Prevalence of Low Back Symptom and Impact of Job Stress among Working Women as Clinical Nurses in University Hospitals

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Purpose: This study was aimed to investigate the impact of job stress on low back symptoms among Clinical nurses (CNs) in university hospital. **Methods:** A total of 322 CNs employed in a hospital in Seoul were interviewed by a well-trained interviewer using the structured questionnaire. Data collected for this study includes demographics, social and work characteristics, low back symptoms, and job stress. To test the impact of job stress on low back symptoms, we used multiple logistic regression analysis. **Results:** The prevalence of low back symptoms was 25.8% in this study. Low back symptoms differed significantly by factors, such as physical work burden, past history of injury and work duration. Also low back symptoms differed significantly by organizational system among independent variables of job stress. In a multiple logistic regression analysis, the odds ratio of organizational system to low back symptoms was 2.07 after an adjustment. **Conclusion:** This study showed that organizational system among job stress was a significant variable in explaining low back symptoms. We suggest the improvement of organizational system category as a preventive strategy for low back pain in CNs working in hospital.

Key Words: Clinical nurse, Lower back pain, Stress

INTRODUCTION

Nursing occurs in an environment that is notable for its high physical strain on the lower back area. This is due to the fact CNs usually work in a standing position. Among female workers, nursing aides, licensed or practical nurses and maids had the highest rates of back pain (Heibert, Weiser, Campello, & Nordin, 2007). Recent report emphasized that complaints of initial back pain can be the appropriate time to identify individuals who are at a higher risk for developing chronic or acute musculoskeletal symptoms (Daraiseh, Cronin, Davis, Shell, & Karwowski, 2009).

Along with a demanding physical workload, hospital nurses felt job stress through other environmental factors that include job demand, insufficient job control, interpersonal conflict, organizational system, occupa-

tional climate etc. They also felt job stress from the rapid change of information, various health care needs, expanded work expectation, and advance nursing practice (Kim, Park, & Park, 2009). All of these factors can have a mentally and physically negative impact on nurses (Kim et al., 2006). Occupational errors or accidents involving CNs have a direct and critical influence on the life and prognosis of patients and these are other important issues that must be addressed (Suzuki et al., 2004).

Work-related musculoskeletal symptoms are disorders of the nerves, tendons, muscles, and supporting tissues that result from, or are made worse by, stressful working conditions (Cohen, Gjessing, Fine, Bernard, & McGlothlin, 1997) and are the single target category for work-related health problems in most Asian countries including Korea (Lee, Kim, & Kim, 2008). The development of musculoskeletal symptoms is caused by the accumulation of micro injuries from

repetitive motion or physical stress. Numerous studies have shown that musculoskeletal symptoms are attributed to multiple factors, such as physical workload and psychosocial factors at work (Boswell, & McCunney, 2003; Bureau of Labor Statistics, 2009; Cathilic university, 2003; Halpern, 2007; Ministry of employment and labor, 2004; Rempel, & Janowitz, 2007).

Korea has seen a marked increase in musculoskeletal symptoms since the 1990s due to the increased use of computer terminals, repetitive work, increased work stress, and aging in the working population (Lee, Han, Ahn, Hwang, Kim, 2007; Ministry of Labor, 2010). In Korea, the musculoskeletal symptoms of nonfatal occupational illness have accounted for 68%, 74%, and 77% for the years of 2006, 2007 and 2008, respectively (Park, Kim, & Seo, 2008). These studies have focused on the 6 areas of musculoskeletal symptoms, and not specifically low back symptoms.

Until now, epidemiologic researches on musculoskeletal injuries or disorders (Kim et al., 2005; Nam & Lee, 2003) have mainly been in relation to physical capacity (e.g., muscle strength, range of movement), whereas little attention has been given to low back symptoms and its psychosocial factors.

It is important to mention that working women continue to fulfill household tasks when they come back home from work. They continue to carry out their tasks at a standing position. Keeping this in mind, the primary aim of this study was to investigate the impact of job stress on low back symptoms among women CNs employed in one university affiliated hospital in Seoul. The second aim was to predict the impact factors on low back symptoms. The study was expected to provide some important basic information for establishing preventive strategies for low back symptoms among women CNs in a university hospital.

METHODS

A. Study subjects

This study was conducted at one university hospital in Seoul, South Korea. A total of 500 CNs were identified as the study population. From this pool, a total of 346 women CNs were recruited for this study. After official approval from the department of nursing administration, the self-administered questionnaire was distributed to the subjects. The response rate was 69.2%. We excluded questionnaires that contained grossly incomplete data (n=24) and were able to analyze data

from 322 eligible subjects. We did post hoc power analysis and got an effect size of 0.707, greater than large size with alpha=.05, sample size=322, and two tails by G Power 3.1 (Faul, Erdfelder, Buchner, & Lang, 2009).

