

PREVALENCE OF WORK-RELATED MUSCULOSKELETAL DISORDERS AMONG LABORATORY WORKERS.

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ABSTRACT

OBJECTIVES: To determine the prevalence of Work-Related Musculoskeletal Disorders among laboratory workers. **METHODOLOGY:** This cross-sectional study design was used from November 2019 to January 2020, among randomly selected laboratory workers. Data was collected using standardized Nordic Musculoskeletal Questionnaire (SNMQ) and Numeric Pain Rating Scale (NPRS) to determine the prevalence of Work-Related Musculoskeletal Symptoms and pain intensity along with participants' demographic data, among laboratory workers. Data was analyzed using the Statistical Package for the Social sciences (SPSS) version 20 and summarized by descriptive statistics, which were presented using frequency tables and expressed as percentages, mean±SD. **RESULTS:** In this study we found 38% prevalence of Work Related Musculoskeletal Disorders (WRMSDs) among laboratory workers. Moreover, ankles/feet turned out to be the most symptomatic region with prevalence of 0.7% followed by neck and upper back being more common among male 131(87.3%), laboratory technicians 121(81.3%), with mean age of 34.65(11.82%). In our study, most of the participants (63.3%) were having mild pain and 4% had severe pain. **CONCLUSION:** In conclusion, high prevalence of Work-Related Musculoskeletal Pain, affecting one or both ankles/feet, neck, and upper back. Most of the study participants reported having mild pain.

KEYWORDS: Standardized Nordic musculoskeletal questionnaire, Numeric pain rating scale, Statistical package for social sciences

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INTRODUCTION

The technology which is used in medical labs is one of the most important health care branch. Technicians who are working in labs are exceptional group of health care professionals who are at high risk for developing musculoskeletal problems and are at the most frequent health issue faced by working population are musculoskeletal disorders.¹ which are also linked with more disability than any other diseases.² Musculoskeletal disorders not only attack on person's ability to work and function but also exert an financial influence on the work place health system and community.³ Musculoskeletal disorder is describe as feeling of discomfort, difficulty or pain in the musculoskeletal systems(joint, muscle, tendon) or soft tissue of the body due to repetitive and irregular movement or long term poor body posture and also define as an extensive range of inflammatory conditions.⁴ Worldwide, the musculoskeletal problems are very common.⁵ lab workers which includes pathologist, microbiologist, biochemist and technicians are at high risk for developing musculoskeletal problems like lower back and shoulder injuries

and even other joints and muscles.⁶ Laboratory technicians are reported to have high level of strain in neck and shoulders owing to prolonged static loading which leads to high prevalence of neck pain, shoulder pain, elbow pain, hand /wrist pain, upper back, lower back and ankle/foot.⁷⁻⁸ Prevalence of musculoskeletal problems in those using microscope for 11-15 years was found in maximum numbers, while those groups using microscopes for more than 15 years reported smaller numbers.⁹ As indicated by World Health Organization (WHO) reports, laboratory workers are prone to work related muscular problems which causes high occurrences in pain related to neck, hand and shoulder. Neck pain is associated with poor posture. worldwide occurrence of musculoskeletal problems occur from 14% to 42%¹⁰ Female are at high risk and increased working hours may further increase to the occurrence of musculoskeletal problems¹¹⁻¹² In Iran and India, the prevalence of laboratory work-related musculoskeletal disorders is reported between 72% and 80%. Increased sites of musculoskeletal problems in lab workers areas back (31% to 43%) and neck (18% to 33%)¹²⁻¹³ laboratory workers are reported to have increased

level of neck and shoulders strain due to constant loading those results in increased prevalence of shoulder and neck pain.¹⁴ In studies from America¹⁵⁻¹⁶ Ethiopia¹⁷ Sweden¹⁸ Switzerland¹¹ reported that neck and back are vulnerable sites. The shoulder (58% to 60%), upper back (25% to 57%) and hand/wrists (28% to 57%) were also recorded with increased involvement in pipetting and microscope activities.^{11,15,16,18} This study aims to estimate the prevalence of reported musculoskeletal symptoms among laboratory workers with regard to their work-related physical factors. There is lack of literature available on the health care profession particularly in medical laboratories. Laboratory workers during their training who may be at increased risk initially in their carrier. According to our knowledge only few studies have been conducted on prevalence of Work-Related Musculoskeletal Disorders among laboratory workers. So, the results of our study will therefore, helps to identify the occurrence of disorders related to Musculoskeletal in literature and to improve quality of life among laboratory workers of Hyderabad and Nawabshah. It will support the existing literature and can further help in finding risk factors to which laboratory workers are exposed.

