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Psychosocial Factors in Relation to Musculoskeletal Disorders among Nursing Professionals in Raparin Administration

Karwan M. Khudhir, Kochr A. Mahmood, Kochar Kh. Saleh and Saman R. Adulah

Department of Community health, Erbil Polytechnic University, Koya Technical Institute, Erbil Polytechnic University, Kurdistan Region, Iraq

Abstract—A cross-sectional study was conducted to determine the prevalence of musculoskeletal disorders (MSDs) and psychosocial factors associated with it, among Raparin nursing professionals. Data collected using simple random sampling from 220 questionnaires volunteered nurses. Results of the study showed that the overall prevalence of MSDs among Raparin administration nurses was 74% in different body regions and by body regions, neck pain was reported to be the highest complaint of 12 month MSDs (48.4%) compared to other body regions. Logistic regression analysis indicated 6 variables that are significantly associated with MSDs: Smoking (odd ratio [OR] = 19.472, 95% confidence interval [CI]: 5.396, and 70.273), body mass index (OR = 5.106, 95% CI: 1.735, and 15.025), physical activity (OR = 8.639, 95% CI: 3.075, and 24.271), psychological demand (OR = 6.685, 95% CI: 3.318, and 13.468), social support (OR = 3.143, 95% CI: 1.202, and 4.814), and job satisfaction (OR = 2.44, 95% CI: 1.04, and 5.63). Prevention strategies and health education which emphasizes psychosocial risk factors and how to improve working conditions should be introduced.

Index Terms—Musculoskeletal disorders, Nurses, Psychosocial factors, Raparin administrative.

I. INTRODUCTION

Musculoskeletal disorders (MSDs) are disorders of the muscles, nerves, tendons, ligaments, joints, cartilage, or spinal discs that have been determined by Bureau, 2006 [1]. The risk factors related to MSDs are recognized to comprise workplace activities such as manual handling, heavy lifting, strenuous task, and work environment. Individual and psychosocial factors such as low control at work, high psychological demand, low social support, low job satisfaction, and body size variability are also important

predictors in the development of this condition [2]. Health-care work has been identified as high risk for developing MSDs [3]. According to the Australian data on work-related injuries (which include MSDs) indicate that the health and public facilities sector has one of the highest statements rates [4]. Most attention has been directed toward nursing as the major occupational group in the health-care sector.

The profession of nursing is one of the most stressful and demanding careers in the present day, due to the number and variety of risk factors associated with the work environment. During a typical workday, nurses may be exposed to a wide range of psychological stressors, including but not limited to conflicts with patients and families of patients, disagreements with management, and dissimilarities of judgment with physicians, and dealing with distress, and possible death on a daily basis.

Nurses have to achieve numerous physically demanding occupations as well, such as transferring patients between beds and chairs, lifting patients onto a bed, and frequently keeping bent forward or twisted postures. These work tasks put nurses at high risk for acute and cumulative MSDs [5]; the most frequently reported MSDs among nurses are low back pain, followed by neck and shoulder problems, and knee pain [6]. MSDs are reported to considerably impact the quality of life, cause loss of work time or absenteeism, increase work restriction, transfer to another job, or disability than any other group of diseases with a significant financial toll on the individual, the organization, and the society as a whole [7]. According to the United States Bureau of Labour Statistics (2013) placed nursing among the professions with the highest rate of suffering from MSDs [8], with reported 1-year prevalence at any of body region fluctuating between 40% and 85% among both Asian populations[1] and Western populations [9].

Even though many prevalence studies have reported MSDs among nurses, most research has been undertaken in the developed populations [10]. Therefore, acknowledge gap exists in the scientific literature regarding the prevalence of MSDs among professional nurses in Kurdistan Region, Iraq. The current study sought to fill this gap by investigating MSDs among nurses; the associated job risk factors and the coping strategies toward reducing the risk of development of MSDs among nurses from selected hospitals and health-

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Corresponding author's e-mail: karwan.khudhir@gmail.com

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care centers. A central aim of this study was to document the prevalence of self-reported MSDs among Kurdistan professional nurses and to determine the association between psychosocial risk factors and MSDs.

