ORIGINAL ARTICLE

The Relationship between Mental Workload and Work-Related Musculoskeletal Symptoms in Different Working Groups in a Hospital

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Abstract

Background: Mental workload is the operator´s mind effort, the excessive levels of which can endanger his/her health. Work-related musculoskeletal symptoms (WMSs) could be the result of a high mental workload. As the workload level depends on the task, this study aims to assess the relationship between mental workload and musculoskeletal symptoms in different working groups of a hospital.

Methods: This cross-sectional study was conducted on 240 employees in three main working groups including office staff, clinical employees, and service workers in a governmental hospital at Shiraz. Demographics, NASA Task Load Index, and Nordic musculoskeletal symptoms questionnaire were the data collection tools. SPSS, version 21, was used for data analysis.

Results: The mean mental workload was 66.03 in office staff, 67.86 in clinical employees, and 72.41 in service workers. The prevalence of WMSs was 67% in office staff, 62.5% in clinical employees, and 60.8% in service workers. The overall mental workload was related to symptom prevalence in the elbow, thighs, knee, and foot ($P<0.05$).

Conclusion: Some domains of the mental workload are related to WMSs in the studied working groups. Paying attention to the special needs of each working group is necessary for reducing mental workload and WMSs.

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Introduction

The term ´workload´ describes aspects of the interaction between a worker and a task that is specific in its properties.[1] Mental workload is the effort of mind when an operator conducts a task and is related to his/her mental capacities.[2] It has a complex structure and can be affected by various factors such as task, environment, cognitive abilities, etc.[3] Different studies have shown that high levels of mental workload can lead to fatigue, reduced efficiency, and injuries in the workforce.[4,5] Different jobs and tasks can impose different levels of workload.[3] Sarsangi et al. reported high mental workload in nurses;[6] also, Babamiri et al. concluded that mental workload in health center workers was at a medium level and can be associated with work-related musculoskeletal symptoms.[7] In another study on office workers,[8] Fallahi et al. reported mental workload as higher than average in traffic control operators which could cause mental fatigue;[9] also, mental workload was high in assessment of assembly line workers and could lead to low back symptom.[10] Therefore, different working groups experience different levels of workload which can lead to health issues in them, and this point should be considered carefully in organizations with different working groups, such as hospitals.

Among the work-related health issues, work-related musculoskeletal disorders (WMSDs) are

the second most common occupational diseases.[11] Musculoskeletal disorders include degenerative and inflammatory conditions that influence joints, ligaments, tendons, muscles, peripheral nerves, and blood vessels.[12] Working conditions can lead to physical injuries in the workforce.[13] High rates of work-related musculoskeletal symptoms were reported in assembly-line workers[14] and nurses,[15] while office workers have shown lower work-related musculoskeletal symptoms rates.[7, 8] Work-related musculoskeletal disorders in the healthcare industry have a higher rate than service industries,[16] and the symptoms are common in the healthcare workers.[17]

A variety of factors can cause work-related musculoskeletal symptoms,[12] including psychosocial factors, as today's work environments impose high mental requirements.[18] Mental workload is one of these psychosocial factors which can affect the prevalence of work-related musculoskeletal disorders in the working population.[2, 8, 19] High levels of workload are associated with higher rates of low-back pain.[10] As the hospital is the most complex service organization which provides a large variety of health services,[20] the health of healthcare workers is a very important issue.[21] In a hospital, there are different working groups, such as nurses, office employees and service workers. This study was conducted to investigate the relationship between mental workload and work-related musculoskeletal symptoms (WMSs) in different working groups of a hospital.

Materials and Methods

This cross-sectional study was conducted at a public hospital located in Shiraz in 2018. The hospital managers asked the authors to conduct this research and provided permissions. The inclusion criterion was working in the hospital for at least one year. The employees with previous mental and musculoskeletal problems were excluded. 542 employees were eligible to participate, and based on the Cochrane formula, 225 of them were randomly selected to be studied. In order to achieve better results, 250 questionnaires were distributed among three main working groups including office staff, clinical employees (nurses and treatment wards employees), and service workers; of them, 240 were filled out completely. The researchers explained the aim of the research to the participants and asked them to answer the questions carefully and sign the consent form. The name and characteristics and employee information remained confidential. The questionnaires were returned after two weeks.

