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T. Sinsongsook

S. Taptagaporn

W. jaimjarasrangi

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Association of work-related factors and shoulder pain among hospital nursing personnel

Thanes Sinsongsook*

Sasitorn Taptagaporn** Wiroj Jiamjarasrangsi***

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- Objectives** : *To determine the prevalence and related factors of shoulder pain among nursing personnel in King Chulalongkorn Memorial Hospital.*
- Research design** : *Cross sectional study.*
- Method** : *Subjects were 223 full-time registered nurses and 143 licensed practical nurses who were cluster randomly selected by wards from all nursing personnel of the hospital. Data were collected by a set of self administered questionnaires during January to March 2004 with the response rate of 86.2 percent.*
- Result** : *The results showed that the prevalence rate of persistent shoulder pain among nursing personnel in previous 12 months was 20.3 percent (95 % CI 0.16 - 0.24 and that limited work activities was 14.0 percent (95 % CI 0.10 - 0.18). Multiple logistic modeling showed that the 41-50 years age group (OR 2.95, 95 % CI 1.02 - 8.52), transporting patient by wheelchair (OR 5.48, 95 % CI 1.11 - 27.05), lifting objects between 10 - 25 kilogram (OR 2.27, 95 % CI 1.01 - 5.12) were significantly associated with persistent shoulder pain and lifting objects between 5 - 10 kilogram (OR 2.65, 95 % CI 1.07 - 6.54) were significantly associated with shoulder pain that limited work activities ($p < 0.05$).*

* Division of Occupational Medicine, Samutprakarn Hospital

** Bureau of Occupational and Environmental Disease, Department of Disease Control, Ministry of Public Health

***Department of Preventive and Social Medicine, Faculty of Medicine, Chulalongkorn University

Conclusion : *The results indicated that nursing task/ work posture were associated with shoulder pain among nursing personnel and nursing tasks should therefore be further evaluated and improved.*

Keywords : *Shoulder pain, Nursing personnel, Work-related factors.*

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Samutprakarn Province.

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ธเนศ สิ้นส่งสุข, สลิธร เทพตระการพร, วิโรจน์ เจียมจรัสรังษี. การศึกษาความสัมพันธ์ของปัจจัยที่เกี่ยวข้องกับการทำงานกับการเกิดอาการปวดไหล่ในบุคลากรทางการแพทย์. จุฬาลงกรณ์เวชสาร 2548 ก.พ; 49(2): 61 - 72