II. MATERIALS AND METHODS

A. Materials

Subjects

An analytic cross-sectional survey administrated to nurses working in two general hospitals (Ranya and Qaladiza) and seven health centers (Raparin, Kewarash, Chwarqurna, Zharawa, Sangasar, Shkarta, and Sarwchawa) in which are located in Raparin administration of Sulaymaniyah city, Kurdistan region, Iraq. The required sample size was estimated using a formula for hypothesis testing of two group comparison [11]. Simple random sampling was applied to select 220 nurses based on the inclusive and exclusive criteria. Nurses were invited to participate in the study with minimum 1-year experience working in the clinical area with no history of MSDs. Of 220 questionnaires volunteers, which were distributed among nurses, 210 of them agreed to participate giving 95% respondent rate. Data were collected between September 10, and December 30, 2015.

Exclusive criteria

Non-respondents were those who refused to have the researcher measure their height and weight (10 workers). At the end of the survey, only 192 questionnaires were analyzed because 18 participants were excluded from the analysis (nurses who were pregnant at the time of study period and nurses with a history of MSDs due to injuries). The current research was of the cross-sectional design, which may not represent a causal association between risk factors studied with MSDs. Furthermore, the 12-month prevalence of each body region and working conditions were based on self-reporting questionnaire to collect data, and, as a result, recall bias cannot be ruled out.

B. Methods

To collect subjective data standardized and modified questionnaire comprised three sections were used: Section A: Demographic and individual variables which included (age, gender, smoking, body mass index [BMI], and physical activity). Seca model 208 was used to measure height, which has a precision of up to 0.05 cm and weight was measured using TANITA weighing scale with accuracy of 0.1 kg. BMI was calculated as weight in kilogram divided by the height in meters. Section B: Musculoskeletal problems were assessed using a slightly modified validated version of the Standardized Nordic Questionnaire [12] to examine the musculoskeletal symptoms in any of nine anatomical body regions (neck and shoulder pain, upper back pain, low back pain, arm pain, knee and leg pain, and ankle and foot pain) in the previous 12-month period as reported by the respondents. Section C: Participants exposures to psychosocial variables were assessed by using a slightly modified version of the

Job Content Questionnaire developed by Karasek [13]. The 5-points response options ranged from strongly disagree to strongly agree. The reliability of the Job Content Questionnaire was assessed using Cronbach's α , yielding a score of 0.80, which was judged acceptable. Four experts commented on the draft questionnaire, and modifications were made to improve its validity.

Statistical analysis

After data collection, the data were validated, coded, and analyzed using the statistical package for the social sciences (SPSS) software (IBM, version 21). Descriptive characteristics of the respondents were calculated as frequency, percentage, median, and interquartile range (IQR). Data were checked for normality using the Kolmogorov–Smirnov test; all data were no normally distributed which were presented as a median and IQR. Bivariate analysis (Chi-square test) was employed to determine the relationship between categorical independent and dependent variables. *P*-value was considered significant if <0.05 ($P < 0.05$). Finally, multiple logistic regression was performed to identify the risk factors of MSDs, using odd ratios (ORs), 95% confidence interval (CI), and probability (*P*) values (set at $P < 0.05$), which is considered significant association with an OR of 95% CI.

Ethical consideration

Ethics approval was obtained from the Koya Technical Institute, Kurdistan Ministry of higher education. Before collecting data, approval was also obtained from the respective Directorate of public hospitals plus health-care centers and a written letter of consent was obtained from each participant. The respondents were informed about the purpose of the study and that participating in this study was voluntary. Furthermore, the participants were told that their answers would be kept confidential and would only be used for research purposes.

III. RESULTS

A total of 220 questionnaires were distributed for this study, whereas only 210 of them are responded (response rate = 95%). Details of the sociodemographic, individual, and psychosocial information are presented in Table I, which shows that the age of the nurses was between 21 and 62-year-old and they are divided into two groups, with 50.5% in the older group (>39.5 years) and 49.5% in the younger group (≤ 39.5), with median of age at 39.5 years (IQR = 9.75). The majority of nurses are female (57.3%), non-smoker (85.4%), and 65.1% of them were obese (BMI ≥ 25 kg/m²). Of the 192 respondents, 142 (74%) of them do not have frequent exercise.