Data collection tools were three questionnaires including:

1. Demographics: It includes questions on age, gender, marital status, working years in the hospital and work unit

2. NASA Task Load Index (NASA-TLX): This questionnaire assesses the mental workload with 6 questions about different workload domains including mental, physical, temporal, performance, effort, and frustration which could be rated with a 0 to 100 scale. The validity and reliability of the tool were confirmed in a former study on different occupational groups.[22]

3. Nordic musculoskeletal symptoms questionnaire: This questionnaire includes 18 questions about symptom and discomfort in nine parts of the body during the last 12 months and during the study period with yes/no answers. The neck, shoulders, elbows, wrists and hands, back, lower back and buttock, thighs, knees, and foots are the studied body parts. Nordic musculoskeletal symptoms questionnaire is a valid and reliable tool.[23]

Data were analyzed using SPSS version 21 software. The normality of the data was checked using the Kolmogorov Smirnov test; then, descriptive statistics including mean, standard deviation, and the independent sample t-test were used to analyze the data. The significance level was determined as 0.05.

Results

74 office staff, 64 clinical employees, and 102 service workers participated in this study. The mean and standard deviation of age and work experience in the studied population were 37.97±6.97 and 11.61±7.11 years, respectively. 154 participants (64.2%) were male and 86 (35.8%) of them were women. 70 participants (29.2%) were single and 170 of them were married. Table 1 shows the demographic characteristics of the studied population according to job type, separately.

The mean and standard deviation of total mental workload in all employees was 69.23±15.94 out of 100. Among the working groups, service workers had the highest total workload score (72.41±16.33). Table 2 shows the mean scores of mental workload scores in different working groups.

The prevalence of WMSs in the last 12 months and in the survey period was 79.16% and 63.33%, respectively. The clinical employees had the highest 12 months prevalence (84.37%). This amount was 78.73% for office staff and 76.74% for service workers. Studying the prevalence of WMSs during the study period showed higher rates among the office staff (67%). Clinical employees (62.5%) and service workers (60.78%) showed lower rates. Table 3 shows the prevalence of WMSs in the nine body parts in the studied working groups, separately.

Assessment of the relationship between overall workload and WMSs in the working groups showed that mental workload was significantly related to

Table 1: Demographic chracteristics of hospital employees according to the type of job

		Office staff	Clinical employees	Service workers
Age (years)		40.10±6.14	37.21±6.044	36.90±7.60
Work experience (years)		13.97±6.97	11.03±7.29	10.27±6.80
Gender	Men	32 (43.2%)	30 (46.9%)	92 (90.2%)
	Women	42 (56.8%)	34 (53.1%)	10 (9.8%)
Marital status	Single	20 (27%)	24 (37.5%)	26 (25.5%)
	Married	54 (73%)	40 (62.5%)	76 (74.5%)

Table 2: Mental workload domains scores in different working groups

	Office staff	Clinical employees	Service workers
Mental	78.37±22.04	77.18±20.03	66.27±25.53
Physical	45.94±30.59	59.37±24.87	82.15±19.07
Temporal	70.27±20.06	72.81±17. 82	76.07±20.59
Performance	74.86±22.31	73.12±20.07	74.90±20.13
Effort	71.08±24.12	67.71±21.38	71.23±23.38
Frustration	55.67±32	56.87±30.42	61.76±31.79
Total workload	66.03±16.31	67.86±14.33	72.41±16.33

Table 3: Work-related musculoskeletal symptoms prevalence in the working groups

	Office staff		Clinical employees		Service workers	
	Last 12 months	Now	Last 12 months	Now	Last 12 months	Now
Neck	59.5%	43.2%	43.8%	31.3%	41.2%	39.2%
Shoulders	45.9%	43.2%	37.5%	25%	35.3%	27.5%
Elbows	21.6%	16.2%	31.3%	28.1%	29.4%	19.6%
Wrists and hands	48.6%	40.5%	37.5%	25%	43.1%	33.3%
Back	43.2%	35.1%	49.9%	28.1%	33.3%	27.5%
Lower back	51.4%	40.5%	40.6%	37.5%	54.9%	47.1%
Thighs	18.2%	16.2%	28.1%	16.6%	35.3%	27.5%
Knees	35.1%	27%	34.4%	28.1%	59.2%	43.1%
Foots	27%	21.6%	37.5%	31.3%	43.1%	33.3%

the elbow symptom (P=0.026), thighs symptom (P=0.001), knee symptom (P=0.006), and foot symptom (P=0.016), but there was no significant relationship between overall mental workload and 12-month prevalence. Anyway, the prevalence of WMSs in the last 12 months showed a significant relationship with some mental workload domains. In the office staff, mental workload was related to the knee symptom (P=0.025); in clinical employees physical and temporal demands with thighs symptom (P=0.024, P=0.036); and in service workers mental domain was significantly related to thighs symptom prevalence (P=0.032).

