International Journal of Nursing Research (IJNR)

International Peer Reviewed Journal

Research article

The pain had an effect on work-life among university employees

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Abstract

Objective: This study aims to investigate pain characteristics and pain-related factors and their effects on work-life among university employees using data from the Qualities Online Survey in Istanbul, Turkey in 2015. **Methods:** In a cross-sectional research design, the study sample consisted of a total of 122 participants. The questionnaire was responded to by academic and administrative employees. Pain characteristics, individual and work-related factors and effect of pain on work-life were analyzed using descriptive statistics and logistic regression. **Results:** More than 80% of participants experienced pain while working, 75.5% of them suffered from pain more than 6 months. In logistic regression, headaches were more common in employees who experience insomnia. The risk of neck pain was about twenty-three-fold for those experiencing ergonomic problems in the workplace in comparison to those who did not experience ergonomic problems. Employees who had ergonomic problems had about a 15 times greater likelihood of back pain and those who experienced stress in the workplace had a 6 times greater likelihood of back pain. The odds ratio indicates that workers who had a headache, neck pain or back pain had a greater possibility of having a lack of concentration. Lack of concentration and the reduction of work efficiency were respectively likely to occur due to neck pain. **Conclusions:** The significant relations underscore that several preventive interventions in the work environment may be useful to modify both individual and work-related risk factors to prevent a headache, neck and back pain and their negative effect on work life..

Keywords: Pain, University, Employee

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1. Introduction

In the last five decades, some transformations have occurred in the work environment and with the development of computer-based technologies; the number of desk-based occupations has increased [1]. Risk factors due to the work environment may lead employees to experience acute or chronic pain and be detrimental to their work life. Environmental factors (noise, air, light etc.), physical factors (body posture, sitting or standing up for a long time, building features, etc.) and psychological factors (work-related stress, workload, insufficient break times, insomnia) are predictors of any kind of pain [2]. Poor ergonomics, as well as insufficient building features such as air and light, are associated with pain in the work environment. Studies emphasize the importance of the control of pain and related risk factors in the work environment among university employees. Organizational factors such as problems in work atmosphere increased work pressure and insufficient job opportunities are generally related to musculoskeletal discomfort. Naturally, individuals try to relieve their aches while fulfilling responsibilities in the work environment. Regardless, studies carried out to date found that the employees still experience pain and

Musculoskeletal problems such as upper and low back pain, neck pain and related factors among university staff [3-5].

Therefore, support mechanisms should be established for employees apart from individual coping methods to prevent pain and related problems that may occur in the work environment.

In many epidemiologic studies, researchers have discovered the association between working in an office

Access this article online

Website:www.innovationalpublishers.com/journal/ijnr | e-ISSN: 2456-1320

How to cite this article: Ayda Kebapci, Begum Yalcin, The pain had an effect on work-life among university employees. Int J Nur Res. 2018; 4(2): 110-116.

environment with musculoskeletal symptoms in developed countries. However, there is still a need for in-depth and qualified studies about pain and work environment adjustments and the development of support mechanisms to improve individual coping strategies with pain among university employees in Turkey. In order to determine the most effective strategies for pain management in the work environment, the first step should be the identifying pain characteristics and related factors as well as their effect on an individual's work life. This study is important to prevent the occurrence of pain among university employees. Thus, we carried out this prospective study among university staff. The aims of this first study are to a) determine pain characteristics and related individual and work-related factors b) the effect of pain on work life.

2. Materials and methods

Design and sample

In a cross-sectional research design, the study was conducted at Koç University in Istanbul, Turkey, between April 30 – July 30, 2015, among university employees to evaluate pain types, work-related and individual factors as predictors, situations caused by pain and interventions performed to relieve pain. The data was collected through the Qualtrics Online Survey System in Turkey. The online survey form was prepared by the researchers following a literature review. It involved age, gender, and questions related to pain. Participation in the survey was encouraged through announcements in the daily event calendar of the university during a 3 month period. Surveys were completed on the Qualtrics Online Survey site by the participants. The survey included 13 questions. The population consisted of all administrative and faculty staff at the university (N=5500). The research sample consists of a total of 122 participants. Sample selection criteria were: 1) working as a full-time employee (academic or administrative), 2) be literate in Turkish and 3) voluntary participation in the study.

