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Original Article

Relationship between concealment of emotions at work and musculoskeletal symptoms: results from the third Korean working conditions survey

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Abstract: In this study, we explored the relationship between concealing emotions at work and musculoskeletal symptoms in Korean workers using data from a national, population-based survey. Data were obtained from the third Korean Working Conditions Survey in 2011. We investigated the prevalence of three musculoskeletal symptoms ("back pain", "pain in the upper extremities", and "pain in the lower extremities"). Multiple logistic regression analysis was also performed to determine odds ratios (ORs) for musculoskeletal symptoms according to concealing emotions at work, adjusting for socioeconomic factors. In both sexes, the emotion-concealing group showed a significantly higher prevalence of "pain in the upper extremities" and "pain in the lower extremities" than the non-emotion-concealing group. For back pain, male—but not female—workers who concealed their emotions showed a higher prevalence than their non-emotion-concealing counterparts; the difference was statistically significant. Adjusted ORs for musculoskeletal symptoms (excluding "back pain" for female workers) in the emotion-concealing group were significantly higher. Our study suggests that concealment of emotions is closely associated with musculoskeletal symptoms, and the work environment should operate in consideration not only of the physical health work condition of workers but also of their emotional efforts including concealing emotion at work.

Key words: Concealment of emotions, Emotional labor, Musculoskeletal symptom, Back pain, Upper extremity pain, Lower extremity pain

Introduction

In workplace, workers may suppress their subjective emotion and express positive emotion to meet work demands. This "surface acting" accounts for a key component in defining emotional labor (EL)[1)]. Previous studies have shown that EL has a positive relationship with depression, sleep disturbance, fatigue, absenteeism, and burnout[2–5)]. Even though workers are not in job sectors involving "people work", they may be required to hide their negative emotions and sustain positive emotional expressions during interaction with their co-workers or superiors in the workplace. One's subjective emotional effort could affect physical condition of individual and be associated with musculoskeletal pain[6)]. Some studies suggested that EL is associated with musculoskeletal symptoms in relation to occupational stress[7, 8)].

Musculoskeletal disorders account for the largest proportion of reported occupational diseases, and lead to high financial and time costs due to efforts to compensate for

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and correct these issues[9]. Musculoskeletal disorder can occur under various work conditions and can affect almost every parts of body. Despite physical work conditions are considered as significant factors of musculoskeletal disorder, there have been evidences that psychosocial work conditions such as high works demands, job satisfaction, job stress, social support at work, and so on can affect work-related musculoskeletal symptoms[8, 10, 11]. Concealing emotion at work also can be considered as a psychological occupational stressor and could be associated with musculoskeletal symptoms.

Although there are several studies which suggested evidences for the role of EL in the musculoskeletal symptoms[7, 8], there has been no study which evaluated the relationship between concealing emotions and musculoskeletal symptoms. In this study, we investigated the association between concealment of emotions at work and musculoskeletal symptoms among Korean workers using data from a national, population-based survey.

Subjects and Methods

Materials and subjects

This study was based on data obtained from the third Korean Working Conditions Survey (KWCS), which was performed by the Korean Occupational Safety and Health Research Institute between June 1, 2011 and November 30, 2011. The third KWCS used a systematic, stratified, cluster-sampling procedure based on the 2005 Korean National Census Registry, and was administered to workers aged above 15 yr who had been paid for more than 1 h of work during the previous week. In total, 50,032 workers were surveyed and interviewed in the third KWCS. In this study, subjects were selected based on the following criteria: paid worker (n=29,711); and working in the office, sales, or services sector, according to the standard Korean classification of occupation (n=17,143). We excluded workers whose working conditions involved routinely painful postures, standing, repetitive movements of the hands and arms, or exposure to noise or vibrations, because such factors may affect musculoskeletal symptomatology regardless of whether emotions are concealed (n=4,957). Finally, 12,186 workers were enrolled in this study. The study was approved by the Institutional Review Board of Haeundae Paik Hospital (IRB No.2016-05-004).

Emotion-concealing status at work and musculoskeletal symptoms

We used the questionnaire item "Do you have to hide your emotions during your worktime?" to identify workers who concealed their emotions at work. Respondents who answered "always" or "mostly" were categorized as the emotion-concealing group (n=3,730) and 8,456 respondents who answered "sometimes", "not much", or "never" were the non-emotion-concealing group.