The prevalence of symptoms during the study period showed a significant relationship with some mental workload domains only in the office staff. Mental and temporal demands were related to knee symptom prevalence (P=0.012 and P=0.046, respectively); physical, temporal, and frustration domains to thighs symptom prevalence (P=0.049, 0.003, and 0.008, respectively), and effort and frustration domains were associated with foot symptom prevalence (P=0.028 in both).

Discussion

This study was conducted to assess the relationship between mental workload and musculoskeletal symptoms in different working groups of a hospital. As WMSs can originate from different sources,[24] studying possible causes such as work psychosocial factors such as mental workload is important. These factors may not directly cause a symptom, but can affect the incidence of WMSs. The results showed that service workers had higher mental workload levels than the other two groups; the 12 month prevalence was higher in clinical employees, and the office staff had the highest WMSs compliant levels.

The office staff is engaged with mental tasks because of the nature of their job. Clinical employees experience high levels of mental workload as they should make important decisions and handle the patients' needs. In service workers, the physical demand was high; this result can also be due to the nature of their job. This result is not consistent with former studies.[2, 10] The differences in the results could be due to different job descriptions. Service workers

do not work like assembly-line or industrial workers. We did not find any study on the hospital service workers' workload to make a comparison.

The 12-months prevalence of WMSs was higher than the prevalence during the study period. This result is consistent with those of former studies on the prevalence of WMSs.[8, 25] It is clear that experiencing discomfort or symptom in the body parts during one year is more probable than one week.

Among the body parts, the neck, shoulders, wrist and hand, and lower back had a higher prevalence of WMSs in office employees. Higher prevalence of WMSs in the neck and shoulders is consistent with some former studies,[8, 26] as the office workers mainly adopt a sitting position and work with computers and show higher symptoms in the upper limbs. Another study[7] reported a higher prevalence in the thighs and waist. This difference can be due to the characteristics of work-station such as positioning of monitors and the quality of table and chairs which can not only prevent WMSs, but also increase the productivity of the office workers.[27]

In clinical employees, lower back and knees symptoms had a higher prevalence than other body parts which is consistent with former studies on nurses.[25, 28, 29] High low back symptom prevalence was reported in studying physical therapists.[30] Clinical employees experience both mental and physical demands of work and are highly susceptible to WMSs. They work while standing for many hours a day, so they can experience higher symptoms, especially in the lower limbs.

Service workers must do more physical jobs. Their higher prevalence of symptoms in the lower back is consistent with studies on other practitioners such as assembly-line[10] and tile factory workers.[19] Knees were the second body part with higher prevalence; this result was obtained by Mohammadzadeh et al.[2] Standing and doing more physical jobs can cause symptoms in the lower limbs, especially in the knees. High physical work loads can make the workers prone to injuries in different body parts.

Mental workload and WMSs prevalence were significantly related in the office staff. This result is consistent with those of the Haghshenas et al.'s study.[8] Darvishi et al. found similar results in studying bank employees.[31] It was revealed that mental workload plays a role in forming WMSs by causing low sleep quality and fatigue,[32] so it is important to be studied. It seems that mental workload while conducting cognitive tasks causes more difficulties in office staff. In clinical employees, the domains of physical, temporal, and performance were related to WMSs 12-month prevalence. This result is consistent with those of Mahmoudifar's study.[25] Clinical employees experience a high mental workload and conduct some physical tasks, so the presence of these factors can cause work-related musculoskeletal symptoms. Service workers normally do physical tasks and are at a high risk of WMSs and their tasks might be comparable with industrial workers. On the other hand, some workload domains such as frustration can be higher than others, because of organizational factors and hierarchy. Mental pressure in service workers can be one of the causes of WMSs as Bolghanabadi et al. revealed that mental workload was related to work-related musculoskeletal symptoms in the workers.[29] Different working groups showed this relationship in different body parts, so paying attention to their special needs is recommended.

Assessing and comparing the three main working subgroups in a hospital is the strength of this study. However, this study was not without limitations. As this was a cross-sectional study, we could not determine the cause and effect. The low number of female service workers was another limitation that was inevitable due to the studied population characteristics.

Conclusion

This study showed that mental workload was related to WMSs in different working groups of the studied hospital. Different domains of the workload are related to WMSs in different parts of the body. Reducing all domains of workload in the office staff, decreasing temporal and physical needs in the clinical employees, and lowering mental and frustration demand of workload in service workers can be useful in lowering WMSs in the studied working groups.

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