Original Research Paper

Medical Science

ASSESSMENT OF PREVALENCE OF MUSCULOSKELETAL DISORDERS AMONG PHARMACEUTICAL SUPPLY CHAIN WORKERS AND ITS DEPENDENCE ON THEIR AGE AND YEARS OF WORK

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ABSTRACT Musculoskeletal Disorders (MSD) are injuries or disorders that occur due to repetitive body movements and continuous adoption of body postures. Workers involved in packing and dispatch activities in the pharmaceutical supply chain industry do certain repeated movements and adopt several postures, some of which may be awkward and may cause the onset of Work-related Musculoskeletal Disorders (WMSD). This research was conducted to: assess the prevalence of MSD among pharmaceutical supply chain workers and identify the relationship of MSD with workers' age and years worked. 88 male workers from pharmaceutical supply chains were interviewed, and their anthropometric measurements were taken. 65% and 27% of workers reported pain in the lower back and knee, respectively. No significant relationship of pain in body parts with age and years of work was seen. The findings imply a need for: supply chain workers' work posture assessment as a potential cause of the MSD in the lower back and knee and bring a workplace design intervention to improve posture and reduce pain and discomfort.

KEYWORDS : Musculoskeletal disorders (MSD), posture, pharmaceutical supply chain industry, work-related musculoskeletal disorders (WMSD).

INTRODUCTION

"Musculoskeletal disorders (MSD) are injuries and disorders that affect the human body's movement or musculoskeletal system (i.e. muscles, tendons, ligaments, nerves, discs, blood vessels, etc)," says Middlesworth (2020). Moreover, work-related musculoskeletal disorders (WMSDs) are the musculoskeletal disorders that arise from activities and postures such as bending, twisting, and stretching. We do these activities every day but what makes them more harmful at the workplace is the constant repetition and the long time spent in those postures (CCOHS, n.d.). In a study of work of 102 workers in the forging industry, Singh, Lal, & Kochar (2012) found out that 20.33%, 34.33%, and 45.32% of the workers were under high, medium, and low risk of MSDs, respectively. Small scale industries are important to the economy in countries like India and represent a large part of the workforce. Yet, barely any attention is given to the workplace design and postures assumed by the workers in these industries, which causes WMSD among them (Mali & Vyavahare, 2015; Sain & Meena, 2016). According to Joshi, Menon, & Kishor (2001), 59.4% of workers from 60 small and medium-sized factories in Delhi reported musculoskeletal disorders in different body parts depending upon the industry type.

Pharmaceutical packing workers reported the MSD prevalence to be 74 percent in the upper limb, 59.3 percent in the back, and 60 percent in the lower limb due to the poor posture adopted during work (Velaga & Telaprolu, 2013). 36.8% back and spinal disorders were reported in a study of pharmacy packaging workers (Varmazyar, Varyani, & Zeidi, 2009). Prevalence of musculoskeletal disorders in the upper back, wrists/hands, low back, knees, neck, and shoulders were seen to be predominant among pharmaceutical packing workers (Pourmahabadian, Akhavan, & Azam, 2008).

Canadian Centre of Occupational Health and Safety suggests that "hazards are best eliminated at the source; prevention strategies involving workplace layout, tool, and equipment design, and work practices should be considered" (CCOHS, n.d.). Stooping, squatting, and squat sitting postures were dominant postures in potato cultivation jobs, and the lower back (92.26%) was the most affected body part (Pal, De, Sengupta, Maity, & Dhara, 2015).

The Objective Of This Paper Is To Investigate:

1. The prevalence of musculoskeletal disorders among workers of the pharmaceutical supply chain.
2. The dependence of musculoskeletal pain on factors like age and years of work experience among workers of the pharmaceutical supply chain.

METHODOLOGY

Sample

A sample of 88 workers between 18 to 41 years of age and 1 to 12 years of work experience was chosen from 11 pharmaceutical supply chain units for the study. Workers were divided into groups based on age and years of work experience; two age groups were 18 to 25 years and 26 to 41 years, and two work experience groups were 1 to 6 years and 7 to 12 years.

Job Description

The main job of workers in pharmaceutical supply chain or distribution units is to pick medicines from different parts of the godown, gather them in one place, and pack them into customized boxes for supply. These workers are commonly referred to as pickers. The activities workers do in this job include standing, walking, sitting in squatting and kneeling on the floor position, and carrying the load. The postures adopted while doing these activities are standing, standing with one or both legs bent, standing and sitting with bent and twisted back, squatting, and kneeling on the floor.

Data Collection Tool

Demographic Data:

A questionnaire was used to collect the demographic details of workers.

Musculoskeletal Disorder Data:

Respondents were asked to mark body regions where they experience pain out of the nine anatomical regions prone to develop MSD. Nine anatomical areas are neck, shoulder, elbow, wrist/hand, upper back, lower back, hips/thighs/buttocks, knees, and ankles/feet as suggested by Kuorinka et al (1987).

