Occupational Stress in Development Musculoskeletal Disorders Among Embassy Personnel of Foreign Countries in Iran at 2015

Mohammad Hassan Nassiri-Kashani[1], Mashallah Aghilinejad[1], Elahe Kabir-Mokamelkhah[1], Amer Abdullah[1], Narges Shahnaghi[2], Amir Bahrami-Ahmadi*[1]

1) Occupational Medicine Research Center (OMRC), Iran University of medical sciences and health services (IUMS); Tehran-Iran
2) Farzanegan1 high school, Co-member of occupational medicine research center (OMRC), Iran University of medical sciences and health services (IUMS); Tehran-Iran

**Author for Correspondence:* bahrami.a@gmail.com

Received: 25 Nov. 2015, Revised: 18 Jan. 2016, Accepted: 27 Jan.2016

ABSTRACT
Concept of occupational stress and its relations with musculoskeletal disorders has been investigated for years. The present study was performed for determining the role of occupational stress in the development of musculoskeletal disorders (MSDs) among embassy personnel of foreign countries in Iran.
Study population in the present cross sectional study was 200 embassy personnel of foreign countries in Tehran capital of the Islamic Republic of Iran. Study questionnaires (Nordic Questionnaire; The occupational stress scale) were distributed into participants and finally 161 questionnaires come back to the researchers (response rate: 80.5%).
One week and one year period prevalence of musculoskeletal complaints of included embassy personnel were 59.6% and 75.2% respectively. Mean of occupational stress in embassy personnel with musculoskeletal disorders in recent week and year were significantly higher than embassy personnel without musculoskeletal disorders. Smoking and occupational stress score were independent predictor of musculoskeletal disorders.
Occupational stress had an impact on development and persistence of WRMSDs among embassy personnel and next studies in this new field will suggest for more detecting actual causes of WRMSDs in these persons and other office workers.
Keywords: Musculoskeletal Disorders; Occupational stress; Prevalence; Workers

INTRODUCTION
In previous studies musculoskeletal symptoms had been developed among office workers [1, 2]. Musculoskeletal disorders were multifactorial origin and several factors such as physical and psychological factors might contribute to their progression and persistence [3-5]. Previous studies reported that sustained sitting posture during working in offices accompanied with poor ergonomic status of workplaces was more significant causes of musculoskeletal development of symptoms among office workers [6, 7].
Concept of occupational stress and its relations with musculoskeletal disorders has been investigated for years [8, 9]. Research studies on the impact of organizational intervention for control of stress suggested that stress management in the workplace may lead to improved safety such as reduction of work related musculoskeletal disorders. Bonger *et al.* reported that a higher level of occupational stress had a positive association with work related musculoskeletal especially in upper extremities [10]. In the review of the National Research Council reported that most of studies focused on positive association between symptoms of occupational stress and upper extremities pain [11].
Embassy personnel of foreign countries in Iran had specific work with stressful workplace and up to searching on the literature; we did not find same research for assessment of work related musculoskeletal disorders among embassy personnel and in the other hand our study is the first study in this filed. The present study was performed for determining the role of occupational stress in the development of musculoskeletal disorders (MSDs) among embassy personnel of foreign countries in Iran.

MATERIALS AND METHODS
Study population
Study population in the present cross sectional study was embassy personnel of foreign countries in Tehran capital of the Islamic Republic of Iran, who like to complete the questionnaires and participate.

study sampling method was census and all of foreign embassies (200 people) as sampling frame had opportunity to included into the
study. Study questionnaire was distributed into the participants and finally 161 questionnaires come back to the researchers (response rate: 80.5%). all of foreign embassies can included into the study and among them those who have history of bone fracture, tumor, neurodegenerative and rheumatic lesions or metastatic pain in their musculoskeletal system were excluded from the study.

Data gathering instruments

In this study, some basal variables of embassy personnel including their age, gender, education, BMI, marital status, smoking status and history previous disorders were collected via study check list. Data of musculoskeletal complaints gathered by means of Standardized Nordic self-reporting Questionnaire [12]. The questionnaire included questions such as age, duration of occupation as a worker, weight of carried loads, daily working hours and musculoskeletal complaints in each of the following body regions: neck, shoulder, elbow, wrist/hand, upper back, lumbar, one or both hips/thighs, one or both knees and one or both ankle/feet. Data on daily working hours were obtained by the time spent in the workplace. The validity and reliability of the questionnaire have been approved in different studies [13, 14]. Musculoskeletal complaint was defined as pain or discomfort experienced in soft tissue of the different body regions, which had occurred at least 2-3 work days during the past week or 12 months. Noted pain has improved on the weekends, vacations and holidays. All medical records and questionnaire filling were supervised by the research team. The occupational stress scale was used to measure Job Stress. The scale was developed by the Martin Company and the American Institute (2001) which consists of eight items. The response was given on a five-point scale that ranges from 'Never' to 'Very Often' [15].

