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Psychosocial and Individual Characteristics and Musculoskeletal Complaints Among Clinical Laboratory Workers

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Musculoskeletal disorders (MSDs) are an important health problem among healthcare workers, including clinical laboratory ones. The aim of the present study was to investigate the prevalence of MSDs and individual and psychosocial risk factors among clinical laboratory workers. A cross-sectional study was carried out among 156 workers of 30 clinical laboratories in 3 towns of Iran. The Nordic questionnaire with individual and psychosocial risk factors was used to collect data. Multiple logistic regression analysis was performed. The prevalence of reported MSDs among the study population was 72.4% in the past 12 months. The most prevalent MSDs were pain in the lower back and neck; 42.7% and 33.3%, respectively. Significant relations were found between MSDs and age, gender, heavy work at home and job control ($p < .05$*). MSDs among laboratory workers were high and associated with age, gender, heavy work at home and job control. More research into measuring these factors and workplace physical demands is suggested.*

MSDs clinical laboratory workers psychosocial risk factors

1. INTRODUCTION

Work-related musculoskeletal disorders (MSDs) affect the quality of life, sickness absence and disability with noticeable economic consequences on the organization and the society [1]. MSDs are a main health problem in the world [2] and a common health problem among healthcare workers [1]. Nearly one third of all sickness absence of healthcare workers result from MSDs [3]. While numerous studies have studied risk factors for MSDs among nurses, few have been devoted to clinical laboratory workers [4]. Studies have shown up to 80% of professional personnel involved in daily microscope work to report MSDs [5]. David and Buckle's cohort study reported a significantly higher

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occurrence of elbow and hand disorders in the pipette user population as compared to the control population [6]. Working in a biological safety cabinet or fume hoods involves laboratory personnel's increased risk for problems in the upper limbs, neck and back. In addition to these physical problems, recently attention has been focused on the influence of work-related psychosocial factors on work-related MSDs [7, 8, 9, 10, 11]. Some believe that stress is the primary cause of the symptomology associated with many upper-limb work-related MSDs [10].

Studies indicate mental stress is common in laboratory workers' work [12]. Several work-related psychosocial factors introduced in many studies include job demands, stress at work, lack of support, job control, shift work, monotonous work and time pressure [11, 13, 14, 15, 16]. Because there have been very few studies on psychosocial factors and MSDs among laboratory workers worldwide, the first aim of this study was to investigate the prevalence of MSDs among laboratory workers. Another aim was to examine the relation between personal characteristics, psychosocial factors and complaints in the back, neck, shoulders, hands/wrists, legs and MSDs in any body region.

2. METHODS

A cross-sectional epidemiological study was conducted among 156 personnel of 30 public and private clinical laboratories in three towns in Iran (Shahroud, Damghan, Bojnord) in 2010. These are small towns, which are close to each other. Their geographical and social aspects are the same. Also, the environmental situation of private and public laboratories in these towns is almost the same. Working in both private and public laboratories is common; very few clinical laboratory workers work in private laboratories exclusively. Data were collected with a semi-self-structured questionnaire.

Musculoskeletal complaints in different body regions (lower back, neck, shoulders, hands/wrists and legs) in the past 12 months were ascertained with the standardized Nordic questionnaire [17]. In addition, risk factors for MSDs included (a) demographic and organizational characteristics (age, body mass index, job tenure, years in present occupation, work experience, daily working hours, gender, marital status, current work place, previous jobs, shift work, employment status, education, looking after children under 4 years old, physical exercise, smoking, second job and heavy work at home, e.g., lifting, handling heavy loads and shopping; (b) psychosocial factors (work stress, communication with colleagues or supervisor/manager at work, control at work, bonuses, working under pressure to complete daily tasks) and (c) worrying about exposure to needlestick injuries, biological and chemical agents, and working with complex equipment.

Sociodemographic and psychosocial risk factors included in the questionnaire were derived from investigations in many publications [4, 7, 9, 10, 11, 13, 16, 18, 19]. They were then reviewed by a team of experts of laboratory sciences and occupational health, improved several times and validated. The reliability of the questionnaire was investigated by calculating Cronbach's α in a pilot study (.81).

Data were obtained with interviews. Statistical associations between independent variables and symptoms in each body region were initially evaluated with analysis of variance (ANOVA) for continuous variables and χ^2 (or Fisher's exact test, as necessary) for categorical variables. Subsequently, all independent variables that showed significant associations with $p < .05$ in at least one region were included in a multivariate logistic regression mode. Gender and age were included in the model independently of their p, whereas job tenure was omitted from the model, due to its high correlation with age to avoid the problem of multicolinearity. Statistical analysis was done with SPSS version 16; the level of significance was set at $p < .05$.

3. RESULTS

One hundred and fifty-six laboratory workers participated in this study. Table 1 shows the basic characteristics of the study population.