- วัตถุประสงค์** : เพื่อศึกษาความชุกและปัจจัยที่เกี่ยวข้องกับการเกิดอาการปวดไหล่ในบุคลากรทางการแพทย์
- รูปแบบการศึกษา** : การศึกษา ณ จุดเวลาใดเวลาหนึ่ง
- วิธีการวิจัย** : สุ่มเลือกบุคลากรทางการแพทย์ทั้งหมดของโรงพยาบาลจุฬาลงกรณ์ โดยวิธีการสุ่มแบบแบ่งกลุ่ม (cluster random sampling) กลุ่มตัวอย่างคือ พยาบาลวิชาชีพ 223 คนและผู้ช่วยพยาบาล 143 คน และเก็บข้อมูลปัจจัยส่วนบุคคล ปัจจัยที่เกี่ยวข้องกับการทำงาน และการเกิดอาการปวดไหล่โดยใช้แบบสอบถามที่ตอบด้วยตนเองในช่วงเดือนมกราคมถึงเดือนมีนาคม พ.ศ. 2547 มีอัตราการตอบแบบสอบถามกลับร้อยละ 86.2
- ผลการศึกษา** : ผลจากแบบสอบถามพบว่าอัตราชุกของการเกิดอาการปวดไหล่ในบุคลากรทางการแพทย์ที่มีอาการอย่างต่อเนื่องในช่วงเวลา 12 เดือนที่ผ่านมาเท่ากับร้อยละ 20.3 (95 % CI 0.16 - 0.24) และที่มีผลต่อการทำงานปกติเท่ากับร้อยละ 14.0 (95 % CI 0.10 - 0.18) จากการวิเคราะห์ความถดถอยโลจิสติก พบว่ากลุ่มตัวอย่างที่มีอายุ 41 - 50 ปี (OR 2.95, 95 % CI 1.02 - 8.52), การเคลื่อนย้ายผู้ป่วยโดยใช้รถเข็น (OR 5.48, 95 % CI 1.11 - 27.05) และการยกเคลื่อนย้ายวัสดุหนัก 10 - 25 กิโลกรัม (OR 2.27, 95 % CI 1.01 - 5.12) มีความสัมพันธ์กับการเกิดอาการปวดไหล่ที่มีอาการอย่างต่อเนื่อง และการยกเคลื่อนย้ายวัสดุหนัก 5 - 10 กิโลกรัม (OR 2.65, 95% CI 1.07 - 6.54) มีความสัมพันธ์กับการเกิดอาการปวดไหล่ที่มีผลต่อการทำงานปกติอย่างมีนัยสำคัญทางสถิติ ($p < 0.05$)
- สรุป** : ผลการศึกษานี้พบว่าอาการปวดไหล่ในบุคลากรทางการแพทย์มีความสัมพันธ์กับลักษณะและท่าทางการทำงาน จึงควรมีการประเมินและทำการปรับปรุงแก้ไขงานการพยาบาลให้มีความเหมาะสมต่อไป
- คำสำคัญ** : อาการปวดไหล่, บุคลากรทางการแพทย์, ปัจจัยที่เกี่ยวข้องกับการทำงาน

Work-related musculoskeletal disorders (WMSDs) are the major health problems among health care personnel. Several studies indicated that nursing personnel had high prevalence of musculoskeletal disorders.⁽¹⁻³⁾ Data from the US Bureau of labor statistics 2003 showed that nursing personnel was among the top-ten occupations with the greatest number of reported nonfatal musculoskeletal disorders resulting in days away from work.⁽¹⁾ While low back pain is the most frequent musculoskeletal complaints in nursing personnel, shoulder pain is another common complaint which have 12-month prevalence of 30 % to 60 %.⁽⁴⁻⁸⁾

Physical and psychosocial factors such as awkward postures, qualitative mental demand have been found to be work-related factors for shoulder pain in recent studies.^(6-7,9-18) Many nursing tasks have physical work with heavy loads and awkward postures such as patient handling and transferring tasks which are also associated with shoulder pain.^(6-7,9-17) There are, however, few of such studies in Thailand. For pain prevention planning purpose, we decided to carry out this study to determine work-related factors of shoulder pain among nursing personnel in King Chulalongkorn Memorial Hospital.

Subjects and methods

Subjects

This cross sectional study was conducted among nursing personnel in King Chulalongkorn Memorial Hospital during January to March 2004. The questionnaires were distributed to 450 nursing personnel (Registered nurses and licensed practical nurses) who were cluster randomly selected from all nursing personnel of the hospital (sampling units were

wards/sections). Subjects' consents were acquired before data collection.

Questionnaires

Data were collected by a set of self administered questionnaires. These questionnaires comprised 3 sections: work-related factors, demographic characteristics and assessment of shoulder pain in previous 12 months. Work-related factors section consisted of 17 questions about nursing tasks, 12 questions about work postures, duration of employment in the hospital and work at present ward, the number of working hours per day and working days per week, working overtime, having shift works/managerial tasks and psychosocial factors in 3 aspects (mental demand, job control and social support).⁽¹¹⁾ Questions on demographic characteristics included sex, age, work area (ward), body mass index (BMI) calculated from weight and height, marital status, having regular exercise. Questionnaire about shoulder pain was the adapted version of Nordic Musculoskeletal Questionnaire.⁽¹²⁾ Subjects who had history of musculoskeletal injuries and underlying non work-related musculoskeletal disorders were excluded from this study.

