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Original article

Prevalence and related factors of musculoskeletal discomfort among pharmacy personnel of King Chulalongkorn Memorial Hospital

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Background: Pharmacy personnel in hospitals are exposed to workplace hazards, especially biomechanical hazards which potentially cause musculoskeletal discomfort (MSD). Understanding of MSD can help prevent and control the problem.
Objective: To study the prevalence and related factors of MSD among pharmacy personnel of King Chulalongkorn Memorial Hospital (KCMH).
Methods: This study was a cross-sectional descriptive study with a sample size of 197 pharmacy personnel of KCMH. The participants were asked to fill in a self-reported questionnaire comprising of individual and occupational factors and MSD assessed by the modified Nordic questionnaire.
Results: The pharmacy personnel have high prevalence of MSD. The 7-day and 12-month overall prevalence were 83.8% and 93.4%, respectively. The highest affected body site of MSD was the neck, followed by shoulders. The body part of highest prevalence of MSD was the trunk axis. Exercise was significant associated factor with 7- day overall MSD, and there were no statistically significant associated factors to 12 - month overall MSD.
Conclusion: The MSD was common among pharmacy personnel at KCMH and thus medical surveillance of MSD should be done. Health promotion including exercise was recommended to prevent MSD among these personnel.

Keywords: Pharmacy personnel, musculoskeletal discomfort.

The department of pharmacy in hospital is responsible for pharmacy and medical services such as procurement, storage, quality control, manufacturing and dispensing of medicines to patients. The pharmacy personnel such as pharmacists and pharmacy assistants deal with many medical supplies in different work environments, which potentially cause health hazards, including biomechanical hazard.

Biomechanical hazard is important as a cause of musculoskeletal problems.[1] According to the report of Bureau of Occupational and Environmental Diseases, most work-related illnesses were musculoskeletal disorders, accounting for 83.2%.[2] The personnel were probably exposed to these hazards from working with computer and lifting heavy medical supplies. In a previous study, 42.9% of pharmacy personnel were at high risk of musculoskeletal problems[3]

However, there have been a few studies concerning musculoskeletal problems in pharmacy personnel. Moreover, we found no previous studies on musculoskeletal discomfort prevalence and related factors among pharmacy personnel in Thailand. The purpose of this study was to identify the prevention factors and control the musculoskeletal problems among these personnel.

Materials and methods

Sample collections

This is a cross-sectional descriptive study in the Department of Pharmacy at King Chulalongkorn Memorial Hospital. All 228 personnel were recruited and informed about this study although calculated sample size was 144, due to expected high non-response rate. The inclusion criteria of participants were consent to answer the questionnaire, working in the Department of Pharmacy for at least 12 months,

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and ability to communicate in Thai. The exclusion criteria were absence during data collection period, such as maternity or education leave. This study has been approved by the Institutional Review Board, Faculty of Medicine, Chulalongkorn University (COA no. 263/2019).

Assessments

The subjects were asked to complete the self-reported questionnaire on personal details, health status, occupation and musculoskeletal discomfort (MSD). Personal and health data included age, gender, weight, height, body mass index (BMI), ethnicity, domicile, marital status, hand dominance, education level, income, part time jobs, hobbies, exercise, underlying diseases, smoking, alcohol drinking and measures to relieve symptoms. Occupational data comprised occupation, years of experience, work unit, working time and rest.

The validated modified Thai version of Nordic questionnaire was used to assess MSD[4, 5] over 7 days and 12 months aiming to identify the prevalence of MSD at nine body sites (neck, shoulders, upper back, elbows, lower back, wrists/hands, hips/buttocks/ thighs, knees and ankles/feet).

Statistical analyses

The data were analyzed using SPSS version 22.0. The univariate analyses were presented as mean ± standard deviation (SD) for continuous variables and frequency (percentages) for categorical variables. The overall MSD is defined as having at least one symptom at any body sites. For simplicity, nine body sites were assessed as three body parts, comprising of upper extremity (shoulders, elbows and wrists/hands), axial (neck, upper back and lower back) and lower extremity (hips/buttocks/thighs, knees and ankles/ feet).

The bivariate analysis using binary logistic regression (Enter method) was used to examine association between each individual factors and MSD at each body part over 7 days and 12 months, as crude odds ratio with 95.0% confidence interval (CI). Then, the factors with bivariate association ($P < 0.25$) were entered to multivariable logistic regression (Backward: LR method) to explore association between various factors and MSD at each body parts over 7 days and 12 months, as adjusted odds ratio with 95.0% CI. To alleviate confounding, the personnel with existing musculoskeletal diseases or injuries were excluded: thus 183 people left in bivariate and multivariable analyses. In addition, administrative unit factor was excluded for analyses because of only one sample in this unit.