In term of psychosocial factors, the scores of control at work, psychological demand, social support, and job satisfaction are dichotomized into two groups to make two level variables (low and high). All the subjects were categorized based on the cutoff median point, a total of 56% of the nurses were categorized with high job control, 54% of them were categorized with low psychological demand whereas 51% and 52.6% of them were categorized with low social support and low job satisfaction, respectively.

The overall prevalence of MSDs among Raparin nurses in the past 12 months was 74%. The prevalence of neck pain was highest 94 (48.5%), followed by shoulder, 74 (38.5%), upper back 72 (37.5%), feet/ankle 57 (29.7%), lower back 51 (26.6%), thigh/hip 50 (26%), and wrists/hands 47 (24.5), whereas the lowest rate was found to be in knee 43 (22.4%) and elbows 32 (16.7%).

The bivariate analysis in Table II showed that there were significant associations between age and MSDs. Similarly, the associations in MSDs were found to be significant ($P < 0.05$) among nurses according to smoking, BMI, physical activity, control at work, psychological demand, social support, and job satisfaction. However, there were no significant associations shown between MSDs with gender among nurses.

TABLE I
DEMOGRAPHIC, INDIVIDUAL, AND PSYCHOSOCIAL FACTORS OF NURSES

Factors	Frequency (%)	Median (IQR)	MSDs		P value
			Yes	No	
Age groups (years)		39.5 (9.75)			0.007*
≤39.5	95 (49.5)		62	33	
>39.5	97 (50.5)		80	17	
Gender					0.77
Male	85 (44.3)		62	23	
Female	107 (57.3)		80	27	
Smoking					<0.001*
Smoker	45 (16.6)		28	0	
Non-smoker	164 (85.4)		114	50	
BMI		27 (6.9)			<0.001*
Non-obese (≤24.9 kg/m ²)	67 (34.9)		29	38	
Obese (≥25 kg/m ²)	125 (65.1)		23	13	
Physical activity					<0.001*
Infrequent (<3 time/week)	142 (74)		127	15	
Frequent (≥3 time/week)	50 (26)		15	35	
Control at work		19 (4)			0.01*
Low	85 (44)		70	15	
High	107 (56)		72	35	
Psychological demand		27 (9)			<0.001*
Low	105 (54)		63	42	
High	87 (43)		79	8	
Social support		24 (8)			<0.001*
Low	98 (51)		84	14	
High	94 (49)		58	36	
Job satisfaction		32 (7)			<0.001*
Low	101 (52.6)		87	14	
High	91 (47.4)		55	36	

MSDs: Musculoskeletal disorders, IQR: Interquartile range, BMI: Body mass index

TABLE II
PREVALENCE OF MSDs IN DIFFERENT BODY REGIONS OF NURSES

Body regions	No. (%)
Neck	93 (48.4)
Shoulders	74 (38.5)
Elbows	32 (16.7)
Wrists/hands	47 (24.5)
Upper back	72 (37.5)
Lower back	51 (26.6)
Thighs/hips	50 (26)
Knee	43 (22.4)
Feet/ankle	57 (29.7)

MSDs: Musculoskeletal disorders

Independent variables which were previously shown to be significant in the bivariate analysis ($P < 0.05$) were included in a multivariable logistic regression analysis (Table III). Smoking, BMI, physical activity, psychological demand, social support, and job satisfaction were found to be significantly associated with MSDs. Smoker nurses who were found to have 19.472 (95% CI: 5.396–70.273) higher risk of MSDs as compared to non-smokers. In the same way, obese nurses were found (BMI ≥25 kg/m²) to have 5.106 (95% CI: 1.735–15.025) higher risk of MSDs as compared to the non-obese nurses. In terms of physical activity, the respondents who were do not have frequent physical activity were found to have 8.639 (95% CI: 3.075–24.271) higher risk of MSDs as compare to those who have frequent physical activity (>3 times/week). The risk of MSDs for nurses who have high psychological demand was 6.685 (95% CI: 3.318–13.468) as compared to the nurse with low psychological demand, and the risk of MSDs for nurses who have low social support was 3.143 (95% CI: 1.202–4.814) as compared to those who have high social support. Nurses who were dissatisfied 2.44 times more complain to have MSDs (OR = 2.44, 95% CI: 1.04, 5.63) as compared to the workers who were satisfied with their work conditions. In this modeling, the negelkerke R² showed that about 56.4% of the variation of MSDs was explained by independent variables.

