

Prevalance Of Work Related Low Back Pain Among The Information Technology Professionals In India – A Cross Sectional Study

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ABSTRACT: Objective: To study the prevalence of Work Related Low Back Pain (WRLBP) as one of the major Work-related Musculoskeletal Disorders (WMSD's) amongst the Information Technology (IT) Professionals in India. Study Design: As it was intended to study the factors that cause the low back pain in IT establishments, Cross sectional study design was adopted. Materials and Methods: IT Professionals (N=400) working at two IT companies located in Coimbatore city of India were used for initial screening of this study. Cornell Musculoskeletal Discomfort Questionnaire was administered to capture the factors pertaining to the occurrence of Low Back Pain (LBP). Univariate Exploratory Analysis was employed to study the factors among the employees reported with Low Back Pain. Simple percentages and Means were employed to study the factors. The means between the groups with and without Back Pain were tested using Independent t- test. Results: It was inferred that 54% (N=162) male employees and 42% (N=98) female employees have reported LBP. Having considered all the subjects participated in the study, the percentage of employees with Low Back Pain is 51%. Conclusion: The study thus concludes that the Low Back Pain is the major Work Related Musculoskeletal Disorder among the IT Professionals studied. When demographic factors were analyzed, the study suggests life style changes along with therapeutic intervention. Hence appropriate prevention and intervention strategies should be employed to create a healthier working scenario and thereby improve productivity.

Keywords: Work-related Musculoskeletal Disorders (WMSD's), Low Back Pain in Information Technology Professionals, India; Posture and Back Pain.

INTRODUCTION

The prevalence of Work-related Musculoskeletal Disorders (WMSD's) is increasing among Computer users throughout the world (Luis et al., 2003; Arun Vijay., 2013). The Information Technology (IT) Industry boom in India, since the last two decades, has led to an increased use of Computer Devices and peripherals. Approximately 76% of Computer professionals from India reported musculoskeletal discomfort in various epidemiological studies (Talwar R et al., 2009; Bhandari D et al., 2007; Sharma A et al., 2006 & Bakhtia CS et al., 2003). There are several risk factors associated with the development of work related Musculoskeletal Disorders among the workers who use Computer extensively at their workplace. All the risk factors can be divided into two major categories (World Health Organization, 1985). One is occupational and other in non-occupational/personal. Among the occupational factors, repetition, force, awkward/static postures, duration of exposure and vibration are identified as major risk factors. As the IT Professionals are exposed to such different risk factors and therefore it is expected that they are prone to develop Work related Musculoskeletal Discomfort (Wahlstrom J 2005). Hence, the workers involved in the IT profession will have high prevalence of Work-related Musculoskeletal Disorders and that may be associated with work style as one of the risk factors in the development of musculoskeletal discomfort (DeepakSharan et al., 2011). The aim of this study is to identify Work related risk factors that may be associated with the onset or exacerbation of WMSD's in Indian IT Professionals. Epidemiological studies report that the lifetime incidence of Low Back Pain (LBP) in Industrial workers to be approximately 60% (Sevensson and Anderson, 1983; Lee et al, 2001).

Among the occupations which are prone to Musculoskeletal Disorders, Video Display Terminal workers are prominent. Video Display Terminal workers are particularly susceptible to the development of musculoskeletal symptoms, with prevalence as high as 50% (Gerr and Marcus, 2001). Various factors contribute to Back Pain in Information Technology Professionals and these factors include Individual risk factors, Work-related physical risk factors such as poor posture, Work related psycho-social factors and Occupational risk factors. The identification of appropriate risk factors is of vital importance in preventing the recurrence of this health issue. Among the various types of industry workers, the working environment of IT Professionals is unique. A number of studies have suggested that prolonged sitting could be a risk factor for the development of Low-Back Pain (Corlett, 2006; pope et al., 2002). Thus the study of discomfort in relation to prolonged sitting may reveal important aspects of the transition between discomfort and pain. Discomfort is considered to be related with sitting postural changes (Fenety and walker, 2002; Vergara and page, 2002; Liao and Drury, 2000) and it had been reported a positive relationship between discomfort and the frequency of postural changes during computer work. The presence and severity of Low Back Pain is associated with several socio-demographic factors. Among them, sex, age, education level, smoking and occupation are more prominent. Andersson et al., (1998) found that smokers were more likely to suffer from Musculoskeletal injuries than people who never smoke. Pain, specifically in the Lower Back had been increasing depending on the daily cigarette consumption. Obesity has also been found to be a cause of back pain (Peltonen et al., 2003). Physical Inactivity, Inferior fitness and nutrition levels are common characteristics of smokers and obese individuals. Stress, Pain behavior, Depressive mood, cognitive functioning are the Psychosocial risk factors at work. Perceived high pressure on time and workload, low job control, job dissatisfaction, monotonous work, and low support from coworkers and management appear to independently increase the risk of