Data analysis

Severity of shoulder pain that the subjects had experienced in previous 12 months were categorically ranked into never, sometimes, regularly and chronically. Persistent cases were defined as those who had symptoms regularly and chronically. Shoulder pain that limited work activities in previous 12 months were categorized into dichotomous scale (yes or no). Crude associations between shoulder pain

and various factors were assessed by simple logistic regression. Adjusted analyses were then conducted by multiple logistic regressions. Variables with significance levels of $p < 0.10$ from the crude analyses were selected and put into the statistical modeling process. In the final multivariable model only variables with a $p < 0.05$ were retained. As age and occupation

seemed strongly to influence the probability of musculoskeletal symptoms, it was included in the model regardless of the level of significance. Odds ratio with 95 % confidence intervals (95 % CIs) were calculated. All statistical analyses were performed using the SPSS 11.5 for Windows software package.

Table 1. Demographic and job-related characteristics of nursing personnel.

Characteristics	Mean (SD)	No. (%)
Sex (Female)		356 (97.3)
Age (yr)	34.3 (9.0)	
Height (cm)	157.6 (4.6)	
Weight (kg)	53.7 (9.4)	
Body mass index (kg/m ²)	21.6 (3.6)	
Marital status (Married)		133 (36.5)
Having regular exercise		98 (26.9)
Occupation (Registered nurses)		232 (63.4)
Work area		
Pediatric wards		79 (21.6)
Surgical wards		122 (33.3)
Medical wards		110 (30.1)
Obstetrics and gynecological wards		31 (8.4)
Emergency department		24 (6.6)
Cumulative duration of employment in the hospital (yr)	12.2 (8.6)	
Duration of work in present ward (yr)	10.4 (8.3)	
Working hours per day	8.9 (2.3)	
Working days per week	5.6 (0.7)	
Having managerial tasks		112 (31.8)
Working overtime		200 (58.1)
Having shift works		340 (94.7)
Psychosocial variables		
High mental demand		85 (39.5)
Low job control		71 (19.5)
Low social support		115 (31.7)

Results

Totally 388 nursing personnel were included in the study, giving an overall response rate of 86 percent. However, 22 nursing personnel were excluded due to underlying musculoskeletal disorders (17) and musculoskeletal injuries that affect work (5), leaving 366 nursing personnel in the study population. The remainders were 223 full-time registered nurses and 143 licensed practical nurses. Almost all subjects were women (97.3 percent), aged between 21 to 60 years with the mean age of 34.3 years. Only 36.5 percent were married and 26.9 percent had regular exercise. Sixty-three percent of the subjects were registered nurses. The mean (SD) duration of employment in the hospital and work at present ward were 12.2 (8.6) and 10.4 (8.3) years, respectively. Thirty-one percent had managerial tasks, 58.1 percent worked overtime and 94.7 percent had shift works. In psychosocial aspects, lower than 50 percent of subjects had high mental demand, low job control and low social support (Table 1).

The prevalence rates of persistent shoulder pain and shoulder pain that limited work activities among nursing personnel during previous 12 months were 20.3 and 14.0 percent, respectively (Table 2).

Pains on right shoulder were more prevalent than left shoulder.

In the univariate analysis for the association between shoulder pain and demographic variables (Table 3); the 41-50 years age group, married and not having regular exercise were statistical significantly associated with persistent shoulder pain. No clear trend was apparent in the relationship between persistent shoulder pain and age. In contrast with other studies, BMI were not statistically associated with all shoulder pain (data not shown). All demographic variables were not associated with shoulder pain that limited work activities.

For the association between shoulder pain and job-related variables (Table 3), only "low job control" was statistically associated with persistent shoulder pain. All job-related and psychosocial variables were not associated with shoulder pain that limited work activities. The odds ratios (ORs) for duration of employment in the hospital and work in present ward, working hours per day and days per week, working overtime, having shift works and managerial tasks were not shown due to their non-statistically significance.