This study was approved by the Koç University Institutional Research Ethics Board (No: 2015.006.IRB2.004, Date: 27.01.2015) and is consistent with the principles outlined in the Declaration of Helsinki. The participants were informed and written permissions were obtained that they participated in the research via the online system. A button was placed for the participants in Qualtrics Online Survey about whether they want to participate or not prior to prior to the start of the survey questions.

Measures and analytic strategy

The Qualitrics Online Survey was structured by the researchers and required participants' permission to participate. The study was announced in the daily event calendar of the university sent by e-mail. The participants accessed the online survey through the announcement with an e-mail whenever they want to. In addition, each department's secretary also e-mailed the survey link to all their staff. In the first page of the survey, the survey's purpose was explained to the participants. At the second page, the participants entered their consent to participate to this study. If they selected the button to give consent to voluntarily to participate the survey, they were able to continue to questionnaire.

Instruments for the Qualitrics Online Survey were developed by researchers based on a literature review. The final survey contained 13 questions (including age, type of staff, pain characteristics, and work-related and individual factors of pain and impact of pain on work life). In the study, we analyzed pain characteristics, work-related and individual factors of pain, and the conditions caused by pain.

Statistical analysis

Survey data were analyzed by means of SPSS (Statistical Package for Social Sciences) 22.0 software. Descriptive statistics were done for the type of employee, age and pain characteristics. Predicted work-related and individual factors of pain and conditions caused by pain were calculated using logistic regression. Univariate and multivariate analyses were performed to identify risk factors. The finding was evaluated with a confidence interval of 95% at a significance level of 5% and the odds ratio (OR) was calculated. The independent variables associated with each type of pain were subjected to multiple regression analysis to determine effects of the independent variables on dependent variables (a headache, neck and back pain). Individual factors that influenced for three types of pain were stress in private life, insomnia, insufficient rest periods, psychological and chronic diseases. These factors were adjusted to logistic regression. Potential work-related factors as a predictor of headache (air, lighting, temperature, odors, ergonomic problems, transportation, stress in workplace, insufficient breaks, inadequate drinking water and workload), neck pain and back pain (air, temperature, ergonomic problems, transportation, stress in workplace, often sitting for a prolonged time, insufficient breaks and workload) were assessed using logistic regression. It is plausible that work-related and individual factors' variables were found to be independently associated with all types of pain.

3. Results

Sample characteristics

There were 122 participants (49 academic workers and 73 administrative workers). The mean age was 34.6. More than 80% experienced pain while working and 75.5% of them suffered from pain more than 6 months. About 72% of participants experienced pain intermittently, and the mean pain score was 5.62 (min 1, max 10) (Table 1). 62%

of employees experienced back pain. 59% and 45% of them had neck pain and headache, respectively.

Table no 1: Pain characteristics of employees (n=122)

Variables	Classification	Total	%
Suffering from pain while working	Yes	102	83.6
	No	20	16.3
Most common types of pain	Back pain (yes)	63	62
	Neck pain (yes)	60	59
	Headache (yes)	46	45
The duration of the pain*	< 6 months	25	24.5
	>6 months	77	75.5
The prevalence of pain*	Persistent	29	28.5
	Intermittent	73	71.5
	Mean	Min	Max
Age	34.9	25	53
Pain score	5.62	1	10

*n=102 among those who experience pain while working

Individual factors predicting pain

When analyzed by pain, in logistic regression (Table 2), insomnia was the predictor of a headache and it was a leading factor 4.41 times for a headache. Neck and back pain was predicted by insufficient rest. Workers who had insufficient rest had a 4.48 and 4.71 times greater likelihood of respectively, neck and back pain.