TABLE III
MULTIPLE LOGISTIC REGRESSIONS OF PREDICTORS OF MSDs

Variables	B	SE	Significant	Adjusted OR	95% CI
Age					
≤39.5	-	-	-	1	-
>39.5	-0.354	0.522	0.498	0.702	0.252, 1.954
Smoking					
Smoker	2.969	0.655	<0.001	19.472	5.396, 70.273
Non-smoker	-	-	-	1	-
BMI					
Non-obese (≤24.9 kg/m ²)	-	-	-	1	-
Obese (≥25 kg/m ²)	1.630	0.551	0.003	5.106	1.735, 15.025
Physical activity					
Infrequent (<3 time/week)	2.156	0.527	<0.001	8.639	3.075, 24.271
Frequent (≥3 time/week)	-	-	-	1	-
Control at job					
Low	-0.457	0.517	0.377	0.633	0.230, 1.745
High	-	-	-	1	-
Psychological demand					
Low	-	-	-	1	-
High	1.900	0.357	<0.001	6.685	3.318, 13.468
Social support					
Low	1.145	0.490	0.019	3.143	1.202, 4.814
High	-	-	-	1	-
Job satisfaction					
Low	0.885	0.430	0.039	2.44	1.04, 5.63
High	-	-	-	1	-

SE: Standard error, *significant at $P < 0.05$, OR: Odd ratio, CI: Confidence interval, MSDs: Musculoskeletal disorders

IV. DISCUSSION

This study has revealed that the prevalence of MSDs is 74% among nurses. The result of the current study is in agreement with previous study conducted among Malaysian public hospital nurses, who reported prevalence of MSDs (73.24%) [14], but also higher compared to other study findings, which reported the prevalence of MSDs (57.2%) among nurses working in governmental health institutions of Gondar town, Ethiopia [15]. Nevertheless, as compared to the nursing employee in other Asia countries, the prevalence of MSDs was found to be much lower, (78.0–94.6%) [16]. In this study, the highest prevalence of MSDs was found in the neck with the prevalence of 48.5%, followed by the shoulder (38.5%) and upper back 72 (37.5%). These findings were agreement with a study conducted among Malaysian public hospital nurses in which neck pain and upper back were the most common and predominantly occurring prevalence of MSDs [15]. Whereas in the previous study conducted in Japan among nurses, most prevalent of MSDs reported was of shoulder (71.9%), followed by the low back (71.3%), neck (54.7%), and upper back (33.9%) [16]. Age in the current study was seen to be an important factor in MSDs. The results of this study were in accordance with the most of the previous researches done [6]. Besides, this study showed that the prevalence of MSDs is 82% and much higher among the older group nurses when compared to younger age group nurses (65%). Possible explanation could be aging, biological changes; biological in nature due to the aging process such as degenerative changes that occur in muscles, tendons, ligaments, nerves, and joints. Based on these two important findings among the nurses who were in older age, and the fact that the prevalence of MSDs was higher among them, there is an essential necessary for this problem to be tackled completely by organize programs that promote physical exercise and training in ergonomics.

However, the result of this study has shown that there was no statistically significant association was found between gender and MSDs, the prevalence of MSDs is slightly higher among female nurses than male nurses (75% vs. 73%, respectively). This finding is in line with the study conducted among Denmark nurses [17]. Greater prevalence or severity of symptoms may be due to the higher demands and constraints that women face, or women are being exposed to different cumulative risk factors at work and home due to the nature of domestic chores performed by women. Another factor which may be responsible for the prevalence of MSDs in women may be constitutional or anatomical differences between men and women [18].

Bivariate analysis revealed that there was a statistically significant association between MSDs and smoking status. This study finding is in agreement with the previous researches showed that smoking to be significant risk factors for MSDs (OR = 1.90; 95% CI 1.18–3.06), (OR = 1.12, 95% CI 0.82–1.52), respectively [19]. On the contrary, the study conducted among Denmark nurses found that there was no significant association between smoking and MSDs [17]. This could be explained by the fact that scientists have shown

that there is an association between cigarette smoking and MSDs. First of all, cigarette smoking may cause a decrease in the amount of blood perfusion to bones and to almost all tissues of the human body which leads to low production of bone-forming cells (osteoblasts). Furthermore, smoking seems to break down estrogen in the body more quickly that is important to build and maintain a strong skeleton in women and men. Besides, the nicotine in cigarettes slows the production of bone-forming cells (osteoblasts) so that they make less bone. Another explanation is that cigarette smoking causes calcium deficiency by reducing the absorption of the quantity of calcium from the diet which the body needs for building strong bones [20].