Table 2. Prevalence of shoulder pain among nursing personnel.

Prevalence	No. of subjects	%	95 % CI
Persistent shoulder pain in 12 months	364	20.3	0.16 - 0.24
Left	366	13.9	0.10 - 0.17
Right	364	18.4	0.14 - 0.22
Shoulder pain that limited work activities in 12 months	365	14.0	0.10 - 0.18
Left	365	11.5	0.08 - 0.15
Right	366	11.7	0.08 - 0.15

Table 3. Crude odds ratios (ORs) for shoulder pain and demographic / work characteristics.

Variables	Persistent pain			Pain that limited work activities		
	No. of subjects	No. of cases	OR (95 % CI)	No. of subjects	No. of cases	OR (95 % CI)
Age (yr)						
21-30 yr	78	20	1	157	24	1
31-40 yr	45	15	1.45 (0.65 - 3.23)	95	13	0.88 (0.42 - 1.82)
41-50 yr	32	16	2.90 (1.23 - 6.85)*	74	10	0.87 (0.39 - 1.92)
51-60 yr	10	1	0.32 (0.04 - 2.71)	19	3	1.04 (0.28 - 3.84)
Occupation						
Registered nurses	104	28	1	222	30	1
Licensed practical nurses	71	25	1.48 (0.77 - 2.83)	143	21	1.10 (0.60 - 2.01)
Marital status						
Single	105	23	1	230	31	1
Married	70	30	2.67 (1.38 - 5.18)*	133	18	1.01 (0.54 - 1.88)
Having regular exercise						
Yes	41	7	1	98	17	1
No	133	45	2.48 (1.02 - 6.04)*	265	33	0.68 (0.36 - 1.28)
Mental demand						
Low	60	22	1	130	23	1
High	39	15	1.08 (0.47 - 2.48)	84	9	0.56 (0.25 - 1.27)
Job control						
High	136	35	1	293	39	1
Low	39	18	2.47 (1.18 - 5.17)*	71	12	1.33 (0.65 - 2.68)
Social support						
High	114	36	1	247	37	1
Low	58	17	0.89 (0.45 - 1.79)	115	14	0.79 (0.41 - 1.52)

* p < 0.05

Concerning nursing tasks, only "transporting patient by wheelchair" was associated with both types of shoulder pain (Table 4). Transferring patient between bed and wheelchair, transporting patient by wheelchair, assisting patient to eat/drink, transferring patient by two persons and moving beds were statistically associated with shoulder pain that limited work activities.

Associations between persistent shoulder pain and work postures were found for working in uncomfortable postures and lifting objects between 10-25 kg (Table 5) and no trend was found between the ORs of this complaint and increasing weight of objects. For shoulder pain that limited work activities, working above shoulder height and lifting objects between 5-25 kg were statistically associated with the complaint.

Table 4. Crude odds ratios (ORs) for shoulder pain and various nursing tasks.