B. Data collection

Data were collected using a structured questionnaire from February to April 2007. All subjects were given a verbal explanation of the study procedures before they submitted a written informed consent. For this study, 322 eligible subjects were included in the analysis.

C. Measurements

The questionnaire included items on socio-demographics, personal medical history, smoking, alcohol drinking habits and work related factors.

a. Low back symptoms
Low back symptomswere measured by using part of the KOSHA Code H-30-2003 that has been developed by the Korea Occupational Safety and Health Agency (KOSHA). It consisted of work-related symptoms in any of the six body regions (neck, shoulders, arms, hands/wrists, lower back, and legs/feet). For the purpose of this study, we used items that only focused on the lower back. Symptom cases were defined as having occurred at least once a month or having lasted at least one week in the past year with at least moderate pain on the pain intensity scale.

b. Job stress
Job stress was evaluated by 24 items of the short form of the Korean Occupational Stress Scales (KOSS-SF) in the work setting (Chang et al., 2005). Items were scored using the Likert scales for the response, ranging from 1 (not at all) to 4 (always). This stress scale had seven subscales as follows: job demand (4-items), insufficient job control (4-items), interpersonal conflict (3-items), job insecurity (2-items), organizational system (4-items), lack of reward (3-items), and occupational climate (4-items). The levels on the subscales of occupational stress were divided by using a median as the high and low group.

D. Statistical analysis

Descriptive statistics were used to examine the dis-

tribution of demographics, social, and occupational characteristics. x^2-test was used to estimate the difference in the existence of low back symptoms according to 4 categorical analyses: 1. demographics, 2. social, 3. work characteristics, and 4. job stress. Multiple logistic regression modeling was used to examine the impact of job stress on low back symptoms. Statistical analysis was performed using SPSS/WIN 14.0 (SPSS Inc., Chicago, IL, USA). All P values were based on two-sided tests and were considered to be statistically significant ($p<.05$).

RESULTS

A. Prevalence of low back symptoms and its difference by background characteristics

The prevalence of low back symptoms was 25.8% in the study subjects. About 52% were between 20 and 29 years of age, 33% were between 30 and 39 years of age, and 15% were older than 40 years, indicating that the majority of the subjects were in their 20s and 30s. There was no difference in the prevalence of low back symptoms according to age and marital status. However, a significant difference in the prevalence of low back symptoms was observed in having physical work burden (x^2=18.2, $p<.001$). There was a difference in the prevalence of low back symptoms from having a past history of injury, although a borderline statistical significance was observed (x^2=3.64, p=.056). Significant difference was shown in work duration, indicating that the majority of prevalent cases occurred less than 10 years (63.7%) (x^2=11.1, p=.025) (Table 1).

B. Distribution of job stress score

The average score of total job stress was 47.8±9.1. In the mean scores for individual subscales, job demand was the highest. The second highest was organizational system and the third highest was insufficient job control (Table 2).

Table 1. Differences of Background Characteristics by Low Back Symptoms (N=322)

Characteristics	Categories	n (%)	Low back symptoms Negative n (%)	Low back symptoms Positive n (%)	x^2	p
Age (year)	20~29	168 (52.2)	120 (71.4)	48 (28.6)	1.44	.488
	30~39	106 (32.9)	82 (77.4)	24 (22.6)		
	≥40	48 (14.9)	37 (77.1)	11 (22.9)		
Marital status	Single	183 (56.8)	132 (72.1)	51 (27.9)	0.97	.325
	Married	139 (43.2)	107 (77.0)	32 (23.0)		
Housework	No	59 (18.3)	48 (81.4)	11 (18.6)	1.92	.166
	Yes	263 (81.7)	191 (72.6)	72 (27.4)		
Physical work burden	No	142 (44.1)	122 (85.9)	20 (14.1)	18.2	<.001
	Yes	180 (55.9)	117 (65.0)	63 (35.0)		
Past history of injury	No	210 (65.2)	163 (77.6)	47 (22.4)	3.64	.056
	Yes	112 (34.8)	76 (67.9)	36 (32.1)		
Work department	Wards	140 (43.5)	104 (74.3)	36 (25.7)	2.27	.322
	Special department	103 (32.0)	72 (69.9)	31 (30.1)		
	Outpatient department	79 (24.5)	63 (79.7)	16 (20.3)		
Work duration (year)	<5	112 (34.8)	83 (74.1)	29 (25.9)	11.1	.025
	5~9	74 (23.0)	46 (62.2)	28 (37.8)		
	10~14	62 (19.2)	54 (87.1)	8 (12.9)		
	15~19	47 (14.6)	36 (76.6)	11 (23.4)		
	≥20	27 (8.4)	20 (74.1)	7 (25.9)		

