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RESEARCH ARTICLE

WORK RELATED MUSCULOSKELETAL DISORDERS AND ASSOCIATED RISK FACTORS AMONG WORKERS IN A PHARMACEUTICAL FACTORY: A SURVEY STUDY

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ABSTRACT

Background: Work related musculoskeletal disorder (WMSD'S) is a term used to describe a painful or disabling injury to the muscles, tenders or nerves aggravated by work. WMSD'S are preventable or at least can be delayed. To date, no systematic review of the literature on WMSD'S in pharmaceutical factory workers has been conducted.

Purpose: The purpose of the present study was to identify the prevalence of work-related musculoskeletal disorders among workers in a pharmaceutical factory to assess the associated risk factors & also to investigate which Body areas among low back, neck and upper extremity are more prevalent sites of WMSD'S among workers in a pharmaceutical factory.

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INTRODUCTION

"Work-related musculoskeletal disorders" (WMSDs) is a term used to describe a painful or disabling injury to the muscles, tendons or nerves caused or aggravated by work. (Ufuk Berberoglu and Burcu Tokuc, 2013) WMSDs are preventable or at least can be delayed. Work-related musculoskeletal disorders were first noticed by Bernardino Ramazzini, who documented the disorders that he saw in workers with "insistent and irregular movements in unnatural postures." (Ufuk Berberoglu and Burcu Tokuc, 2013) The term "work-related musculoskeletal disorders" implies musculoskeletal disorders that occur by ergonomic risk factors present in assigned tasks and jobs and their influences, which are more than the physiological, anatomical and biomechanical capabilities of the body. (Alireza Choobineh *et al*., 2015) Occupational diseases and disorders are among common problems in the society. Studies show that feeling pain indifferent parts of the musculoskeletal systems is one of major reasons for absence from workplaces. (Moulood Valipour Noroozi *et al*., 2015) According to National Institute for Occupational Safety and Health (NIOSH) in 1997, musculoskeletal disorders have the second rank among health problems. (Moulood Valipour Noroozi *et al*., 2015) In the United States of America, about 1 million individuals per year become absent from work places for treatment and freedom from pains due to musculoskeletal disorders and government pay compensation to 2% of work forces due to backache every year. (Moulood Valipour Noroozi *et al*., 2015) Different studies have shown that approximately 10% of occupational injuries and disorders are associated with the musculoskeletal system. (Moulood Valipour Noroozi *et al*., 2015) It has been found that WRMSDs associated with numerous occupational risk factors, including physical work load such as force, posture, movement and vibration, psychosocial stressors and individual factors which are also known to be important as predictive variables. (Ramazan Mirzaei *et al*., 2014) The level of exposure to physical workload can be normally assessed with respect to intensity (or magnitude), repetitiveness and duration. (Ramazan Mirzaei *et al*., 2014) Both experimental science and epidemiology indicate that job features that increase the of WMSDs are heavy lifting, repetitive hand motions, static work in which the body is maintained in a fixed posture, vibrations and any of these in combination along with an undesirable psychosocial work environment. (Ufuk Berberoglu and Burcu Tokuc, 2013) Work-related musculoskeletal disorders are caused mainly by manual handling, frequent bending and twisting, heavy physical work and whole-body vibration. The risk of WMSDs can increase with an increase in workloads, low work satisfaction, high work demands and work-related stress. Work-related musculoskeletal disorders (WMSDs) are widespread in the

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world, with substantial individual and socio-economic impacts. Some factors such as biomechanical, organizational and individual characteristics could be known as possible factors affecting these disorders. (Moulood Valipour Noroozi *et al*., 2015) Other risk factors for MSDs are obesity, smoking, muscle contraction and conditions of workplace. One of the considered factors for the WMSDs in other literatures of ergonomic and epidemiology would be gender. (Pourmahabadian and Azam, 2008) According to previous studies despite similarity of the work procedures, severity and prevalence rate of WMSDs varies by gender. (Pourmahabadian and Azam, 2008) But in most cases there are factors (beyond the genetic factors and aging), so called "ergonomic risk factors" due to assigned tasks and jobs, which are involved in inducing the WMSDs. In a study conducted on 188 women workers in garment industry, it was found that 60% of participants suffered from carpal tunnel syndrome, which is related to their job and experience. (Alireza Choobineh *et al*., 2015) Epidemiologic studies show clues of relation between work factors and musculoskeletal disorders and also some studies demonstrate that pain prevalence, pain location, and other signs may be related to standing posture, work habit and other demographic factors. (Moulood Valipour Noroozi *et al*., 2015) In pharmaceutical industry, where pharmaceutics are packed, workers are involved in a fairly long hour of static work. In packing works, awkward posture and repetitive movements are very common. The majority of jobs are characterized by a sitting posture worker's head and trunk flexed forward and shoulders flexed and abducted. (Ramazan Mirzaei *et al*., 2014)