Variables	Persistent pain			Pain that limited work activities		
	Subjects	Cases	OR (95 % CI)	Subjects	Cases	OR (95 % CI)
Lifting patient in bed	164	52	4.64 (0.58 - 37.23)	337	50	4.36 (0.58 - 32.87)
Transferring patient between bed and wheelchair	157	49	1.59 (0.49 - 5.07)	314	50	9.09 (1.23 - 67.39)*
Transporting patient by wheelchair	145	51	7.59 (1.74 - 33.18)*	290	49	7.22 (1.71 - 30.42)*
Repositioning patient in bed	165	51	1.79 (0.37 - 8.73)	334	49	2.41 (0.56 - 10.43)
Bed bath	158	52	6.87 (0.88 - 53.66)	330	50	5.71 (0.76 - 42.77)
Assisting patient to toilet	153	50	3.07 (0.87 - 10.88)	315	48	2.82 (0.84 - 9.42)
Assisting patient to eat/drink	145	48	2.47 (0.89 - 6.87)	306	48	3.47 (1.04 - 11.55)*
Transferring patient by one person	101	34	1.47 (0.75 - 2.86)	196	34	1.86 (1.00 - 3.48)
Transferring patient by two persons	128	43	1.87 (0.85 - 4.12)	271	45	2.92 (1.20 - 7.09)*
Making bed with patient in bed	159	53	-	328	50	6.29 (0.84 - 47.00)
Making bed without patient in bed	152	47	1.27 (0.47 - 3.42)	320	46	1.31 (0.49 - 3.49)
Moving bed with patient in bed	136	44	1.73 (0.73 - 4.10)	278	50	17.98 (2.45 - 132.28)*
Moving bed without patient in bed	112	38	2.12 (0.94 - 4.79)	237	46	5.78 (2.23 - 14.96)*
Wound care	123	41	1.69 (0.83 - 3.45)	254	39	1.47 (0.74 - 2.92)
Preparation equipment	148	46	1.29 (0.51 - 3.26)	308	48	3.26 (0.98 - 10.86)
Medication	119	36	0.97 (0.49 - 1.94)	247	37	1.28 (0.66 - 2.48)
Administrative work	130	39	0.92 (0.44 - 1.92)	275	39	1.03 (0.51 - 2.07)

* p < 0.05

Table 5. Crude odds ratios (ORs) for shoulder pain and work postures.

Variables	Persistent pain			Pain that limited work activities		
	Subjects	Cases	OR (95 % CI)	Subjects	Cases	OR (95 % CI)
Working above shoulder height	121	42	2.03 (0.95 - 4.35)	270	47	4.74 (1.66 - 13.55)*
Working with arms away from body	148	49	2.59 (0.85 - 7.99)	313	48	2.84 (0.85 - 9.49)
Hyperextension of wrist and demand of high strength	159	53	-	331	48	1.64 (0.48 - 5.59)
Neck/Shoulder are not in neutral position	160	53	-	341	50	3.61 (0.48 - 27.43)
Bending and twisting	156	51	4.13 (0.92 - 18.56)	331	49	2.61 (0.60 - 11.26)
Sitting for long periods	116	35	1.04 (0.52 - 2.08)	249	35	1.01 (0.54 - 1.92)
Standing for long periods	160	51	6.08 (0.78 - 47.77)	333	46	0.80 (0.29 - 2.19)
VDU (Visual display unit) work for long periods	88	31	1.68 (0.87 - 3.25)	182	29	1.38 (0.76 - 2.50)
Working in uncomfortable postures	139	49	4.36 (1.46 - 13.03)*	296	44	1.80 (0.74 - 4.43)
Lifting objects between 5 – 10 kg	108	38	2.02 (0.99 - 4.10)	236	42	3.22 (1.46 - 7.09)*
Lifting objects between 10 – 25 kg	97	36	2.18 (1.09 - 4.34)*	200	35	2.05 (1.08 - 3.91)*
Lifting objects up from 25 kg	88	32	1.83 (0.94 - 3.55)	173	29	1.59 (0.87 - 2.91)

* p < 0.05

After adjusting for demographic and job-related variables (age, occupation, having regular exercise and job control), factors which were statistical significantly associated with persistent shoulder pain were: the 41-50 years age group, transporting patient

by wheelchair and lifting objects between 10-25 kg (Table 6). For shoulder pain that limited work activities (adjusted for age and occupation), only "lifting objects between 5-10 kg" was statistically associated with the complaint (Table 7).

Table 6. Adjusted odds ratios (ORs) for persistent shoulder pain and associated factors.