Survey items pertaining to "health problems during the past 12 months": "back pain", "pain in the upper extremities (shoulder, neck, arms)", and "pain in the lower extremities (hip, leg, and foot)" were included to index the musculoskeletal component. Respondents were classified according to whether they answered "yes" or "no" to these questions; respondents who responded "yes" to more than one of the three musculoskeletal symptoms listed above were considered positive for musculoskeletal problems. The symptoms of "headache and eye-strain", and "general fatigue" were considered as work-related physical symptoms and also included as variables in this study.

Other variables

Age, weekly number of working hours, and nightshift work, socioeconomic, and chronic disease status were included as variables. Age was grouped by 10 yr bins ("younger than 30 yr" to "older than 50 yr"). Hours worked per week were classified into three groups ("less than 40 h/wk", "from 41 to 60 h/wk", and "more than 61 h/ wk"). Monthly household income was divided into four groups ("less than 1.5 million won", "from 1.5 to 2.5 million won", "from 2.5 to 4 million won", and "more than 4 million won"). Regarding nightshift work, respondents who worked at night for more than 4 d per month were classified as nightshift workers; the remaining respondents were not nightshift workers. Hypertension status was also included as a variable.

Statistical analysis

Musculoskeletal symptoms were analyzed according to whether emotions were concealed using χ^2; separate analyses were done for each sex. Multiple logistic regression analysis was also performed to determine odds ratios (ORs) for musculoskeletal symptoms according to concealing emotions, adjusting for socioeconomic factors. SPSS for Windows software (ver. 22; IBM Corp., Armonk, NY, USA) was used to conduct all of the statistical analyses.

Results

Table 1 presents the respondents' demographic characteristics by musculoskeletal symptom prevalence and sex.

Table 1. Characteristics of the study population and work-related musculoskeletal symptoms by sex

Variable		Musculoskeletal problems*					
		Male			Female		
		Yes (%)	No (%)	*p*-value	Yes (%)	No (%)	*p*-value
Age (yr)	<30	485 (41.2)	691 (58.8)	0.001	701 (43.4)	914 (56.6)	<0.001
	31–40	941 (39.5)	1,439 (60.5)		869 (45.2)	1,053 (54.8)	
	41–50	767 (41.3)	1,088 (58.7)		849 (53.4)	741 (46.6)	
	>50	469 (47.1)	527 (52.9)		404 (62.0)	248 (38.0)	
Job type	Office	1,564 (38.4)	2,507 (61.6)	<0.001	1,010 (42.8)	1,350 (57.2)	<0.001
	Sales	443 (41.0)	637 (59.0)		613 (49.8)	617 (50.2)	
	Services	655 (52.1)	601 (47.9)		1,200 (54.8)	989 (45.2)	
Monthly income (won)	<1.5 million	315 (48.2)	339 (51.8)	<0.001	1,126 (51.2)	1,074 (48.8)	0.031
	1.5–2.5 million	456 (47.5)	503 (52.5)		819 (46.6)	939 (53.4)	
	2.5–4 million	825 (40.5)	1,214 (59.5)		557 (47.8)	608 (52.2)	
	>4 million	1,066 (38.7)	1,689 (61.3)		321 (48.9)	335 (51.1)	
Working hours (h/wk)	<40	897 (33.7)	1,766 (66.3)	<0.001	1,074 (43.8)	1,377 (56.2)	<0.001
	41–60	1,533 (46.1)	1,790 (53.9)		1,517 (50.8)	1,472 (49.2)	
	>61	232 (55.1)	189 (44.9)		232 (68.4)	107 (31.6)	
Nightshift work	Yes	263 (50.7)	256 (49.3)	<0.001	163 (52.2)	149 (47.8)	0.218
	No	2,399 (40.7)	3,489 (59.3)		2,660 (48.7)	2,807 (51.3)	
Hypertension	Yes	125 (52.1)	115 (47.9)	<0.001	80 (75.5)	26 (24.5)	<0.001
	No	2,537 (41.1)	3,630 (58.9)		2,743 (48.4)	2,930 (51.6)	
Concealment of emotions	Yes	945 (50.4)	930 (49.6)	<0.001	1,048 (56.5)	807 (43.5)	<0.001
	No	1,717 (37.9)	2,815 (62.1)		1,775 (45.2)	2,149 (54.8)	

*Respondents answering "yes" to more than one of three musculoskeletal symptoms (back pain, pain in the upper extremity, and pain in the lower extremity) were considered positive for musculoskeletal problems.