Results

A total of 197 subjects (86.4% of recruited personnel) were assessed in this study. The average age of subjects was 37.8 years. Most of them were females (79.2%), age range between 31 and 40 years (37.6%), normal BMI group (39.6%), single (62.9%), Bachelor's degree holders (55.3%), monthly income between 20,001 and 50,000 Baht, right-handed (91.9%), and without a hobby (70.6%) (Table 1).

Table 1. Characteristics of subjects (n = 197).

Characteristics	N Mean	(%) ± SD	Characteristics	N Mean	(%) ± SD
Sex			**Hobbies**		
Male	41	(20.8)	No	139	(70.6)
Female	156	(79.2)	Yes	58	(29.4)
Age (years)	37.8	±9.9	**BMI (kg/m²)**	23.82	±4.3
≤20	3	(1.5)	<18.50	15	(7.6)
21 - 30	47	(23.9)	18.50 - 22.99	78	(39.6)
31 - 40	74	(37.6)	23.00 - 24.99	38	(19.3)
41 - 50	46	(23.4)	25.00 - 29.99	52	(26.4)
51 - 60	27	(13.7)	≥30	14	(7.1)
Marital status			**Hand dominance**		
Single	124	(62.9)	Right	181	(91.9)
Married	66	(33.5)	Left	14	(7.1)
Divorced or widowed	7	(3.6)	Both	2	(1.0)
Education level			**Income**		
High school	66	(33.5)	**(Baht/month)**		
Diploma	3	(1.5)	10,001 - 20,000	77	(39.1)
Bachelor	109	(55.3)	20,001 - 50,000	96	(48.7)
Master	19	(9.6)	50,001 - 100,000	24	(12.2)

As for health data, 31.0% of the subjects had underlying diseases, the highest percentage of underlying disease was allergy (36.1%), followed by hypertension and musculoskeletal disease (14.8%). At least one method was used to relieve symptoms for most of them (87.3%), with muscle relaxant drugs as the most frequent (54.3%), followed by self-massage balms (52.8%). Most of them did not exercise (57.4%), had normal weight (39.6%), had never smoked (94.4%), and had never or rarely been drunk (91.9%) (Table 2).

As for occupational data, the numbers of pharmacists and pharmacy assistants were similar. The majority of the personnel worked in the outpatient service unit. Their average years of experience were 13.5. Over 12 months, 12.7% of them had work rotations, and they worked averagely in outpatient service unit at most, 6.3 months per person. Most of them did not have part time jobs (Table 3).

The prevalence of overall 7-day and 12-month MSD were 83.8% and 93.4%, respectively. As for severity of 12-month MSD, 60.3% and 15.2% of them had effects of MSD on daily activities and limitation of work, respectively. According to their body sites, the most prevalence of both 7-day and 12-month MSD was at the neck, followed by shoulders, lower back and ankle/foot, respectively (Table 4).

As for bivariate analysis (Table 5), married and Bachelor Degree related to 12-month upper-extremity MSD. Exercise, working time and proportion of rest to working time related to 7-day axial MSD. BMI, exercise, working time, proportion of rest to working time, and work periods in outpatient service and general manufacturing related to 12-month axial MSD. Bachelor degree, income 50,001 - 100,000 THB/month, alcohol drinking, underlying disease and pharmacy assistant related to 7-day lower-extremity MSD. Age and pharmacy assistant related to 12-month lower-extremity MSD. Exercise and working time related to 7-day overall MSD. No factors related to 12-month overall MSD.

As for multivariable analysis (Table 6), exercise associated with 7-day overall MSD, but no factor associated with 12-month overall MSD.

Table 2. Health characteristic.