Statistical analysis

Presenting study groups, data showed as mean ± standard deviation for continues variables and frequency (percentage) for discrete variables. Chi squared test was used to compared demographic variable between study groups. This article has two major propose, Firstly chi-square test was used to comparison of musculoskeletal complaints between study groups. Second this question is answered that are musculoskeletal complaints frequency difference in our study samples after adjusting for demographic and health related variables. A multinomial regression model was used for answering this question. In this model, musculoskeletal complaints in recent year selected as the dependent variable. Demographic variable including age, sex, work history, marital status, educational status, smoking, BMI and occupational stress score was inserted in the model. A backward (Likelihood ratio) procedure was used in this analysis. Variables are entering in model if they had significant level lower 0.050. Calculation was done using the SPSS version 16 (SPSS Inc. Chicago Ill) statistical program and p-value lower 0.050 selected as significant level.

RESULTS

Finally 161 (87 males) questionnaires come back to the researchers. Mean age and work history of study participants was 39.32±6.66 and 9.43±6.21 years respectively. Most of the study participants had Master of Science (104; 64.6%) as educational degree. Mean BMI in the study population was 24.08±2.88. Among study participants 129 (80.1%) persons were married and 86 persons (53.4%) were smoker.

Musculoskeletal complaints prevalence in embassy personnel at recent week and year

According to results of Nordic musculoskeletal complaints questionnaire, one week and one year period prevalence of musculoskeletal complaints in any of the body regions of included embassy personnel were 59.6% and 75.2% respectively. Musculoskeletal complaints in last week was most commonly reported at the neck (29.80%), followed by the wrist(s) (26.10%), lumbar (19.9%), upper back (16.80%) and in 12-months period these rates were most commonly at the neck (49.70%), followed by the wrist(s) (36%), lumbar (34.20%), upper back (29.20%). In last year workers reported that musculoskeletal complaints of wrist(s) (3.7%), lumbar, Knee(s) and shoulder (2.5%) respectively cause limitation in their function. Details of other MSD prevalence were reported in Table 2 and 3.

In comparing prevalence of WRMSDs among categories of embassy personnel according to their work history, age and BMI; prevalence of WRMSDs in recent week had a significant association only with work history of embassy personnel. Prevalence of WRMSDs in a recent year had a significant association with work history, age and BMI of embassy personnel.

Workplace stress in embassy personnel

Mean of occupational stress to study participants was 16.74±3.03 and according to its classification most of embassy personnel were belonged to the fairly low 93 (57.8%). Mean of occupational stress in embassy personnel withmusculoskeletal disorders in recent week (17.18±3.42) was significantly higher than embassy personnel without musculoskeletal

disorders (16.06±2.19, P≤0.02). Mean of occupational stress in embassy personnel with musculoskeletal disorders at a recent year (17.17±3.11) was significantly higher than embassy personnel without musculoskeletal disorders (16.74±3.03; P≤0.00).

Table 1. MSD prevalence at recent week and year in our subjects (n=161)

Musculoskeletal disorders prevalence during recent week			**Musculoskeletal disorders prevalence during recent year**		
Body region	**Frequency**	**Percentage**	**Body region**	**Frequency**	**Percentage**
Neck	48	29.8	**Neck**	80	49.7
Wrist/hand	42	26.10	**Wrist/hand**	58	36
Lumbar	32	19.9	**Lumbar**	55	34.2
Upper back	27	16.8	**Upper back**	47	29.2
Shoulder	12	6.2	**Shoulder**	14	8.7
One or both knees	8	5	**One or both knees**	12	7.5
One or both hips/thighs	2	1.2	**One or both ankle/feet**	2	1.2
Elbow	-	-	**Elbow**	2	1.2
One or both ankle/feet	-	-	**One or both hips/thighs**	-	-

Table 2. MSD prevalence at recent one week and year in embassy personnel according their age, BMI and work duration