Table no 2: Individual predictors of pain in logistic regression, by type of pain

Headache						
Variables	β	SE	Wald	p	OR	(95% CI)
Sleeplessness	1.42	0.49	8.31	0.001	4.14	1.58-18.87
Neck Pain						
Insufficient rest	1.50	0.50	8.92	0.000	4.48	1.67-12.00
Back Pain						
Insufficient rest	1.55	0.52	8.87	0.000	4.71	1.70-13.08

Note: OR, odds ratio; CI, confidence interval.

Work-related factors predicting pain

Analyses of the association between a headache and work-related factors, revealed that a headache was significantly associated with quality of air (dry air or hot stuffy air) (OR = 6.96, 95% CI 1.74-27.29) (Table 3). The risk of neck pain is about twenty-three-fold for those experiencing ergonomic problems in the workplace in comparison to those who did not experience ergonomic problems (OR = 22.60, 95% CI 7.28-70.18). Workers who had ergonomic problems had an about 15 times greater likelihood of experiencing back pain (OR= 14.46, 95% CI 4.94- 42.34) and who experienced stress in the workplace had a 6 times greater likelihood of experiencing back pain (OR= 5.85, 95% CI 1.46- 23.37). The temperature was a predicted factor only slightly for both neck (OR=0.25, 95% CI 0.07-0.94) and back pain (OR=0.14, 95% CI 0.04-0.57) (Table 3).

Table no 3: Work-related predictors of pain in logistic regression, by type of pain

Headache						
Variables	β	SE	Wald	p	OR	(95% CI)
Air	1.94	0.71	7.53	0.012	6.96	1.74-27.29
Neck Pain						
Temperature	-1.38	0.67	4.22	0.041	0.25	0.07-0.94
Ergonomic problems	3.12	0.58	29.08	0.001	22.60	7.28-70.18
Back Pain						
Temperature	-1.93	0.70	7.66	0.012	0.14	0.04-0.57
Ergonomic problems	2.67	0.55	23.75	0.000	14.46	4.94-42.34
Stress in workplace	1.77	0.71	6.25	0.010	5.85	1.46-23.37

Note: OR, odds ratio; CI, confidence interval.

Effect of pain on work life

The odds ratio indicates that workers who suffered headaches had 5 times more possibility of having lack of concentration (OR = 5.04, 95% CI 1.68-15.15) than who did not have headaches. Changes in the emotional state were about 4 times more likely to occur as a result of a headache (OR = 3.82, 95% CI 1.22-11.90). (Table 4).

Lack of concentration (OR = 5.72, 95% CI 1.88-17.41) and the reduction of work efficiency (OR = 3.26, 95% CI 1.11-9.56) was respectively 5 and 3 times likely to occur due to neck pain.

Back pain led to 13 times greater insufficient or restricted physical activity (OR = 13.37, 95% CI 3.20- 55.86) than others who did not experience back pain. The odds ratio indicates that workers who had back pain had an 11 times more possibility of having lack of concentration (OR = 11.07, 95% CI 2.86 -42.86) as a headache and neck pain. Back pain is more than twice (11 vs 5) as likely to cause lack of concentration as a headache and neck pain. (Table 4).

Table no 4: Impact of pain on a work life, by type of pain

Headache						
Variables	β	SE	Wald	p	OR	(95% CI)
Lack of concentration	1.62	0.56	8.29	0.000	5.04	1.68-15.15
Alteration in the psychological state	1.34	0.58	5.33	0.020	3.82	1.22-11.90
Neck Pain						
Lack of concentration	1.74	0.57	9.44	0.001	5.72	1.88-17.41
The reduction of work efficiency	1.18	0.55	4.61	0.033	3.26	1.11-9.56
Back Pain						
Lack of concentration	2.40	0.69	12.12	0.000	11.07	2.86 -42.86
Restricted physical activity	2.59	0.73	12.64	0.001	13.37	3.20- 55.86

Note: OR, odds ratio; CI, confidence interval.