Heath factors	N Mean	(%) ± SD	Heath factors	N Mean	(%) ± SD
Smoking			**Alcohol drinking (days/week)**	0.2	± 0.5
Never	186	(94.4)	Never/Rarely	181	(91.9)
Former	10	(5.1)	1 - 6	16	(8.1)
Current	1	(0.5)	Everyday	0	(0)
Underlying diseases			**Method to relieve symptom**		
No	136	(69.0)	(Allow answer more than one)		
Yes	61	(31.0)	Muscle relaxant drugs	107	(54.3)
Allergy	22	(36.1)	Self-massage balms	104	(52.8)
Hypertension	9	(14.8)	Anti-inflammatory drugs	41	(20.8)
Musculoskeletal disorders	9	(14.8)	Thai massage	31	(15.7)
Dyspepsia	8	(13.1)	Acetaminophen	29	(14.7)
Dyslipidemia	7	(11.5)	Acupuncture	5	(2.5)
Diabetes mellitus	3	(4.9)	Others	13	(6.6)
Others	23	(37.7)			
Exercise (times/week)	0.9	± 1.3			
No	113	(57.4)			
< 3	62	(31.5)			
3 - 5	21	(10.7)			
> 5	1	(0.5)			

Table 3. Occupational characteristic.

Occupation factors	N Mean	(%) ± SD	Occupation factors	N Mean	(%) ± SD
Occupation			**Work rotation**		
Pharmacist	90	(45.7)	No	172	(87.3)
Pharmacy assistant	107	(54.3)	Yes	25	(12.7)
Work unit			**Months of work unit rotation in 12 months**		
Administrative	1	(0.5)	Administrative	0.1	±0.9
Inventory	17	(8.6)	Inventory	1.0	±3.3
Outpatient service	105	(53.3)	Outpatient service	6.3	±5.9
Inpatient service	33	(16.8)	Inpatient service	2.0	±4.5
Manufacturing	19	(9.6)	General Manufacturing	0.4	±2.1
General	6	(3.1)	Total parenteral nutrition	0.2	±1.6
Total parenteral nutrition	4	(2.0)	Chemotherapy	0.6	±2.4
Chemotherapy	9	(4.6)	Drug information	0.3	±1.8
Clinical pharmacy	22	(11.2)	Ambulatory care	1.1	±3.4
Drug information	5	(2.5)			
Ambulatory care	17	(8.6)			
Years of experience	13.5	±9.9	**Working time (hours/week)**	65.8	±23.2
1 - 10	104	(52.8)	**Rest (hours/day)**	1.0	±0.4
11 - 20	36	(18.3)	**Proportion of working time to rest (%)**	9.6	±3.4
21 - 30	48	(24.4)	**Part time jobs**		
31 - 40	8	(4.1)	No	189	(95.9)
41 - 50	1	(0.5)	Yes	8	(4.1)

Table 4. Prevalence of MSD.

Body sites	7-day Prevalence (n = 197)	12-month Prevalence (n = 197)	N	Limit daily activity	Limit work
Overall	165 (83.8)	184 (93.4)	184	111 (60.3)	28 (15.2)
Neck	105 (53.3)	140 (71.1)	140	67 (47.9)	12 (8.6)
Shoulders	102 (51.8)	127 (64.5)	127	70 (55.1)	14 (11.0)
Upper back	68 (34.5)	84 (42.6)	84	37 (44.1)	8 (9.5)
Elbows	15 (7.6)	20 (10.2)	20	11 (55.0)	2 (10.0)
Lower back	80 (40.6)	106 (53.8)	106	47 (44.3)	13 (12.3)
Wrists/hands	64 (32.5)	92 (46.7)	92	45 (48.9)	7 (7.6)
Hips/buttocks/thighs	44 (22.3)	63 (32.0)	63	35 (55.6)	8 (12.7)
Knees	64 (32.5)	87 (44.2)	87	39 (44.8)	8 (9.2)

Table 5. Crude odds ratio of 7-day and 12-month MSDs for related factors.