BMI was found to have a significant association with MSDs, the prevalence of MSDs among nurses who were obese was significantly higher than non-obese nurses. These findings are consistent with other studies elsewhere in a similar population [12]. In contrast, Rasmussen, *et al.* reported that there was no significant association between MSDs and BMI ($P > 0.05$) [17]. This finding could be because overweight workers may not be physically active and do less exercise, in a way that they may be more susceptible to MSDs [20]. Physical activity was significantly associated with increased odds of MSDs among the participants in this study, suggesting that physical activity may be important in reducing MSDs of nurse. Even though there is evidence that physical activity enhances health [20], literature on the relationship between physical activity and MSDs in working populations is still inconsistent. Whereas several studies [21] have showed a positive association between the frequency of leisure time sports activity and MSDs, others found no association between the duos [22].

The current study result reveals that based on the median score as the cutoff point, the majority of Raporin nurses 107 (56%) experience high job control. Control at work is significantly associated with MSDs, and similar findings have been demonstrated in previous studies [14-24]. In contrast, Kim, *et al.*, conducted a study among male fire-fighters in Korea. They reported that there was no significant association between MSDs and insufficient job control [25]. Majority of nurses have low psychological demand 105 (54%), and psychological job demand is significantly increased odds of musculoskeletal (OR = 6.685, 95% CI: 3.318, 13.468). Corroborating earlier results, those workers with high psychological demand are at higher risk of MSDs and probably suffer multiple site pains [12-21]. Furthermore, this study reveals that the majority of the nurses 98 (51%) experience low social support and there was a significant association between MSDs and social support, in agreements with the previous research results [24].

The descriptive statistics show that 101 (52.6%) of nurses experience low job satisfaction. Chi-square test (P value) proved that there is a significant association between MSDs and job satisfaction. The results of this study accordance to the previous findings by Woods [26] whereas conversely, studies conducted by El-Bestar, *et al.* [27] and Sim, *et al.* [28] found that there is no significant association between job satisfaction and MSDs ($P > 0.05$). Possible

clarification for this could be the fact that psychosocial factors related to work can lead to stress. Stress may increase the tone in muscles causing them to become fatigued, or it may increase the period of muscle activity and decrease the chance for recovery. When workers are stressed, they experience more muscle contractions than normal, and therefore the muscles cannot relax completely. Furthermore, stress may increase the perception of pain, or undermine the mechanisms used to cope with pain. Seen from a more pathophysiological perspective, stress may, apart from increasing muscle activity, impair circulation and the supply of oxygen to tissues as a result of hyperventilation. Moreover, prolonged stress may degrade tissue quality and the ability of tissues to recover due to hormonal processes [29].

V. CONCLUSION

Raparin administrative nurses showed high prevalence of MSDs (74%); neck and shoulders have the highest prevalence rate among the nine body regions covered by the study. In this study, the major risk factors responsible for MSDs were smoking, BMI, physical activity, control at work, psychological demand, social support, and job satisfaction. These association patterns suggest also prospects for intervention strategies to stimulate health lifestyle and increase a positive psychosocial work environment.

VI. RECOMMENDATIONS

According to the results of this study, the major risk factors responsible for MSDs was BMI, physical activity so staffs should be educated on how to maintain an optimal BMI through the consumption of appropriate meals and regular exercise recommended to prevent MSDs. Similarly, psychosocial factors such as decision making, feelings of alienation and job dissatisfaction have a tangible effect on MSDs. Thus, there is need for an awareness to be created among workers through numerous strategic prevention programs and campaigns focused on psychosocial risk factors and improvements of work conditions targeted at reducing the risk of MSDs complaints among nurses. Social support should be improved through activities such as team building, entertaining activities, peer group activities, and other activities. In addition, provide and preserve high work conditions for nurses (ability to make decisions, how to perform their work and not asked to do extra work) so that they feel comfortable.

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