk rotation and flexion, neck flexion, arm abduction, and excessive wrist deviation [33]. Krause et al evaluated cleaners in the United States who predominantly performed the tasks of mirror/glass polishing and sink/tub cleaning, which require back extension as well as squatting and kneeling [27]. Moreover, a previous study used the Ovako Working Posture Assessment System to identify awkward positions in cleaners and revealed forward bending and trunk twisting to be major adverse movements. Although previous studies have shown awkward positions to be associated with MSDs, evidence on the frequency of cleaners with NSLBP required to perform these movements is still limited. The present study could be used as a model for future research on the frequency of performing various movements during cleaning tasks.

In the present study, cleaners who felt exhausted after work were found to be 4.3 times more likely to develop NSLBP than those who did not feel exhausted. This finding is supported by a study conducted in Ethiopia (AOR= 2.70; 95% CI= 1.16–6.20), though our study focused more specifically on NSLBP rather than MSDs in general. The demanding workload and fatigue associated with performing intensive and repetitive movements in awkward positions during cleaning tasks can lead to NSLBP and significantly impact cleaners' capacity to complete these tasks [17].

The association between job dissatisfaction and NSLBP found in this study differed from the results of previous studies [26, 29]. Chang et al [26] did not find a relationship between job dissatisfaction and low back discomfort among the cleaners included in their study, while Alie et al reported a significant association between job dissatisfaction and the prevalence of MSDs in street cleaners. However, our results showed an odds ratio value (AOR= 0.64; 95% CI= 0.018–0.228) that was lower than that reported by Alie et al (AOR= 2.66; 95% CI= 1.05–6.75). Different cleaning settings may be the reason for the differing values, as the present study included cleaners working at a university while Alie et al recruited street cleaners, whose occupational characteristics may involve cleaning tasks requiring a greater physical workload than that required in an academic setting. Work-related stress and a lack of influence over work conditions may result in job dissatisfaction and contribute to the occurrence of NSLBP among cleaners [4, 26]. Interestingly, cleaners in the present study who reported job dissatisfaction were less likely to suffer from NSLBP compared to those who did not have job dissatisfaction. This might be explained by cleaners who are satisfied with their work and income working harder, leading to a heightened risk of LBP, while those with job dissatisfaction may have a lower work ethic or divert attention to searching for a new job.

This study had several limitations to note. First, this study only investigated associations between NSLBP and physical and psychological factors among female cleaners working in different sectors at Chulalongkorn University. The results can thus only be generalized to the cleaners of this single public university. To ensure generalizability to all cleaners,

future studies should recruit cleaners from other private companies and small enterprises. Additionally, participants' level of physical activity was not assessed, which might confound the occurrence of NSLBP. As this study collected data solely through self-reported questionnaires, an objective examination should be added as a prediction factor in future studies. Feeling exhausted was evaluated as a single variable, though it comprises several aspects, including physical, mental, and emotional exhaustion; further study should thus delineate the various components of exhaustion to improve the understanding of this risk factor. The associations between NSLBP and other physical, psychological, and work-related factors, such as age, body mass index, task duration, distance covered while cleaning per day, leisure time, and stress level, should be explored in future studies, as should the population of male cleaners.

The findings of this study present several implications for clinical practice. First, the results may help physical therapists and health care providers to design clinical decision-making models to prevent and treat cleaners with NSLBP through early identification of the causes of LBP and education on proper lifting techniques and appropriate ergonomics during work. Second, the results highlight the importance of workers properly managing their work schedules, as the appropriation of work and leisure time may reduce the presence of LBP. Finally, the findings of this study may help work organizations raise awareness regarding mental health to increase the quality of life of people in the cleaning profession.

Conclusion

This study revealed a high prevalence of NSLBP compared to other MSDs in female cleaners working at Chulalongkorn University. Associations between NSLBP and physical and psychological factors involving postures at work, quality of life, and job satisfaction were investigated. Decreasing forward bending, having higher physical quality of life scores, and proposing better strategies for performing tasks to ensure job satisfaction were identified as protective factors while performing less squatting and kneeling during work and experiencing mental exhaustion were identified as risk factors for NSLBP in female cleaners. It is thus recommended that female cleaners undergo ergonomic training and exercise prescriptions to prevent NSLBP.

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