TABLE 1. Characteristics of Laboratory Workers (*N* = 156)

Variable	*M (SD)*
Age (years)	
females	31.7 (8.8)
males	36.0 (9.1)
total	33.6 (9.3)
BMI	
females	22.9 (3.2)
males	25.6 (3.6)
Job tenure (years)	10.2 (8.8)
Years in present occupation	10.2 (8.7)
Daily working hours	
females	9.3 (2.4)
males	7.6 (1.9)
total[a]	8.4 (2.4)
	%
Gender	
female	53.8
male	46.2
Marital status	
single	26.3
married	73.7
Education	
less than bachelor's degree	73.1
bachelor's degree and more	26.9
Second job	
yes	19.9
no	80.1
Children <4 years old living at home	
yes	15.4
no	84.6
Regular physical activity	
yes	17.3
no	82.7
Heavy work at home	
yes	34.4
no	65.6

Notes. BMI = body mass index; a = range: 4–18 h.

At least one musculoskeletal complaint in the past 12 months was reported by 72.4% of the respondents, 64.7% reported under three and 35.3% reported three or more musculoskeletal complaints. Table 2 presents the 12-month prevalence of musculoskeletal complaints.

TABLE 2. Prevalence of Musculoskeletal Complaints in Past 12 Months Among Laboratory Workers (*N* = 156)

Body Region	*n* (%)
Trunk	
neck	52 (33.3)
shoulders	38 (24.4)
upper back	32 (20.8)
lower back	65 (41.7)
Arms	
elbows	11 (7.1)
wrists	25 (16.0)
Legs	
upper legs	29 (18.7)
knees	43 (27.6)
lower legs	29 (18.6)
ankles	30 (19.2)
MSDs in any body region	13 (72.4)

Notes. MSD = musculoskeletal disorder.

Between individual and psychosocial factors, age, gender, level of education, heavy work at home, daily working hours, job control and communication showed significant associations in at least one body region, $p < .05$. Subsequently, all of these were included in a multivariate logistic regression model.

In multiple logistic regression analyses, all statistical associations were confirmed (Tables 3–4). Age ($p = .030$), gender ($p = .014$), heavy work at home ($p = .013$) and low control ($p = .001$) were associated with musculoskeletal complaints. Gender ($p = .049$) and low control ($p = .020$) were associated with lower back pain. Age ($p = .100$) was associated with neck pain. Gender ($p = .004$) and low control ($p = .014$) were associated with shoulder pain. Gender ($p = .021$), daily working hours ($p = .002$), communication ($p = .030$) and low control at work ($p = .031$) were associated with complaints in the legs. Age ($p = .034$), gender ($p = .039$), heavy work at home ($p = .019$) and low control ($p = .033$) were associated with hand/wrist pain.

Even though the participants reported that they were highly worried about their working conditions, this study found no significant association between MSDs and those factors. The highest

TABLE 3. Risk Factors Associated With Presence of Musculoskeletal Disorders in Body Regions Among Laboratory Workers

	Lower Back			Neck		
Risk Factor	***OR***	**95% CI**	***p***	***OR***	**95% CI**	***p***
Age	1.027	[0.984, 1.071]	.216	1.061	[1.015, 1.110]	.010
Gender (female)	2.537	[1.006, 6.399]	.049	2.49	[0.958, 6.51]	.061
Heavy work at home (no)	0.861	[0.354, 2.096]	.742	0.460	[0.178, 1.191]	.110
Daily working hours	0.926	[0.774, 1.107]	.398	1.145	[0.961, 1.364]	.130
BMI	1.071	[0.959, 1.195]	.224	0.981	[0.872, 1.103]	.750
Education (bachelor's degree and more)	0.460	[0.203, 1.040]	.062	0.898	[0.392, 2.059]	.800
Good communication (yes)	0.714	[0.224, 0.277]	.569	0.409	[0.125, 1.336]	.139
Job control (yes)	0.421	[0.203, 0.874]	.020	0.635	[0.300, 1.343]	.235

	Shoulders			Hands/Wrists		
Risk Factor	***OR***	**95% CI**	***p***	***OR***	**95% CI**	***p***
Age	1.040	[0.989, 1.094]	.128	1.071	[1.005, 1.141]	.034
Gender (female)	5.353	[1.690, 6.955]	.004	4.282	[10.76, 17.036]	.039
Heavy work at home (no)	0.736	[0.250, 2.168]	.578	0.120	[0.210, 0.701]	.019
Daily working hours	1.147	[0.937, 1.404]	.185	1.081	[0.837, 1.395]	.551
BMI	1.040	[0.916, 1.181]	.545	0.957	[0.810, 1.131]	.605
Education (bachelor's degree and more)	1.308	[0.520, 3.289]	.568	1.215	[0.390, 3.782]	.757
Good communication (yes)	0.307	[0.090, 1.046]	.059	1.152	[0.257, 5.165]	.853
Job control (yes)	0.344	[0.147, 0.805]	.014	0.339	[0.125, 0.917]	.033