Individual factors	Duration	Upper extremities	Axial	Lower extremities	Overall
Age (years)	12-month	NS§	NS†	1.04 [1.00, 1.07]	NS¶
BMI (kg/m²)	12-month	NS§	0.90	NS§ [0.83, 0.97]	NS†
Marital status					
Single		1	1	1	1
Married	12-month	0.45 [0.22, 0.90]	NS§	NS§	NS§
Divorced/widowed	12-month	NS§	NS¶	NS¶	NS§
Education level					
Below bachelor		1	1	1	1
Bachelor	7-day	NS§	1NS†	0.40 [0.21, 0.78]	NS§
	12-month	2.39 [1.18, 4.84]	NS§	NS†	NS¶
Master	7-day	NS§	NS§	NS†	NS§
	12-month	NS†	NS¶	NS¶	NS§
Income (THB/month)					
10,001 - 20,000		1	1	1	1
20,001 - 50,000	7-day	NS§	NS§	NS¶	NS§
50,001 -100,000	7-day	NS§	NS§	0.29 [0.10, 0.83]	NS§
Exercise (times/week)	7-day	NS†	0.68 [0.54, 0.87]	NS¶	0.66 [0.51, 0.87]
	12-month	NS†	0.73 [0.56, 0.94]	NS§	NS†
Alcohol drinking (days/week)	7-day	NS¶	NS†	2.56 [1.012, 6.44]	NS¶
Underlying disease					
No		1	1	1	1
Yes	7-day	NS§	NS¶	2.26 [1.15, 4.44]	NS¶
Working time (hours/day)	7-day	NS†	1.02 [1.01, 1.04]	NS†	1.03 [1.01, 1.05]
	12-month	NS†	1.02 [1.00, 1.04]	NS§	NS§
Proportion of rest to working time (%)	7-day	NS¶	0.83 [0.73, 0.93]	NS¶	NS¶
	12-month	NS¶	0.88 [0.76, 1.00]	NS§	NS§
Occupation					
Pharmacist		1	1	1	1
Pharmacy assistant	7-day	NS†	NS†	3.97 [2.14, 7.35]	NS¶
	12-month	NS†	NS†	2.36 [1.25, 4.46]	NS§
Work period in unit					
Outpatient	12-month	NS§	1.08 [1.01, 1.15]	NS§	NS§
General Manufacturing	12-month	NS§	0.85 [0.73, 0.99]	NS§	NS§

NS = not significant † = *P* - value 0.051 - 0.250 ¶ = *P* - value 0.251 - 0.500 § = *P* > 0.5

Table 6. Adjusted odds ratio of 7-day and 12 month overall MSD.

Factors	Crude OR	Coefficient (B)	Adjusted OR Exp(B)	95% CI	*P*-value
7-day overall MSD model[a]					
Exercise (times/week)	0.66	-0.323	0.72	0.55, 0.95	0.022*
Working time (hours/week)	1.03	0.019	1.02	1.00, 1.04	0.086
Constant		0.924			
12-month overall MSD model[b]					
BMI (kg/m^2)	0.90	-0.112	0.89	0.80, 1.00	0.058
Exercise (times/week)	0.73	-0.332	0.72	0.51, 1.02	0.064
Constant		5.728			

* $P < 0.05$

[a] logit (p) = 0.924 - 0.323 *Exercise* + 0.019 *Working time*

[b] logit (p) = 5.728 - 0.112 *BMI* - 0.332 *Exercise*

Discussion

This study revealed that the prevalence of 7-day and 12 month overall MSD at the Department of Pharmacy of King Chulalongkorn Memorial Hospital were high. Compared to the previous study of Aminian O, *et al*., the prevalence of 12-month overall MSD in the female hospital pharmacists of this study (95.8%) is higher than that of female general pharmacists in Iran (87.7%).[6] Of note is both prevalence were high. In addition, the most affected body site in upper extremity was neck, which was the same as the study in female general pharmacists. However, the result was different for the trunk axis. In this study, the most prevalent body site was the neck, contrast to the lower back in the previous study.

The result of this study indicates the importance of exercise since it related negatively to the 7-day overall MSD among these pharmacy personnel. In other studies, Celik S, *et al*. found regular exercise negatively associated with musculoskeletal pain in office workers[7], and Hagberg M, *et al*. found low physical exercise was a factor for reduced productivity from musculoskeletal symptoms in computer users.[8] Moreover, 57.4% of the pharmacy personnel did not exercise. Therefore, encouraging them to exercise would be beneficial.

There were some limitations in this study. This study was cross-sectional therefore it is impossible to explain the temporal effect of factors on MSD. Collecting the past data with a questionnaire can lead to recall bias. In addition, healthy worker effect, which is a type of selection bias in occupational studies characterized by lower mortality and morbidity rates because unhealthy individuals are excluded from employment, could arise. Specifically, more personnel with lower MSD possibly were selected in this study because severe cases quitted jobs due to incapacity to work. Finally, administrative unit had only one sample, thus it was excluded from the analysis.

However, one interesting point of this study is that it is one of few studies which point out the characteristics and factors of musculoskeletal problems in hospital pharmacy personnel. These findings can be further applied to find occupational health plans to resolve musculoskeletal problems in these personnel.

Conclusion

The musculoskeletal discomfort was common among pharmacy personnel of King Chulalongkorn Memorial Hospital, thus medical surveillance of musculoskeletal discomfort should be performed. Health promotion including exercise was recommended to prevent musculoskeletal discomfort among these personnel.

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Conflict of interest

The authors, hereby, declare no conflict of interest.

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