Variables	Odds ratio	95% CI	p value
Age (yr)			
21-30 yr	1		
31-40 yr	1.72	0.69 -4.27	0.246
41-50 yr	2.95	1.02 -8.52	0.045
51-60 yr	0.60	0.06 -6.39	0.675
Occupation			
Registered nurses	1		0.592
Licensed practical nurses	0.783	0.32 -1.92	
Having regular exercise			
Yes	1		0.055
No	2.69	0.98 -7.39	
Job control			
High	1		0.077
Low	2.36	0.91 -6.12	
Transporting patient by wheelchair	5.48	1.11 -27.05	0.037
Working in uncomfortable postures	2.84	0.87-9.29	0.084
Lifting objects between 10 – 25 kg	2.27	1.01 -5.12	0.047

Table 7. Adjusted odds ratios (ORs) for shoulder pain that limited work activities and associated factors.

Variables	Odds ratio	95% CI	p value
Age (yr)			
21-30 yr	1		
31-40 yr	1.05	0.48 - 2.29	0.898
41-50 yr	1.01	0.42 - 2.45	0.984
51-60 yr	1.26	0.29 - 5.43	0.756
Occupation			
Registered nurses	1		0.985
Licensed practical nurses	1.01	0.49 - 2.04	
Assisting patient to toilet	0.53	0.12 - 2.26	0.388
Moving bed with patient in bed	8.32	0.99 - 69.51	0.050
Moving bed without patient in bed	2.59	0.92 - 7.27	0.071
Working above shoulder height	2.74	0.90 - 8.35	0.075
Lifting objects between 5 -10 kg	2.65	1.07 - 6.54	0.035

Discussion

The prevalence rates of shoulder pain in this study were lower than some other studies, probably due to our stricter case definition. Cases with minor or transient episodes of shoulder pain were not calculated as persistent shoulder pain. Direct comparisons among studies are difficult, due to the differences in methodology and assessment of outcomes.

We found that age seemed to be associated with persistent shoulder pain in dose-response manner, except for the oldest category where the association tailed off. Similar pattern had been previously reported in other studies.⁽⁶⁾ It was possible due to increasing degeneration of the tendons or development of osteoarthritis in the joints and elderly personnel had shifted to less hazardous job. In contrast to other previously studies, marriage was associated with persistent shoulder pain in this study.⁽⁵⁾ Not having regular exercise was also significantly associated with the complaint, while previous studies showed inconsistency results.^(10,15,17)

Almost job-related variables were not associated with persistent shoulder pain except low job control. This was consistent results with previous studies.^(6-7,15-17)

After adjusting for demographic and job-related variables, almost all nursing tasks were not associated with persistent shoulder pain, except for transporting patient by wheelchair (OR 5.48, 95 % CI 1.11 – 27.05) and lifting objects between 10 -25 kg (OR 2.27, 95 % CI 1.01– 5.12). For shoulder pain that limited work activities, only lifting objects between 5-10 kg (OR 2.65, 95 % CI 1.07– 6.54) was associated with the complaint. These associations were also

reported in several studies.⁽¹⁰⁻¹²⁾

As this study is cross sectional design, the associations between shoulder pain and some factors can be established but no conclusions on the temporality of the relations could be made. This design might have also entailed sources of bias. Subjects who experienced musculoskeletal complaints might have resigned or moved away from hazardous jobs, left only those who had no such illness (healthy worker survival bias) and resulted in underestimation of the prevalence of musculoskeletal complaints. A number of subjects might not be able to recall their illness during the past 12 months, and information bias could be caused by better recall or overestimation of past exposures among those with shoulder complaint. Furthermore, negative results might be attributable to our small sample size (some subgroups of analyses) and thus insufficient statistical power.

Implications

This study supports that shoulder pains are the results of several factors, including work-related and individual factors. Ergonomic evaluations and improvements in working tasks and conditions may prevent the occurrence of such complaints and work disability. Further studies should thus focus on the prevention of these problems and require further testing with prospective study to reduce potential bias of cross sectional study.

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