MATERIAL AND METHODS

This research was conducted during Nov 2019 to January 2020 at laboratories of Nawabshah and Hyderabad in Sindh province of Pakistan, and comprised laboratory technicians and all of them (n=150) participated voluntarily. Those included were both male and female gender. And Laboratory workers e.g., Pathologist, biochemist, microbiologist, technicians. Age 18 to 65 years. Those who were not working in laboratories and known cases of Previous back pain history, Previous back injuries, Previous surgeries, and Previous disabilities were excluded. Approval for the study was obtained from the institutional ethics committee (letter No/PUMHS/IPRS/ORS/3111/10) and consent was taken from all the participants. Participants filled a questionnaire, Nordic standardized musculoskeletal questionnaire and numeric pain writing scale. Prior to the inclusion in the study, all subjects signed an informed consent. All the participants were given a detailed description of the study, and their anonymity and data confidentiality was guaranteed and it took approximately 20-30 minutes. Simple structured standardized Nordic musculoskeletal questionnaire was used for this study. Our questionnaire was divided into three sections: The first section was on the socio-demographic proforma of the laboratory workers like age, gender and lab specialty (microbiologist, pathologist, biochemist, technicians). The second section includes standardized Nordic musculoskeletal disorder questionnaire which is used for scanning musculoskeletal problems and epidemiologic studies for the general complaints of shoulder/neck, upper/lower back and other body regions. It also indicates the symptoms in these

nine areas of body. There are two types of questionnaire general and specific questionnaire. The general questionnaire was used in present study which is binary response questionnaire and consists of 27 questions. The permission to use this questionnaire from the author through mail. The third section includes Numeric Pain Rating Scale (NPRS) which ranges from 0 to 10, 0 shows no pain, while 1-3 shows mild pain, and 4-6 shows moderate pain, while 7-10 represent severe pain. Data was entered in Microsoft Excel Sheets and analyzed by using Statistical Package for Social Sciences (SPSS) version-20. Demographic data was calculated by descriptive statistics which includes (mean, standard deviation and percentages) and Nordic musculoskeletal questionnaire to determine the prevalence of work-related musculoskeletal disorders.

RESULTS

The results of our research project are presented in 3 sections. The first section includes Demographic information. The second section includes the occurrence of Muscles related problems in lab staff, through the Standardized Nordic Musculoskeletal Questionnaire (SNMQ). The third section consists of Numeric pain rating scale (NPRS) through which we had determined pain. The 12 months prevalence of Work-related Musculoskeletal disorders (WMSDs) was found to be 57(38%) with pain in one or both ankles/feet while only 1(0.7%) had pain in left elbow.

Table 4.1: *Subjects information*

VARIABLE	MEAN	SD
Age	34.65	11.82
	FREQUENCY (%)	
Gender		
Male	131	87.3%
Female	19	12.7%
Lab specialty		
Microbiologist	10	6.7%
Pathologist	13	8.7%
Biochemist	5	3.3%
Laboratory technicians	122	81.3%

DISCUSSION

Several occupations have increased risk of muscles associated problems. Lab staff like doing pipetting work reported increased occurrence of pain related to neck, shoulder, elbow, back, and hand¹⁹. Mechanism for work-related musculoskeletal disorders involves fibrosis, tissue injury, recurrent cycle of inflammation that further lead to recurrent pain, muscle diseases, and dysfunction of ligament and fascia.^{20,21,22,23,24}

Table 4.2: Occurance of work- related muscular problems in Lab staff

Body regions	Problems within Last 12 months n (%)			
	Yes		No	
	Frequency	percentage	frequency	Percentage
Neck	53	35.3%	97	64.7%
Shoulders	24	16%	105	70%
	7	4.7%		
	14	9.3%		
Elbows	10	6.7%	13	90.7%
	1	0.7%		
	3	2.0%		
Wrists/hands	28	18.7%	105	70%
	9	6.0%		
	8	5.3%		
Upper back	53	35.3%	97	64.7%
Lower back	50	33.3%	100	66.7%
One or both Hips/thighs	25	16.7%	125	83.3%
One or both knees	49	32.7%	101	67.3%
One or both ankles/feet	57	38%	93	62%

Table 4.3: Occurance of activity compromised in lab staff.

Body regions	Problem Preventing daily activities N (%)			
	Frequency	percentage	frequency	Percentage
Neck	16	10.7%	134	89.3%
Shoulders	9	6%	141	94%
Elbows	3	2%	147	98%
Wrists/hands	12	8%	138	92%
Upper back	17	11.3%	133	88%
Lower back	16	10.7%	134	89.3%
One or both Hips/thighs	9	6%	141	94%
One or both knees	16	10.7%	134	89.3%
One or both ankles/feet	14	9.3%	136	90.7%

Table 4.4: Occurance of work related muscular problems in laboratory staff

Body areas	within Last 7 days N (%)			
	Yes		No	
	Frequency	percentage	frequency	Percentage
Neck	25	16.7%	125	83.3%
Shoulders	17	11.3%	133	88.7%
Elbows	9	6%	141	94%
Wrists/hands	16	10.7%	134	89.3%
Upper back	27	18%	123	82%
Lower back	30	20%	120	8%
One or both Hips/thighs	12	8%	138	92%
One or both knees	26	17.3%	124	82.7%
One or both ankles/feet	43	28.7%	107	71.3%

Table 4.5 Prevalence of pain in laboratory workers.