4. Discussion

This study examines the most common types of pain of employees at a private university in Istanbul, individual and work-related factors of pain and its impact on work life. The prevalence of a headache, neck and back pain was higher among employees and these findings are consistent with previous studies on pain in this population [6-8].

This study indicated that individual and work-related factors and conditions are both related to three types of pain. There are different studies which focus on individual and work-related factors of pain. Although variables were different in these studies due to differences in populations and the time period, generally both individual and work-related factors were associated with pain. Overall, the response rate could be considered low.

We found a significant relationship between risk factors and the occurrence of a headache, neck and back pain. Insomnia was significantly associated with a headache in this study and consistent with previous research. Studies found that pain is associated with sleep problems [9-14]. It is an expected result that individuals will be likely to have a headache when they experience sleep problems.

In this study insufficient rest was found as the leading factor for neck and back pain. Previous research indicates that there is a relation between self-reported duration of computer and mouse usage at work and neck-shoulder symptoms [15]. In addition, the study showed that self-reported long-duration computer usage could be associated with acute symptoms [16]. However, we didn't measure the duration of employee's computer time due to questions of self-reporting reliability. The studies reported the significant relation between insufficient physical activity during leisure time or working in the same posture for a prolonged time with pain symptoms [17-19]. Our findings were consistent with previous researchers [11, 13,20] showing that employees who have difficulty to take a break from work are more predisposed to experiencing neck and back pain. The risk factors like lack of breaks and heavy work-load cause work-related musculoskeletal disorders among employees. This indicates that increased duration of work and the possibility of upper and low extremity activity during leisure times fail due to taking insufficient breaks. Therefore, work exposures for a long time may cause persistent neck and back muscle disorder. In order to protect users from the adverse effects, having short breaks, reducing daily exposure and doing relaxation exercises at work are suggested to minimize the chance of getting job-related musculoskeletal disorders.

Air quality factors such as hot stuffy air and dry air were significantly associated with a headache in participants and consistent with previous studies [6, 21]. Brauer et al. (2006) [22] found that the mucous membrane symptoms were associated with the stuffy and dry air in the physical environment. Hence, the employee may have ventilation difficulty due to mucous membrane symptoms and experience headache because of the increased level of CO_2.

The air temperature was a significant predictor of neck and back pain in this study. This finding is consistent with the previous studies and they indicate a significant association between temperature discomfort and neck pain [6, 23]. Generally, muscle and joint pain are seen as seasons pass and instantaneous temperature changes cause pain, cramps, and spasms in the muscle. As a result of temperature fluctuations, employees experience limit movement due to pain. Rapid temperature changes reduce blood flow to the muscle and cause pain and limit movement. Similarly, the cold exposure lowers the temperature of the skin and muscle and can cause muscular aches.

In this study, it was found that ergonomic factors were leading factors in both neck and back pain. Ergonomic factors are known to be related to musculoskeletal system symptoms. Our findings were similar to other studies that emphasized those ergonomic factors such as awkward back posture, rotating and bending and repetitive movements were associated with back pain [7, 24, 25]. Sedentary work lifestyle and sitting down for lengthy periods also generate potential risks for musculoskeletal health problems. This can be explained as the contraction of the cervical and back muscles may increase the pressure on the posterior part of the vertebral bodies, intervertebral discs and the vertebral joints. As a result, nerves are prone to be compressed resulting in neck and back pain due to decreased intervertebral foramen. The adverse events are avoidable with the sit-stand or activity-permissive workstations and these strategies may prevent musculoskeletal morbidity caused by sitting for a prolonged time and insufficient breaks.