There were 12,186 respondents in our study, consisting of 6,407 (52.6%) males and 5,779 (47.4%) females. Our results showed a higher prevalence of musculoskeletal symptoms among workers who were older, worked longer hours, and had lower incomes. Concerning occupation, workers in the services sector showed the highest prevalence of symptoms, followed by those working in sales; office workers had the lowest prevalence of musculoskeletal symptoms. Workers who performed nightshift work and were receiving treatment for hypertension also showed a high prevalence of symptoms. These trends were present and statistically significant in both sexes. The prevalence of musculoskeletal symptoms was significantly different, in both males and females, according to experiencing concealing emotion at work.

The prevalence of three musculoskeletal symptoms and two physical symptoms according to whether emotions were concealed is presented in Table 2. The emotion-concealing group showed a higher prevalence of "pain in the upper extremities", "pain in the lower extremities", "headache", "eye-strain", and "general fatigue" than the non-emotion-concealing group, and these differences were statistically significant for both sexes. In the case of back pain, male workers who concealed emotions showed a higher prevalence than the non-emotion-concealing group (7.0% vs. 5.5%) and the difference was statistically significant. However, no significant difference in back pain was seen between female emotion-concealing and non-emotion-concealing workers.

Crude and adjusted odds ratios (ORs), and 95% confidence intervals, for the musculoskeletal and physical symptoms are presented in Table 3 according to whether emotions were concealed. In the logistic regression model, age, monthly income, number of working hours, and nightshift work and hypertension status were included. Crude and adjusted ORs for two of the musculoskeletal symptoms (i.e., all except back pain) and two physical symptoms in the emotion-concealing group were significantly higher. In the case of back pain, while the male concealing-emotions group showed significantly high ORs (crude OR=1.292; 95% CI: 1.039–1.606 and adjusted OR=1.253; 95% CI: 1.005–1.562, respectively) as compared to the non-concealing-emotions group, female workers did not show statistically significant results (crude

Table 2. Relationship between concealment of emotions and self-reported work-related musculoskeletal and physical symptoms by sex

Self-reported work-related symptom	Male			Female		
	Concealment of emotions		*p*-value	Concealment of emotions		*p*-value
	Yes	No		Yes	No	
Back pain						
Yes	132 (7.0)	1,743 (93.0)	0.021	165 (8.9)	1,690 (91.1)	0.574
No	251 (5.5)	4,281 (94.5)		367 (9.4)	3,557 (90.6)	
Pain in the upper extremities (shoulder, neck, arm)						
Yes	465 (24.8)	1,410 (75.2)	<0.001	576 (31.1)	1,279 (68.9)	0.001
No	865 (19.1)	3,667 (80.9)		1060 (27.0)	2,864 (73.0)	
Pain in the lower extremities (hip, leg, foot)						
Yes	266 (14.2)	1,609 (85.8)	<0.001	361 (19.5)	1,494 (80.5)	0.032
No	455 (10.0)	4,077 (90.0)		673 (17.2)	3,251 (82.1)	
Headache or eye-strain						
Yes	391 (20.9)	1,484 (79.1)	<0.001	381 (20.5)	1,474 (79.5)	<0.001
No	666 (14.7)	3,866 (85.3)		592 (15.1)	3,332 (84.9)	
General fatigue						
Yes	506 (27.0)	1,369 (73.0)	<0.001	556 (30.0)	1,299 (70.0)	<0.001
No	783 (17.3)	3,749 (82.7)		756 (19.3)	3,168 (80.7)	

Table 3. Odds ratios of self-reported work-related musculoskeletal and physical symptoms in the emotion-concealing versus non-emotion-concealing group by sex

OR (95% CI)	Male		Female	
	OR (95% CI)		OR (95% CI)	
	Crude	Adjusted*	Crude	Adjusted*
Back pain	1.292 (1.039–1.606)	1.253 (1.005–1.562)	0.946 (0.780–1.147)	0.982 (0.806–1.196)
Pain of upper extremities (shoulder, neck, arm)	1.398 (1.230–1.590)	1.373 (1.206–1.563)	1.217 (1.078–1.373)	1.263 (1.116–1.430)
Pain of lower extremities (hip, leg, foot)	1.481 (1.260–1.742)	1.479 (1.254–1.743)	1.167 (1.013–1.345)	1.219 (1.053–1.411)
Headache or eye strain	1.529 (1.332–1.757)	1.505 (1.308–1.732)	1.455 (1.261–1.678)	1.416 (1.226–1.635)
General fatigue	1.770 (1.557–2.011)	1.750 (1.537–1.991)	1.794 (1.580–2.037)	1.821 (1.599–2.073)

OR: odds ratio; CI: confidence interval.