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hospitalization of back disorders with a low-control job compared with a high-control job. Occupational risk factors and low back pain are hampered by the difficulties of measuring specific exposures. The two major occupational risk factors for Low Back pain symptoms are static muscle load (Bernard, 1997; Hedman and Fernie, 1997) and flexed curvature of the lumbar spine, both of which are involved in seated work tasks (Wilder et al., 1988; Chaffin and Andersson, 1990; Bernard, 1997). In this article, the term Work related Low Back Pain was narrowed down to the symptoms such as ache, pain, and discomfort in the Low Back region which arise mainly due to Work activities. The term 'IT professional' is applied to those who belong to the software development and programming personnel only. Thus, the objective is to study the prevalence of Work Related Low Back Pain as one of the major Work-related Musculoskeletal Disorders among the Information Technology professionals in India.

METHODS

STUDY DESIGN

As it was intended to study the factors that cause the Low Back Pain in IT establishments, Cross sectional study design was adopted.

SUBJECTS

The total number of Software Professionals (N=400) working in two different Multinational Information Technology companies in Coimbatore, Tamilnadu were formed the population of this study. Out of which only those who reported to have low back pain as indicated in the Cornell musculoskeletal discomfort questionnaire was selected for analyzing the risk factors contributing to its occurrence. Subjects who satisfied the following criteria were selected:

- (i) Software professionals of both sexes aged between 25 and 40 years who are working on day shift.
- (ii) The duration of working hours were also taken into consideration which is fixed as at least 5 hours a day or 25 hours per week.
- (iii) Further, the Software professionals who are working in other service domains of Information Technology Industry including support services are excluded.

Accordingly, a total of 302 Male employees and 98 female employees were recruited for this study thus constituting the male: female ratio of 3:1. Such ratio is proportionate to the gender specific distribution of the work force in the IT Organization.

METHODOLOGY

The Demographic Data Information Sheet and the Cornell Musculoskeletal discomfort questionnaires along with consent form were distributed with prior approval from the Human Resource Department and with proper intimation to the respective Head of the Department to get their full cooperation and support. A presentation was done to all the participants about the questionnaire and doubts were clarified before the distribution of the Questionnaires. The Work Related Musculoskeletal Disorders of the subjects

was assessed by Cornell University's musculoskeletal discomfort questionnaire (CMDQ) (JasobantaSethi et al., 2011). The Questionnaire was used to identify the number of subjects who had pain in Low Back region with respect to other body regions. Even though, the prevalence of all the musculoskeletal disorders was captured through the Questionnaire, the objective of this study is capturing the prevalence of Low Back Pain.

DATA ANALYSIS AND RESULTS

This part deals with the work related risk factors of Low Back Pain in Software Professionals. Univariate Exploratory Analysis was employed to study the factors among the employees reported with Low Back Pain. Simple percentages and Means were employed to study the factors. It is inferred from the Table No.1, 50% of subjects reported Lower back pain, 16% of subjects reported Neck Pain and 11% percentage of subjects reported shoulder pain, 7% reported upper back pain and 5% reported wrist and hand symptoms. The mean scores between the groups with and without Low Back pain were tested using Independent t-test. The Table 2 shows the prevalence of Low Back Pain in which 203 (51%) employees reported low back pain (LBP). Correspondingly, out of the 302 male employees, 54% (N=162) employees reported LBP and out of all the female employees, 42% (N=41) reported LBP. With respect to the distribution of age among male subjects, 72% were between the ages of 21 to 30. 26% of them were between the age group of 31 to 40. With respect to the distribution of age among female subjects, 90% were between the ages of 21 to 30. 10% of them were between the age group of 31 to 40. The mean age of all the employees is 28.04 years. The mean age of those who complained of LBP is 28.39 years and that of who did not report LBP is 27.68 years. This difference is statistically insignificant at 5% level (Independent t-test). With respect to the working hours of subjects with low back pain, 22% of subjects were working less than 40 hours and 71% of them were working 41 to 50 hours a week. Only 7% of the subjects were working more than 50 hours per week. The mean Work Hours per week of all the employees is 45.57 hours. The mean Work Hours per week of those who complained of LBP is 46.4 hours and that of who did not report LBP is 44.72 hours. This difference is statistically significant at 5% level (Independent t-test). It is relevant to note here that those who had LBP have put in more hours of work per week. With respect to the Body Mass index of the subjects with Low back pain, 38% were at normal level and 49% of subjects were overweight. Only 13% of were obese as indicated in the BMI over 30. The mean BMI of all the employees is 25.23. The mean BMI of those who complained of LBP is 26.29 and that of who did not report LBP is 24.13. This difference is statistically significant at 5% level (Independent t-test). With respect to the distribution of Waist-Hip Ratio (W-H ratio) of male subjects, 77% was less than 0.95. 15% of them were between the Waist-Hip ratio group of 0.96 to 1.0. With respect to the distribution of Waist-Hip Ratio of female subjects, 7% was less than 0.80. 37% of them were between the Waist-Hip ratio group of 0.81 to 0.85. 56% of them were more than 0.86. The mean W-H ratio of the 400 employees is 0.90. The mean W-H ratio of those who complained of LBP is