	Legs		
Risk Factor	***OR***	**95% CI**	***p***
Age	1.016	[0.972, 1.061]	.483
Gender (female)	3.037	[1.181, 7.811]	.021
Heavy work at home (no)	0.541	[0.222, 1.318]	.176
Daily working hours	1.337	[1.114, 1.605]	.002
BMI	1.096	[0.977, 1.229]	.117
Education (bachelor's degree and more)	0.804	[0.362, 1.782]	.590
Good communication (yes)	0.244	[0.068, 0.873]	.030
Job control (yes)	0.444	[0.212, 0.928]	.031

Notes. OR = odds ratio, CI = confidence interval, BMI = body mass index. Reference for gender = male; heavy work at home = yes; education = less than bachelor's degree; good communication = no; job control = no.

prevalence was found for worrying about exposure to needlestick injuries (54.2%), biological (42.7%) and chemical agents at work (37.9%), and working with complex equipment (25.3%).

4. DISCUSSION

This study found high prevalence of musculoskeletal complaints among clinical laboratory workers (72.4%); however, it was lower than that Ramadan and Ferreira found (86.7%) [4].

Lower back pain is the most common musculoskeletal problem among laboratory workers, which is similar to nurses [20, 21, 22], dentists [23] and X-ray technicians [24]. In a study among microscope users, symptoms were most prevalent at the neck (53.4%), followed by the lower back pain (39.2%) [18].

The prevalence of all MSDs except neck pain was affected by female gender. In Lorusso, Bruno, Caputo, et al.'s study among microscope users, female gender was also associated with complaints in all regions except the lower

TABLE 4. Risk Factors Associated With Presence of Musculoskeletal Disorders Among Laboratory Workers

	Logistic Regression		
Risk Factor	***OR***	**95% CI**	***p***
Age	1.060	[1.006, 1.123]	.030
Gender			
male	1	—	—
female	4.060	[1.324, 12.434]	.014
Heavy work at home			
yes	1	—	—
no	0.272	[0.098, 0.757]	.013
Daily working hours	1.195	[0.972, 1.468]	.090
BMI	1.004	[0.878, 1.148]	.955
Education			
less than bachelor's degree	1	1	—
bachelor's degree and more	0.416	[0.167, 1.036]	.059
Good communication			
no	1	—	—
yes	0.160	[0.017, 1.462]	.104
Job control			
no	1	—	—
yes	0.180	[0.065, 0.500]	.001

Notes. OR = odds ratio, CI = confidence interval, BMI = body mass index.

back [18]. From individual factors after adjustment for other significant factors, age and gender were significant factors for MSDs in any body region and hands/wrists. Age was a significant factor for neck and knee pain. In many studies, age [18, 23, 24, 25] and gender [19, 23, 25, 26] were significant risk factors for some MSDs. Gender imbalance in domestic work can account for gender differences in MSDs [27]. In our study, heavy work at home also showed a significant relation with MSDs, and hours of work were associated only with leg pain, Lorusso et al. showed hours of microscope use was associated with neck, arm and hand/wrist pain [18].

Even though many studies on healthcare described psychosocial factors as important risk factors for MSDs [9, 11], only one study investigated such factors among laboratory workers and it did not find any significant association [15]. However, our study found a significant association between lower job control and lower back, shoulders, hands/wrists, legs and musculoskeletal complaints in any body region. Also communication at work was identified as a significant risk factor for leg pain among laboratory workers. Another study showed that pain in the neck, shoulders and upper back was more common at work with high demands and low control [19]. Bongers, de Winter, Kompier, et al. indicated that monotonous work, high perceived work load, time pressure, low job control and lack of social support from colleagues were associated with musculoskeletal disease [15]. Smith, Choe, Jeon, et al. showed that the prevalence of MSDs among Korean hospital nurses was 93.6% and nurses suffering from depression were exposed to the risk of MSDs 3.3 times more often [11].

Research among Iranian nurses indicated that high prevalence of self-reported musculoskeletal symptoms in the neck, hands/wrists, upper back and feet/ankles was associated with psychosocial factors and, specifically, stress [9]. However, the present study did not find any association with stress at work.

5. CONCLUSION

This study showed that the prevalence of musculoskeletal complaints among clinical laboratory workers was high, and age, gender, heavy work

at home and low control were associated with it. The study supports the view that risk factors like age, gender, heavy work at home and low control are strongly associated with work-related MSDs. More workplace research that gives equal emphasis to measuring these factors and workplace physical demands factors is suggested. It will also require management measures to include effective job control, education programmes on MSD prevention and health promotion among clinical laboratory workers.

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