According to researchers and in spite of increase in automatic and mechanized processes, occupational musculoskeletal disorders are still the major factor in losing work hours, increase of costs and human damages. (Moulood Valipour Noroozi *et al*., 2015) Generally, statistical records show that musculoskeletal disorders are increasing as a silent epidemic tremendously, especially among those employed workers with sitting and repetitive activities in their workplace. (Homa Kheiri *et al*., 2011-2012) Today, few studies have done on identifying and eliminating problems associated with musculoskeletal disorders. Indemnities incurred from occupational disease and its relevant absences and medical and healthcare costs, moreover disrupting the life of employed individuals, indicate the significance of the subject for further studies. (Homa Kheiri *et al*., 2011-2012) Work-related musculoskeletal disorders are a worldwide problem. In developing countries, especially those with high rates of unemployment, it is tempting for employers who build up small and middle- sized industries to disregard safety and health.

MATERIALS AND METHODS

A total number of 414 workers were selected from the Pharmaceutical companies in Selaqui, Dehradun.

Inclusion criteria

Age: 18 to 60 year

Gender: Male & Female

Persons who are working in a pharmaceutical factory. Musculoskeletal disorders present on Nordic questionnaire.

Exclusion criteria

Workers who had musculoskeletal disorder prior to start of work Workers should not have any previous history of diagnosed;

- Osteoporosis
- Adhesive capsulitis
- Systemic illness (Tumour & Rheumatologic disease)
- Congenital anomalies of spine
- Recent Fractures of upper extremity

Workers who reported pain in the area other than the lower back, neck, arm, shoulder & hand. Workers who reported pain more than one area in Standardised Nordic Musculoskeletal symptoms questionnaire.

Nordic Musculoskeletal pain Questionnaire (NMQ)

Nordic musculoskeletal questionnaire was designed to screen the subjects having musculoskeletal disorders in ergonomic context. Subjects were explained with the procedure to fill the questionnaire by the researcher. Subjects were told to answer in yes/no, based on their working ability in the last 12 months. On the basis of the screening by Nordic questionnaire; subjects having back pain were told to fill the Modified Oswestory Low back pain disability questionnaire, for neck pain to fill the Neck disability index and for pain in upper extremity to fill the DASH questionnaire.

Modified oswestory low back pain disability questionnaire

Modified OSW Low Back pain questionnaire was designed to understand the extent of LBP affecting the ability of subjects to manage day to day activities. Researcher marked the answer to each section by encircling the one precise choice that most applied to them as they may feel that more than one statement may relate to them. The researcher marked the answer to every question, based on the workers condition in the last week, by circling it in the appropriate manner. Questionnaire consists of a total of 10 questions .Each question having 6 options ranging from 0-5 point score. Each of the 10 questions were scored separately (0-5 points each) & then added up (Max. Total =50). After completing the form, with the mathematical calculations the total score of the individual subject was calculated.

Neck Disability Index (NDI)

- NDI was designed to enable us to understand the extent of neck pain affecting the ability of subjects to everyday life activities. Subjects were explained with the procedure to fill the questionnaire by the researcher.
- Questionnaire consists of a total of 10 questions. Each questions having 6 options ranging from 5 point score. Each of the 10 questions were scored separately (0-5 points each) & then added up (Max. Total =50). After completing the form, with the mathematical calculations the total score of the individual subject was calculated.

Disabilities of Arm Shoulder Hand (DASH)

DASH questionnaire was developed to measure the disabilities of arm, shoulder and hand. Subjects were explained with the

procedure to fill the questionnaire by the researcher. Questionnaire contains 30 questions with answer on likert scale. The most precise answer was circled by the researcher, as answered by the worker. Total score of the DASH questionnaire was calculated with the mathematical formula. The form was completely filled by the researcher, as reported by the worker, as DASH score cannot be calculated if there are greater than 3 missing items. Total score was measured on the 30-150 scale.