0.91 and that of who did not report LBP is 0.88. This difference is statistically significant at 5% level (Independent t-test). The higher BMI and W-H Ratio of those reported LBP can be attributed to the sedentary life style of the employees. Table 3&4 shows that Levene's Test for Equality of Variances and Independent t-Test for Equality of Means of different variables contributing to Low Back pain in Software Professionals respectively.

Table-01: Categorization of Musculoskeletal disorders in different body regions

Complaint Region	Total number of subjects percentage	
Hip	16	4
Knee	16	4
Lower back	203	50
Lower leg	2	1
Neck	64	16
Shoulder	43	11
Thigh	6	2
Upper arm	0	0
Upper back	29	7
Wrist	21	5
Total	400	100.00

Figure 1: Pie-Chart Showing Prevalence of Low back pain with respect to other body regions among the Software Professionals (Values are expressed in percentage)

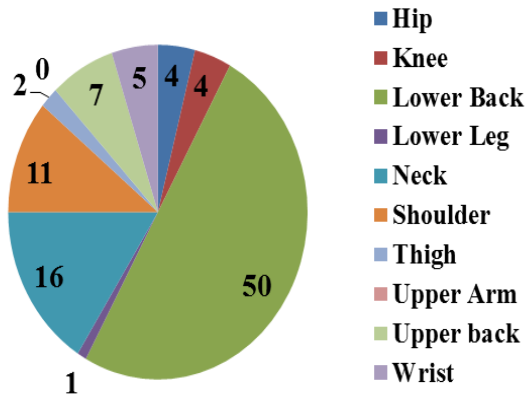


Table-02: Description of Individual Factors contributing to Low Back Pain in the Software Professionals

S.No	Parameters /Variables	N	Mean	Std. Deviation
1.	Age	203	28.39	3.13
2.	Working Hours		46.40	4.78
3.	BMI		26.03	3.42
4.	Waist Hip Ratio		0.904	0.06

Table-03: Levene's Test for Equality of Variances

Variables	Levene's Test for Equality of Variances	
	F	Sig.
Age	20.997	0.00
Work Hours per week	1.859	0.17
BMI	7.610	0.01
W-H Ratio	11.737	0.00

*F ratio is calculated with equality of variance assumed

Table-04: Independent t-Test for Equality of Means of different variables contributing to Low Back pain in Software Professionals

Variables	Equality Assumption	t-Test for Equality of Means			
		t	df	Sig. (2-tailed)	Mean Difference
Age	Equal variances assumed	1.638	398	0.102	0.709
	Equal variances not assumed	1.628	332.414	0.104	0.709
Work Hours per week	Equal variances assumed	3.109	398	0.002	1.683
	Equal variances not assumed	3.109	374.484	0.002	1.683
BMI	Equal variances assumed	5.446	398	0.000	2.164
	Equal variances not assumed	5.425	367.188	0.000	2.164
W-H Ratio	Equal variances assumed	3.721	398	0.000	0.022
	Equal variances not assumed	3.733	385.596	0.000	0.022

* Significant at 0.05 level

DISCUSSION ON FINDINGS

The term "Software Profession" is a wide area of concern in which there are various categories of work in the Information Technology sector. Thus, in this study, the term "Software Professionals" is applied to those belonging to the Software Design and Development Division only. Besides this, certain criteria was fixed for including the subjects into this study to achieve homogeneity of the samples which includes age (i.e. 25- 40 years), and the duration of working hours (at least 5 hours a day or 25 hours per week). Previous studies have cited four hours per day as being a critical time for the development of Musculoskeletal Disorders in employees working with Visual Display Units (Rossignol et al, 1987). The present