Study variable	**MSD type**	**Work duration**	**Positive MSD (%)**		**P-value**
			Number	percentage	
Work duration	Recent week	< 5 years	19	19.8	0.01
		5-10 years	48	50	
		10-15 years	17	17.7	
		15-20 years	10	10.4	
		>20 years	2	2.1	
	Recent year	< 5 years	32	26.4	0.00
		5-10 years	61	50.4	
		10-15 years	14	11.6	
		15-21 years	10	8.3	
		>20 years	4	3.3	
Age groups	Recent week	<29	2	2.1	0.41
		30-39	58	60.4	
		40-49	26	27.1	
		50-59	10	10.4	
		>60	0	0	
	Recent year	<25	2	44.4	0.00
		25-34	82	53.6	
		35-44	25	66.3	
		45-59	12	51	
		>60	0	0	
BMI groups	Recent week	<20	1	1	0.58
		20-24	72	75	
		25-29	21	21.9	
		>30	2	2.1	
	Recent year	<20	1	0.8	0.04
		20-24	92	76.0	
		25-29	24	19.8	
		>30	4	3.3	

Table 3. Results of regression analysis in our embassy personnel

Variable	Beta	Standard Error	significances	95.0% C.I. for EXP(B)	
				upper	lower
Constant	-5.43	0.44	0.09	-	-
Age	0.095	0.078	0.22	0.94	1.28
Sex	-0.24	0.42	0.57	0.35	1.81
Smoking	1.14	0.44	0.01	1.31	7.42
Past work history	-0.11	0.08	0.15	0.76	1.04
Body mass index	-0.07	0.08	0.37	0.79	1.09

DISCUSSION

Prevalence of WRMSDs in participated embassy personnel in recent week and year were 59.6% and 75.2% respectively. Upper extremities including neck, wrist and shoulder had high body regions that they had complaints in two time periods. Mean of occupational stress in study participants were belonging to the fairly low group. Mean of occupational stress in embassy personnel with musculoskeletal disorders in recent week and year were significantly higher than embassy personnel without musculoskeletal disorders. In the present study only smoking and occupational stress score remained in our logistic regression model and were known as independent predictors of WRMSDs among embassy personnel.

We think that work of embassy personnel is classified in the office worker group with some differences in their high stress level due to political and security nature of their work. In our searching the literature we did not find papers that studies of WMSDs among embassy personnel and it seemed that present research is the first study in this field. Previous reports support this fact that both of physical and psychological exposure in the workplace might contribute in development of WRMSDs [10, 11, 16]. Physical part of the work had been received more attention than other work factors due to its visibility [17]. Psychological concepts in the research field are new filed especially in occupational medicine and investigators in the recent years hypotheses that these agents might be responsible for development of WRMSDs [18, 19]. Searching in this field had some limitation due to lack of suitable tools for assessment of psychological factors in the workplaces. Most of relative studies had to cross sectional design and this type of studies had lower power for making causal interface about role of psychological factors in the development of WRMSDs.

The psychological factors can involve the interplay of work organization factor with the personal factor as a primary source of psychological events. This even can impact on biomedical and physical component of workers via influence on muscle tension and strength. In the other hand psychological factors play as moderator in the relationship between physical agents and outcomes in workers such as reporting WRMSDs [20]. Mood disturbance might increase worries and fatigue had impact on detecting labeling and sensation of WRMSDs and its outcomes such as sickness absence, transition from short-term to long-term disability [21]. WRMSDs had been studied in the recent reviews and these studies summarized both of descriptive and causative studies that might be responsible for WRMSDs development [10, 17, 22, 23].

Present study had some limitations; firstly, we cannot access to some foreign embassies due to political and security issues. Secondly, detecting some other psychological factors such as anxiety, depression and others might help us to have better causal interpretation. Thirdly WRMSDs were assessed by self-reporting method and it seems that some psychological factors such as fearing about loss of work or decreasing efficiency of workers may lead them into the lower than actual reporting their symptoms.

CONCLUSION

Occupational stress had an impact on development and persistence of WRMSDs among embassy personnel and next studies in this new field will suggest for more detecting actual causes of WRMSDs in these persons and other office workers.

ETHICAL ISSUES

The study was approved by the ethics committee of Iran University of medical sciences.

CONFLICT OF INTERST

Authors of the manuscript didn't had any conflict of interest.

AUTHORS CONTRIBUTION

Mohammad Hassan Nassiri Kashani as first author Drafted the final version of the manuscript and Mashallah Aghilinejad and Elaheh Kabir-Mokamelkhah deigned the study and supervised that.

Amer Abdullah and Narges Shahnaghi collected study data and finally Amir Bahrami Ahmadi perform statistical
analysis on the study data and reviweing the final version of the manuscript.

FUNDING/SUPPORTING

Authors of the manuscript have not received any funding for this study.