C. Differences in low back symptoms by subscales of job stress

The prevalence of low back symptoms differed significantly in organizational system, indicating that the prevalence of was significantly higher in the high stress group of organizational system than in the low stress group (x^2=4.36, p=.037). However, occupational climate had a borderline statistical significance (x^2= 3.60,

Table 2. Distribution of Job Stress Score for the Subjects

Variables	M±SD	Median
Job demand	62.4±14.8	66.7
Insufficient job control	52.7±16.3	50.0
Interpersonal conflict	36.2±13.5	33.3
Job insecurity	41.1±18.8	33.3
Organizational system	54.6±14.5	50.0
Lack of reward	48.0±15.4	44.4
Occupational climate	39.3±15.2	41.7
Total score	47.8±9.10	47.6

p=.058) (Table 3).

D. Odds ratio of socio-demographic variable for low back symptoms

Physical work burden, past history of injury, and work duration had an impact on low back pain symptoms. Physical work burden and past history of injury had significant effects on low back symptoms after controlling for age, marital status, housework, and work department (Odd's ratio 3.31, p<.001; Odd's ratio 1.71, p=.044, respectively). Subjects who had worked for a period of 5~9 years had a 3.81 times greater possibility of experiencing low back symptoms than those who worked for less than 1 year (p=.039) (Table 4).

E. Odds ratio of job stress for low back symptoms

To determine the association between job stress and low back symptoms, a multiple logistic regression analysis was performed on the study subjects. Organizational system was a significant factor for low back symptoms. The highest stress group in organizational

Table 3. Differences in Low Back Symptoms by Job Stress (N= 322)

Variables	Degree	Total	Low back symptoms		x^2	p
			Negative	Positive		
		n (%)	n (%)	n (%)		
Job demand	Low	158 (49.1)	122 (77.2)	36 (22.8)	1.45	.228
	High	164 (50.9)	117 (71.3)	47 (28.7)		
Insufficient job control	Low	116 (36.0)	81 (69.8)	35 (30.2)	1.83	.176
	High	206 (64.0)	158 (76.7)	48 (23.3)		
Interpersonal conflict	Low	42 (13.0)	33 (78.6)	9 (21.4)	0.48	.490
	High	280 (87.0)	206 (73.6)	74 (26.4)		
Job insecurity	Low	52 (16.1)	40 (76.9)	12 (23.1)	0.24	.627
	High	270 (83.9)	199 (73.7)	71 (26.3)		
Organizational system	Low	82 (25.5)	68 (82.9)	14 (17.1)	4.36	.037
	High	240 (74.5)	171 (71.3)	69 (28.8)		
Lack of reward	Low	112 (34.8)	87 (77.7)	25 (22.3)	1.07	.301
	High	210 (65.2)	152 (72.4)	58 (27.6)		
Occupational climate	Low	153 (47.5)	121 (79.1)	32 (20.9)	3.60	.058
	High	169 (52.5)	118 (69.8)	51 (30.2)		
Total	Low	159 (49.4)	125 (78.6)	34 (21.4)	3.17	.075
	High	163 (50.6)	114 (69.9)	49 (30.1)		

system had 2.07 times greater possibility of experiencing low back symptoms than the low stress group (95% CI 1.03~4.19). The odds ratio of occupational climate to low back symptoms was 1.63 (95% CI 0.98~2.72 and was not significant after an adjustment (Table 5).

DISCUSSION

We investigated factors, including socio-demographic variables and job stress that were related to low back symptoms among women CNs employed in one university hospital. The prevalence of low back symptoms was 25.8%. Compared to other study results on Korean employees from Chang et al. (2004), our study indicated slightly higher findings (24.9% vs 25.8%). The average score of total job stress was 47.8 (SD=9.1) in this study and our findings were consistent with a previous study on hospital nurses (Kim, Kim, & Ahn, 2007).