study is the documentation of the prevalence of Work Related Low Back Pain among the Information Technology Professionals. The presence of Computer in the workplace leads to a set of peculiar characteristics of the workstation which require the workers to stay in a static posture for long periods. Back pain usually occurs due to sprains and strains in the back as an outcome of static or an awkward posture. Sedentary workers often complain of back pain due to bad and awkward postures. Injuries occur due to inactivity and static postures (Namrata Arora Charpe, 2009). WMSD's among the Informational Technology professional is a common area of concern worldwide. This study analyzes the limited work related risk factors of Low Back Pain thus concluding that the risk factors are Age, Working hours, Body Mass Index and Waist-Hip ratio. Total number of (N=400) subjects was taken to analyze the work related risk factors in the field of Software Profession. Several studies carried out on Computer workers in India reveals a high prevalence of Musculoskeletal discomfort among Information Technology (IT) workers (Bakhtiar C.S. and Vijaya R.S., 2003; Bhandari D., 2007; Arun Vijay, 2013). Long working hours, Static postures, Poor office Ergonomics, and repetitive nature of work were identified as some of the risk factors leading to pain and discomfort (Talwar R., 2009). Studies have also shown that the IT professionals were exposed to such different risk factors and therefore, it is expected that they are prone to develop work related musculoskeletal discomfort (Wahlstrom J. 2005). The response (dependent) variables adopted in this research was the presence or absence of Low Back Pain. The factors such as Age, Working hours, Body Mass Index and Waist-Hip ratio variables were analyzed to investigate to what extent these factors might be the risk factors for triggering Low Back Pain. Following the descriptive analysis of the study, a Univariate Exploratory Model was used to demonstrate the risk factors. From the analysis, it was inferred that among the total number of subjects (N=400) in the organization, 50% (N=203) of them reported Low Back Pain (LBP). Similarly out of the 302 male subjects 54% (N=162) reported LBP and out of 98 female subjects 42% (N=41) of them have reported LBP. The mean Working Hours per week of those who complained of LBP is 46.4 hours and that of who did not report LBP is 44.72 hours. This difference is statistically significant at 5% level (Independent t-test). It is relevant to note that those who had LBP have put in more hours of work per week. Thus, the finding of the present study supports the number of hours spent on repeated activities at work was associated with the prevalence of back pain (H-R Guo, 2002). The association between Obesity and Low back pain may be causal, in both cross-sectional and cohort studies (Rahman Shiri et al., 2009). Several possible mechanisms can explain this association. First, obesity could increase the mechanical load on the spine by causing a higher compressive force or increased shear on the lumbar spine structures during various activities. Secondly, obese people may also be more liable to incur accidental injuries (Hu HY, Chou YJ, Chou P, et al. 2009). Thirdly, obesity may cause low back pain through systemic chronic inflammation. Obesity is associated with increased production of cytokines and acute-phase reactants and with activation of pro-inflammatory pathways (Tilg H, Moschen AR. 2006), which in turn, may lead to pain (Karppinen J, 2007). Finally,

population-based studies have shown a stronger association of abdominal obesity than generalized obesity with low back pain (Han TS, Schouten JS, Lean ME, et al. 1997 and Shiri R, et al 2008). In this study, the mean BMI of those who complained of LBP is 26.29 and that of who did not report LBP is 24.13. This difference is statistically significant at 5% level (Independent t-test). Waist-hip ratio is one of the most commonly used anthropometric measures to indicate a central obesity pattern (Perry AC et al., 1998). In this study the mean Waist Hip ratio of those who complained of LBP is 0.91 and that of who did not report LBP is 0.88. This difference is statistically significant at 5% level (Independent t-test).

CONCLUSION

The study concludes that the Low Back Pain is the major Work Related Musculoskeletal Disorder among the IT Professionals. In this study, more than 50% of them reported Low Back Pain. Neck pain, Shoulder, Upper back and wrist are the next most frequent types of Musculoskeletal Disorders. When demographic factors are analyzed, this study suggests that strategies incorporating life style changes along with work modification as the best option. Thus, the present study is a wakeup signal to both the Information Technology professionals and the Human Resource personnel to understand the health problems of the software professionals working in IT industries. Appropriate preventions and intervention strategies must be emphasized to ensure a healthier working atmosphere and thereby improve productivity of the IT Employees.

SCOPE FOR FURTHER RESEARCH

1. Future studies could estimate association between the frequency of Work Related Musculoskeletal disorders and various psychosocial factors such as high stress, low control and limited social support in the Software professionals. These factors should be taken into consideration while designing intervention strategies to reduce Work Related Low Back Pain Problems.
2. The present study was conducted on particular population of Information Technology Professionals who are working in the Software developmental divisions only. Similar studies can be conducted on other divisions of IT Profession to find out the occurrence of work related Low back Pain problems.
3. A similar study can be conducted on wider age group to find out the age impact on the occurrence of musculoskeletal disorders.

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