Anthropometric Data:

A weighing scale and anthropometric kit were used to measure weight and height. Body Mass Index (BMI) was calculated by dividing weight in kilogram by square of height in meter as illustrated by Viester et al (2013).

Observation of tasks performed by workers was done, and video recording and pictures were taken using a DSLR (Digital Single Lens Reflect) camera. Videos and photographs were then transferred to a computer for further evaluation.

RESULTS

Table 1 shows the demographic and anthropometric details of workers.

Table 1 *Demographic Details Of Subjects*

Parameter	Range	Mean ± stdev
Age (years)	18 – 41	26.51 ± 4.95
Work experience (years)	1 – 12	4.07 ± 2.98
Height (centimetre)	153.50 - 179.30	164.73 ± 6.01
Weight (kilogram)	39 – 86	59.14 ± 9.08
BMI (kg/meter square)	16.55 - 30.58	21.77 ± 2.98

Prevalence Of Musculoskeletal Disorder

As shown in figure 1, workers reported the prevalence of musculoskeletal pain in nine body parts, and it was found to be maximum in lower back (64.77%) and knee (27.27%).
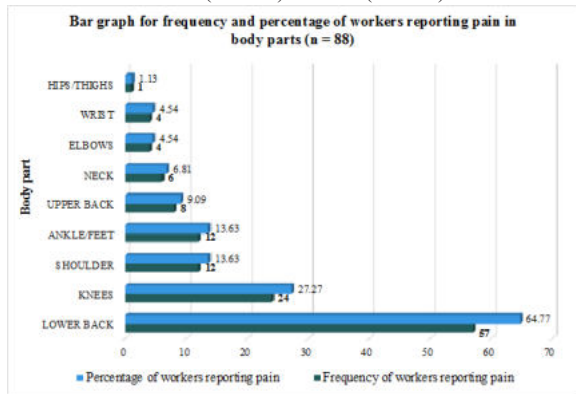
Figure 1 *Prevalence of Musculoskeletal Disorders among Pharmaceutical Supply Chain Workers*

Dependence Of MSD Pain In Lower Back And Knee On Age And Years Worked

The relationship of pain in lower back and knee with age and years of work was assessed. Table 2 shows the frequency and percentage of workers reporting pain in each age group and work experience group. As shown in last column of table 2, Chi-square statistical test showed that the pain in lower back and knee among workers of the two age group and two work experience group did not show any significant difference.

Pain in lower back and knee was distributed equally across categories of age and work experience.

Table 2 *Prevalence of pain in lower back and knee in each age group and work experience group*

Age group (years)		18 -30	31 – 41	Total	Pearson Chi-square (P value)
Pain in lower back	Frequency	46	11	57	0.715
	% in each group	52.3%	12.5%	64.8%	
Pain in knee	Frequency	22	2	24	0.084
	% in each group	25%	2.3%	27.3%	
Work Experience group (years)		**1-6**	**7-12**	**Total**	**Pearson Chi-square (P value)**
Pain in lower back	Frequency	50	7	57	0.052
	% in each group	56.8%	8%	64.8%	
Pain in knee	Frequency	21	3	24	0.397
	% in each group	23.9%	3.4%	27.3%	

Note. Last column in the table indicates the value of Pearson Chi-square (P- value). Level of significance was 0.05.

DISCUSSION

The prevalence of pain in the lower back and knee, respectively, is reported to be 65% and 27% in this study. Similar findings were seen in previous studies: 44.7% knee pain and 36.8% back pain were reported by pharmacy packing workers in Iran (Varmazyar, Varyani, & Zeidi, 2009), and 47% low back pain and 43% knee pain were reported by pharmacy packing workers in another study (Pourmahabadian, Akhavan, & Azam, 2008).

Etemadinezhad, Ranjbar, & Gorji (2013) noted that the workers of a tobacco factory who had to bend and stand with the flexed legs frequently, the prevalence of MSD was in the low back (55%) and knees (45%).

Results of this study revealed that pain in the lower back and knee was the same across all categories of age and work experience of workers. Earlier, Okunribido & Wynn (2010) postulated that the age of workers alone couldn't impact MSD prevalence, but it could influence MSD along with other factors like physical work demand.

It is precedent that pharmaceutical packing workers suffer from MSD, and there is a need to find its cause and remedy.

CONCLUSION

No research prior to this study has been done on work- related musculoskeletal disorders, work posture, and workplace design of pharmaceutical supply chain or distribution workers. As the prevalence of pain in the lower back and knee was prominent among workers in pharmaceutical supply chain units, the study highlights that there is a need to assess postures adopted by workers working in pharmaceutical supply chain units and examine the relationship between postures and the prevalence of musculoskeletal pain. There is a scope of ergonomic intervention and workstation design to reduce musculoskeletal pain among these workers.

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