This study revealed that job demand was the highest category of job stress in the subgroup analysis. This result was consistent with previous studies (Kim et al., 2007; Kim et al., 2009). The mean score of job demand was 62.4 in this study. In comparison to 58.8 in a previous report (Chang et al., 2004), these findings indicated that nurses had high work stress due to high

Table 4. Odds ratios of Physical Work Burden, Past History of Injury and Work Duration for Low Back Symptoms by Multiple Logistic Regression Model[†]

Independent variables	Categories	Low back symptoms[†]		
		OR	(95% CI)	p
Physical work burden	No	1.00	(Reference)	
	Yes	3.31	(1.84~5.99)	< .001
Past history of injury	No	1.00	(Reference)	
	Yes	1.71	(1.02~2.87)	.044
Work duration (year)	<1	1.00	(Reference)	
	1~4	2.15	(0.71~6.50)	.174
	5~9	3.81	(1.07~13.56)	.039
	10~14	1.14	(0.19~6.83)	.883
	15~19	2.91	(0.28~30.40)	.372
	≥20	4.15	(0.20~85.53)	.357

OR=odds ratio; CI=confidence interval.
[†]Adjusted for age, marital status, housework and work department.

Table 5. Odds ratios of Job Stress for Low Back Symptoms by Logistic Regression Model

Independent variables		Low back symptoms					
		Unadjusted			Adjusted[†]		
		OR	(95% CI)	p	OR	(95% CI)	p
Job demand	(High/Low)	1.36	(0.82~2.25)	.229	1.07	(0.61~1.88)	.802
Insufficient job control	(High/Low)	0.70	(0.42~1.17)	.177	0.66	(0.37~1.17)	.154
Interpersonal conflict	(High/Low)	1.32	(0.60~2.88)	.491	1.52	(0.66~3.47)	.327
Job insecurity	(High/Low)	1.19	(0.59~2.39)	.627	1.07	(0.50~2.31)	.857
Organizational system	(High/Low)	1.96	(1.03~3.72)	.039*	2.07	(1.03~4.19)	.042*
Lack of reward	(High/Low)	1.33	(0.76~2.27)	.301	1.48	(0.83~2.66)	.183
Occupational climate	(High/Low)	1.63	(0.98~2.72)	.059	1.51	(0.87~2.64)	.146
Total job stress	(High/Low)	1.58	(0.95~2.62)	.076	1.58	(0.91~2.75)	.103

OR=odds ratio; CI=confidence interval.
[†]Adjusted for age, marital status, housework, physical work burden, past history of injury, and work department.

workload and job demand in hospital settings.

We found that physical work burden, past history of injury and work duration had significant effects on low back symptoms. Since hospital nursing takes place in a work environment that is notable for its high use of the lower back in physical activities, such as moving patients, nursing couch, and working in a standing position for long hours (Kim et al., 2007; Kim et al., 2009), the prevalence of low back symptoms has been reported to be higher in nurses than in the general population (Heibert et al., 2007). In this study, organizational system had a significant impact on low back symptoms and it needs to be compared by job classification in the future. We found that the highest level of job stress was observed in job demand and the second highest level in organizational system, indicating that work characteristics of hospital nursing could be relatively unpredictable and produce feelings of insufficient job control. These findings were consistent with previous reports from Korean nurses (Kim et al., 2007; Kim et al., 2009). It is possible that the current work environment could make high work stress in hospital settings and increase psychological strain, leading to an increased prevalence of musculoskeletal symptoms (Hurrell & Kelloway, 2007). As there are various job types in hospital settings, hospital nurses should provide many kinds of health services in cooperation with other hospital staffs, such as hospital officials and paramedical staffs.

One limitation of this study is the cross-sectional design, because we could not observe a cause-and effect relationship between low back symptoms and job stress over an extended period of time. Another limitation is the use of a measurement tool that relies on subjective reporting. Finally, other potential confounding variables were not evaluated. Therefore, a more comprehensive study evaluating low back symptoms both at the workplace and in daily life need to be carried out in the future. Notwithstanding the known limitations, we thought that the subjective responses of the subjects were somewhat essential for the purpose of investigating our interest variables as those variables such as low back symptoms and work stress contain subjective characters in and of itself. Moreover, diagnosis of low back musculoskeletal disorders and work stress may often be controversial due to a lack of standardized diagnostic criteria on which the study of its prevalence is dependent upon.

CONCLUSION

In conclusion, our findings suggest that low back symptoms were associated with job stress related to organizational system for hospital nurses. To prevent low back musculoskeletal symptoms in hospital nurses, it is important to consider not only job contents but also work environment related to the job stress. Further investigation will be needed to establish preventive strategies for hospital nurses.

CONFLICT OF INTEREST

The authors have no conflict of interest to declare on this study.

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