REFERENCES

[1] Juul-Kristensen B, Jensen C. Self-reported workplace related ergonomic conditions as prognostic factors for musculoskeletal symptoms: the "BIT" follow up study on office workers. Occupational and environmental medicine. 2005;62(3):188-94.
[2] Sillanpaa J, Huikko S, Nyberg M, Kivi P, Laippala P, Uitti J. Effect of work with visual display units on musculo-skeletal disorders in the office environment. Occup Med (Lond). 2003;53(7):443-51.
[3] Feveile H, Jensen C, Burr H. Risk factors for neck-shoulder and wrist-hand symptoms in a 5-year follow-up study of 3,990 employees in Denmark. International archives of occupational and environmental health. 2002;75(4):243-51.
[4] Malchaire J, Cock N, Vergracht S. Review of the factors associated with musculoskeletal problems in epidemiological studies. International archives of occupational and environmental health. 2001;74(2):79-90.
[5] Wahlstrom J. Ergonomics, musculoskeletal disorders and computer work. Occup Med (Lond). 2005;55(3):168-76.
[6] Korhonen T, Ketola R, Toivonen R, Luukkonen R, Hakkanen M, Viikari-Juntura E. Work related and individual predictors for incident neck pain among office employees working with video display units. Occupational and environmental medicine. 2003;60(7):475-82.
[7] Marcus M, Gerr F, Monteilh C, Ortiz DJ, Gentry E, Cohen S, *et al.* A prospective study of computer users: II. Postural risk factors for musculoskeletal symptoms and disorders. American journal of industrial medicine. 2002;41(4):236-49.
[8] Rosenman RH, Friedman M, Straus R, Wurm M, Kositchek R, Hahn W, *et al.* A Predictive Study of Coronary Heart Disease. JAMA : the journal of the American Medical Association. 1964;189:15-22.
[9] Cooper C, Marshall J. Occupational sources of stress: a review of the literature relating to coronary heart disease and mental ill health. J Occup Psych. 1976;49(1):11-28.
[10] Bongers PM, Kremer AM, ter Laak J. Are psychosocial factors, risk factors for symptoms and signs of the shoulder, elbow, or hand/wrist?: A review of the epidemiological literature. American journal of industrial medicine. 2002;41(5):315-42.
[11] Panel on Musculoskeletal Disorders and the Workplace Commission on Behavioral and Social Sciences and Education, Musculoskeletal Disorders and the Workplace: Low Back and Upper Extremities. National Academy press, Washington, DC: 2001.
[12] Kuorinka I, Jonsson B, Kilbom A, Vinterberg H, Biering-Sorensen F, Andersson G, *et al.* Standardised Nordic questionnaires for the analysis of musculoskeletal symptoms. Appl Ergon. 1987;18(3):233-7.
[13] Andersson K, Karlehagen S, Jonsson B. The importance of variations in questionnaire administration. Appl Ergon. 1987;18(3):229-32.
[14] Choobineh A, Lahmi M, Shahnavaz H, Jazani RK, Hosseini M. Musculoskeletal symptoms as related to ergonomic factors in Iranian hand-woven carpet industry and general guidelines for workstation design. Int J Occup Saf Ergon. 2004;10(2):157-68.
[15] Judge TA, Thoresen CJ, Bono JE, Patton GK. The job satisfaction-job performance relationship: a qualitative and quantitative review. Psychological bulletin. 2001;127(3):376-407.
[16] Bernard B. Musculoskeletal disorders and workplace factors: A critical review of epidemiologic evidence for work-related musculoskeletal disorders of the neck, upper extremity, and low back. NIOSH Publication, 1997.
[17] Rugulies R, Braff J, Frank JW, Aust B, Gillen M, Yen IH, *et al.* The psychosocial work environment and musculoskeletal disorders: design of a comprehensive interviewer-administered questionnaire. American journal of industrial medicine. 2004;45(5):428-39.
[18] Buckle P, Deveraux J. Work-Related Neck and Upper Limb Musculoskeletal Disorders. Bilbao, Spain:: 1999.
[19] DeBeeck R, Hermans V. Work-Related Low Back Disorders. Bilbao, Spain:: 2000.
[20] Sauter S, Swanson N. An ecological model of musculoskeletal disorders in office work. In: Moon S, Sauter S, editors. Beyond Biomechanics: Psychosocial Aspects of Musculoskeletal Disorders in Office Work. Bristol, PA:: Taylor and Francis,; 1996. p. 3-21.
[21] Huang GD, Feuerstein M, Sauter SL. Occupational stress and work-related upper extremity disorders: concepts and models. American journal of industrial medicine. 2002;41(5):298-314.
[22] Hoogendoorn WE, van Poppel MN, Bongers PM, Koes BW, Bouter LM. Physical load during work and leisure time as risk factors for back pain.

Scandinavian journal of work, environment & health. 1999;25(5):387-403.
[23] Yassi A. Work-related musculoskeletal disorders. Current opinion in rheumatology. 2000;12(2):124-30.