Another work-related factor is job stress. It was a leading factor in back pain. These findings are consistent with findings that emphasized stress in work environment and they were associated with upper extremity disorders [26, 27]. The results underline that the continuous exposure to stress causes activation of adrenal catecholamines and proinflammatory cytokines at the muscle nociceptor level. Therefore, the employees become more prone to muscle pain contributed by stressful stimulation.

The quality of air is found as a predicted factor in this study. Increased CO_2 level due to insufficient ventilation may lead to decrease in cognitive performances including concentration disorders due to having a headache [28, 29]. A headache causes lack of concentration, leading to stress. This can be also explained as the tight muscles can cause a reduction in blood flow to the brain, which can lead to lack of concentration. This result highlights the importance of the cognitive rest for office employees to continue daily activities that require mental concentration during the workday.

In this study, the headache was a contributing factor that altered psychological state as expected. It is pointed out that depression and anxiety are often accompanied by both a headache and sleep problems [30-32]. Another study observed that the high anxiety score was significantly related to a headache [33]. A headache may trigger a cascade of changes in psychological processes such as changes in perception, attention, mood, motivation, learning, and memory.

Neck and back pain contributed to lack of concentration in the study. Similarly, we found that insufficient rest and physical activity during work are predictors of neck and back pain. The finding of studies on work psychology shows that enhanced concentration on one's tasks leads to better performance [34, 35] and limited relaxation during the work day has negative effects on mental functioning and well-being [36]. Poor physical activity or sitting for long periods have been found to decrease cognitive skills [37]. Other studies have found that employee's cognitive function increase during standing and they tend to achieve decision-making tasks more effectively. Standing may improve muscle strength and be physically fit enhances activity in the regions of the brain associated with cognitive performance, psychomotor reaction time and physiological arousal [38, 39]. While previous studies found the positive effect of sit-stand workstations, a recent RCT study reported that there was no change in productivity and cognitive function in office workers with these strategies [1]. Overall, the consistent studies with this study underline that office employee's experience difficulty concentrating on work while experiencing neck and back pain. Thus, pain experienced in the work environment will likely have a negative impact on employees' ability to work effectively. The tightness of neck and back muscles cause nerve irritation and pain.

We found that university employees experienced the reduction of work efficiency while they experienced neck pain. It was a foregone conclusion that work efficiency may be reduced by lack of concentration due to neck pain. The results underline the importance of taking frequent breaks during intensive work. Furthermore, the management of pain in work environment is crucial to prevent poor work performance among university employees.

Restricted physical activity was greatly related with back pain in the study consistent with previous studies [40-42]. Obviously, employees experience back pain due to reduced ROM of the cervical and thoracic spine and daily activity, so that they consume less energy and gain more fat than muscle as a vicious circle.

Limitations

The study contains several limitations. The study bears certain limitedness since it covers only a single private university. The second limitation is that employees were included in the present study if they reported pain in the work environment. The number of participants in that study was relatively small (n=122). The variables of the air and temperature were self-reported so that there is a possibility of bias. For this reason, we could not present the certain relation between work-related factors and pain and its' effect on work life. Authors recommended further studies to investigate the pain among university employees to find different factors associated with pain and feasible relief methods in the work environment.

Conclusion

In this study presence, and related factors of pain and its' effect on work-life among university employees in Turkey were discussed. 84% of employees experienced a headache, neck or back pain during their work and 75.5% of them suffered from pain more than 6 months.

Individual and work-related risk factors were associated with a headache, neck and back pain. These relations emphasize that several preventive interventions such as education-based health services can be considered as modifiable for both individual and work-related risk factors to prevent pain. These methods reduce the prevalence of multi-system pain and provide work environment adjustments. Additionally, this study indicates that work or other exposures that contains long periods of uninterrupted muscle activity can be minimized to reduce the risk of pain. It is important that to determine predisposing factors will be beneficial for the primary and secondary protection of employees' in pain. Further researchers should study the effect of different preventive interventions to reduce individual and work-related factors of pain in office employees.

Conflicts of interests

No potential conflict of interest was reported by the authors.

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