Data analysis

The data of the study was analyzed by using SPSS version 14.0 software. Descriptive analysis was used to calculate mean value and standard deviation of demographic data (Age, Height, Weight, BMI) along NDI, Modified Oswestory and DASH.

Table 1. The Socio demographic features of the workers

Variables	Neck Pain		Back Pain		Shoulder Pain	
	MEAN	SD	MEAN	SD	MEAN	SD
Age	34.652	9.599	32.214	9.289	33.679	10.241
Height	161.26	9.200	161.63	10.392	161.18	9.092
Weight	58.652	12.654	59.000	12.683	59.821	10.062
BMI	22.500	3.481	22.661	4.110	23.100	3.824

Regions	Male	Female	Non Educated	5th	8th	10	12	Grad	PG
Neck Pain	13	10	0	3	2	4	5	3	6
Low Back Pain	40	30	4	2	14	13	11	12	14
Shoulder Pain	17	11	4	1	4	5	3	3	8

RESULTS

Out of selected 500 participants 414 willingly participated in the study. Out of 414; 293 scored pain in areas other than the back, neck and arm, shoulder and wrists/hands on the Nordic Musculoskeletal pain Questionnaire. Out of 121; who were included in the study, 19.00% were having Neck pain, 57.85% were having Back pain and 23.14% were having pain in the arm, shoulder and hand.

DISCUSSION

This study was an attempt to identify the prevalence of WRMSD's among the workers in a pharmaceutical factory in Dehradun. To assess the associated risk factors which places the workers at a risk of developing the WRMSD's and also to investigate which body areas among neck, low back and upper extremity are more prevalent sites of WMSD's among the workers in a pharmaceutical factory. The results of our study showed that 57.85% complained of low back pain, 19% of the workers complained of neck pain and 23.14% complained of pain in the arm, shoulder and hand. According to statistical and clinical data we found that both continuous sitting and standing >4 hours, could have increase the risk of WRMSD's in the pharmaceutical factory workers. The amount of average workday experience, weight lifted, bending and twisting activities and lumbar support were also found to be related to increase the risk of LBA. The results of our study were supported by (Hafiz Naeem Ur Rasul *et al*.) and (Isa Halim *et al*.); who also said that, forward bending posture in sitting, working hour during factory >4-6 hours were noted to be as the major risk factor for having LBA and duration of standing was also identified as a significant contributor to WRMSD's. (Jeremy C.T. Fairbank and Paul B. Pynsent, 2000; Homa Kheiri *et al*., 2011-2012) In all studied subjects the perceived symptoms of WRMSD's were investigated by the general Nordic questionnaire. The subjects MSD's symptoms were not medically examined. Lower back, shoulder and wrists/hands were among the most prevalent problems followed by neck pain in terms of the WRMSD's among the studied workers. Our study in consistent with the previous study (Alireza Choobineh *et al*., 2015) also showed the highest prevalence rate of WRMSD's symptoms in descending order, which was related to lower back, shoulder and wrists/hands and neck respectively. Prevalence of developing disorders at least in one region of the body during the previous 12 months and even in previous 7 days were also reported by the pharmaceutical factory workers, which were consistent with similar studies. (Pourmahabadian and Azam, 2008) Our study showed 3 month prevalence of low back pain to be 57. 85% (70) in the pharmaceutical factory workers. The factors such as continuous sitting for more than 6 hours and postural changes (like bending and heavy lifting) were found to be the most challenging work, faced by the pharmaceutical factory workers and proved to be the major risk factor for developing the MSD. In our study we found that prevalence of low back pain was 57.85%, neck pain was 19% and 23.14% was prevalent among the arm, shoulder and hand in the pharmaceutical factory workers in Selaqui, Dehradun.

Conclustion

- Prevalence of WMSDs in pharmaceutical factory workers in Dehradun was high. Lower back, shoulder and wrists/hand and neck complaints were found respectively high.
- The results concluded that WMSDs caused minimal disability in the workers. Employment period, working hours and static working were associated risk factors playing a pivot role in WMSDs.
- The need for awareness of physiotherapy and job satisfaction was suggested.

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