*Adjusted for age, monthly income, number of working hours, and nightshift work and hypertension status.

OR=0.946; 95% CI: 0.780–1.147 and adjusted OR=0.982; 95% CI: 0.806–1.196, respectively) as compared to the non-concealing-emotions group.

Discussion

In this study, we found that concealing emotions at work was associated with various musculoskeletal symptoms. In terms of back pain, this was significantly higher in the male emotion-concealing versus non-emotion-concealing group. However, no difference was observed between the corresponding female groups. The results for the other musculoskeletal symptoms were consistent in both sexes, even after adjusting for demographic factors.

Many studies have explored the relationship between psychological stress at work and musculoskeletal symptoms. One study showed that there was a tendency for neck and shoulder symptoms to develop among workers with highly stressful jobs[12]. Another prospective study suggested that stress at work, including high workload and low decision latitude, was associated with new-onset fibromyalgia[13]. Moreover, Bugajska *et al.* reported that psychosocial factors at work were associated with the prevalence of musculoskeletal complaints and repetitive strain injuries[11].

Employees regulate their emotions to meet work demands, regardless of their own feelings[14, 15]. This emotional dissonance can cause stress and may have det-

rimental health consequences[1, 16]. Concealing emotions at work is an emotional regulation process considered a part of EL. Since employees usually hide their negative emotions rather than positive emotions, this concealment of emotions causes emotional dissonance of the employees. The high prevalence of musculoskeletal symptoms among our respondents may have been due to the stress caused by emotional dissonance. Other Korean studies have shown that the degree of EL is positively correlated with musculoskeletal symptoms; in one such study, the prevalence of musculoskeletal symptoms was higher in an EL group than in a control group[7].

Several previous studies observed a positive relationship between occupation-related psychological factors and back pain, in both sexes[17, 18]. However, we observed a positive relationship between concealing emotions at work and back pain only among male workers. This may be because physical demands are usually more severe among male workers than among female workers. Furthermore, diseases associated with back pain (e.g., herniated disc or spinal stenosis) were not explored by our study. Taken together, these factors may have affected our results.

There have been several studies showing that negative emotions, such as fear and anxiety, are associated with various musculoskeletal symptoms[19]. Negative emotions may worsen existing musculoskeletal conditions. Mental stressors could result in a high level of muscle tension, which can accelerate degenerative changes in both muscles and joints[20]. Also, psychologic conditions may affect the perception of pain. Nociplastic pain such as fibromyalgia could be triggered by stressors[21]. Psychological conditions may lead to central sensitization that involves hyperexcitability of central neurons through various synaptic and neurotransmitter activities[22]. This central sensitization results in the brain and spinal cord being hypersensitive to both noxious and non-noxious stimuli, which plays an important role in generating persistent pain[23]. Moreover, the mechanism of central sensitization explains not only musculoskeletal conditions but also general physical symptoms, such as headache and fatigue[24]. Also, negative emotions may affect amygdala and result in impairment of descending noxious inhibitory control, which causes increased sensitivity to stimuli[25–28]. In our study, pain among workers may have involved both an enhanced pain response due to an existing chronic disease and a somatic stress response to normally non-noxious stimuli. The positive relationship between concealment of emotions and general physical symptoms, such as headache and general fatigue, seen in our study was in agreement with the mechanism of central sensitization.

Furthermore, there are studies supporting the view that concealing negative emotions may independently affect musculoskeletal symptoms. According to a report, a person who has to suppress anger may show lower pain tolerance and higher pain ratings[29]. Persons who tend to "anger-out" their emotions also typically showed high pain ratings when their emotions were suppressed[30]. The results of our study support previous studies and increase our understanding of the implications for management of workers who experience high emotional demand in the workplace.

There were several limitations to our study. First, we used data from a survey that did not include items relating to musculoskeletal disorders; some workers may have had existing diseases but we could not adjust for this. This could have limited the power of our study. In addition, our study was cross-sectional in design and could not assess emotional status or musculoskeletal symptoms on a longitudinal basis. Additional studies employing detailed survey items pertaining to disease status, and indexing long-term changes in working conditions or musculoskeletal status, are needed.

In this study, we evaluated the association between concealment of emotions at work and musculoskeletal symptoms and our study suggests that concealment of emotions is closely related with musculoskeletal symptoms. In the labor policies related to musculoskeletal symptoms in workplace, the work environment should be organized in consideration not only of the physical work condition of workers but also of their emotional efforts including concealing emotion at work.

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Conflict of Interest

None declared.

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