CATEGORY	FREQUENCY	PERCENTAGE
No pain	15	10%
Mild pain	95	63.3%
Moderate pain	34	22.7%
Severe pain	6	4%

Therefore, the aim of our study was to find out the prevalence of work-related musculoskeletal disorders among laboratory workers in different laboratories of Nawabshah, Hyderabad and Tando Muhammad Khan through this cross-sectional study. According to findings of

present study, the overall 12 months prevalence of musculoskeletal disorders was 90% with highest prevalence in one or both ankles/feet 57(38%) followed by neck 53(35.5%) and upper back 53(35.5%). In present study the results indicate the greater prevalence of WRMSD in laboratory

technicians which is about (81.3%) as compare to other laboratory workers, being more common in males (87.3%). These findings are supported by previous study conducted in Ethiopia where (21.7%) prevalence of ankle/feet pain founded in 156 laboratory staff [25]. Another study determined the similar prevalence of neck pain (33.3%) among pathologist (chart) and in Sweden the prevalence of upper back pain was (25 to 57 %) among laboratory technicians¹⁸. So far, to the best of our knowledge, no previously study conducted was Pakistan that determining prevalence of WRMSD among laboratory technicians. The occurrence of work-related muscular disorders had been studied in different parts of the world. Among Indian medical lab technicians, the majority of study population 66.9% had the most commonly affected body regions among which the upper back is about (11.5%), neck (18.4%) and ankle/feet (6.9%)²⁶. Furthermore, a study from Iran reported that the prevalence of WRMSD is about between (72% and 80%) among laboratory workers and the more prominent sites of musculoskeletal problems were lower back (31% to 43%) and neck (18% to 33%)^{1,13}. In previous study the global reference to musculoskeletal symptoms in at least one anatomic segment was 86.7% in the last 12 months and 70.2% in the last 7 days regardless of the activity performed by workers.²⁷ According to (WHO) global occurrence of muscular problems varies from 14% to 42%¹². Such findings have shown that WRMSD prevalence is high throughout the world leading to decreased QOL. In addition to lowering the quality of worker life and reducing productivity, WRMSDs are the most expensive form of work disability, attributing approximately 40% of all costs toward the treatment of work-related injuries and work-related MSDs has a huge impact, emerging as an increasing problem in our modern societies.²⁸ and there is very limited literature on the WRMSDs among laboratory workers in Pakistan and this should be addressed in future studies. A total of 150 participants are approached ranging in age from 18 to 65 years, with mean age of participants was 34.65 yrs. Out of 150 respondent, 131 (87.3%) were males, 122 (81.3%) participants were laboratory technicians and only 5 (3.3%) were biochemist. (Table 4.1) Seventeen (11.3%) participants had trouble during their work in past 12 months due to pain in upper back while only 3 (2%) participants had trouble due to elbow pain. Majority of our study participants had trouble in one or both ankles/ feet 43 (28.7%) during their work in last 7 days while only 9 (6%) had trouble due to elbow pain. In our study most of the participants were having 95 (63.3%) mild pain while 6 (4%) had severe pain. To the best of our knowledge there is no any study conducted in Pakistan before which determine the work-related musculoskeletal disorders specifically among laboratory workers. So, this study will support

and contribute in literature to investigate this subject further. However, there are some limitations of this study firstly, the study comprises small sample size and data was collected only from Nawabshah, Hyderabad and Tando Mohammad Khan

CONCLUSION

This study provides detailed information on the prevalence of work-related musculoskeletal disorders among laboratory workers. In conclusion we found a high prevalence among laboratory workers of Nawabshah, Hyderabad and Tando Mohammad Khan with highest frequency of muscular problems noted in one or both ankles/ feet followed by neck and upper back and lowest prevalence in elbow. As present study we have only determined the occurrence muscular problems in lab workers and there may be other related factors like age, obesity, gender, biomechanical loading which can cause muscular problems. So future research must consider these factors and interactions that may occur between them.

DATA AVAILABILITY: data will be available on request. **ETHICS APPROVAL:** The ERC gave ethical review approval. **CONSENT TO PARTICIPATE:** written and verbal consent was taken from subjects and next of kin. **FUNDING:** The work was not financially supported by any organization. The entire expense was taken by the authors. **ACKNOWLEDGEMENTS:** We would like to thank the all contributors and staff and other persons for providing useful information. **AUTHORS' CONTRIBUTIONS:** All persons who meet authorship criteria are listed as authors, and all authors certify that they have participated in the work to take public responsibility of this manuscript. All authors read and approved the final manuscript. **CONFLICT OF INTEREST:** No competing interest declared.

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