Prevalence of Musculoskeletal Disorders and Risk Factors in Bank Office Employees Using VDT - A Case Study

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Abstract

In today's fast lifestyle, occupational health hazards are of great concern. Amongst these, musculoskeletal disorders (MSD) represent one of the most prevalent health problems across a wide range of occupations severely affecting the quality of human life as well as cost economics. Fast innovative improvements, particularly in the use of electronic information have influenced the employees and their work culture. The job of bank employees demands prolonged sitting in the office, which can cause musculoskeletal pain through constant stress on the musculoskeletal system. Bank employees in India are prone to overwork; consequently, their health is ignored, which later results in work-related musculoskeletal pain.

Keywords - VDT (Video display terminal), Musculoskeletal disorders, Bank office employees, Risk factors.

Introduction

Work-related musculoskeletal issues (WMSDs) have been seen regularly and increase in the event of side effects during that time has been seen with the quick growth of VDT (Video display terminal) advancement and consistently expanding the use of VDT (Video display terminal). Bank office VDT users employees are making a very important part of the risk set for musculoskeletal disorders as they are spending long working hours in front of a VDT. Long-term usage of VDT (Video display terminal), working at a desk and sitting for a long time in a chair in workplaces are the main reasons for performing a role in the musculoskeletal disorders among VDT user office employees. Relations between VDT work and MSD's are established in various studies with reference to 12 -month prevalence rate of musculoskeletal pain was found within the lower back (49.7%) and neck (49.0%) (Piranveyseh *et al.,* 2016)

In other study eighty-nine percent of participants reported musculoskeletal symptoms during the past 12 months, most commonly in the neck (69.2%), low back (58.2%), knees (41.8%), Shoulders (35.2%), and upper back (Loghmani *et al.,* 2013). Cho CY *et al.,* 2012 mentioned that the 3 leading regions of musculoskeletal symptoms among the VDT users with high workload were a shoulder (77.3%), neck (75.6%), and upper back (63.9%). Most prevalent was the pain in the neck (51%), followed by low back pain (42%), wrist/hand pain (35%) and shoulder pain (30%). According to study, people having older age, right-handedness, not presently smoking, emotional exhaustion, believe that musculoskeletal problems are commonly caused by work, and low job security were the statistically important risk factors for musculoskeletal pain in different anatomical sites (Oha *et al.,* 2014). Upper extremity musculoskeletal disorders prevailed mostly in the neck, the upper back, and the lower back with prevalence rates of 77.8%, 73.3%, and 60.0% respectively, and with WI rates of 28.9%, 24.4%, and 26.7% respectively (Erdinc *et al.,*2011).

In another study it was mentioned that Information technologies in work-related activities have been developing very fastly. Epidemiological studies have shown that musculoskeletal disorders are generally prevailing among employees working with a VDT. The prevalence rates of shoulder, elbow, and wrist/hand, upper and low back pain were 50.5 %, 20.3 %, 26.3 %, 44.8 %, and 56.1 %, respectively. Individual factors such as gender, age, VDT work experience, and body mass index were found as significant for musculoskeletal pain in various musculoskeletal regions (Gintare Kaliniene *et al.*, 2016). As per the report of Britain Labor Force Survey (2015), a sum of 9.5 million work days was lost because of the WMSD cases, which is 17 days loss for each individual. It was resolved that 40% of the cases that brought about work-related time Wastage included work-related musculoskeletal disorders wastage. According to the report of the U.S. Bureau of Labor Statistics (2014), work-related musculoskeletal disorders framed 32% of all the damage and illness cases and the recurrence of work-related musculoskeletal disorders event was observed to be 33.8% for every 10,000 workers with WMSDs required a normal of 13 days to return to work [http://www.bls.gov/news.release/pdf/osh2.pdf].

In the literature, a relationship between VDT usage and musculoskeletal disorders was clearly seen. On this topic, it was found out that musculoskeletal disorders were common among VDT users office employees in most of the countries like Iran, Ghana, Thailand, Estonia, Turkey, Malaysia, the United States and very few in India. This examination was planned to identify the frequency of musculoskeletal issue and their risk factors among bank office employees working on VDT.

Methods

A cross-sectional survey was carried out on 381 VDT user bank employees (age 39.03±6.94) at various bank offices in Punjab (India) between July-September 2015-2016. Musculoskeletal disorders and risk factors were evaluated for participants socioeconomics and employment using Cornell University Musculoskeletal Discomfort Questionnaire including factors like working hours of office work, a frequency of rest break, daily traveling hours, workplace layout and musculoskeletal disorders.

Study Population

Data was collected through questionnaires during the period between July 2015 and September 2016. Given the study design questions on events in the past 12 months, workers were only eligible for the current study when they had at least 1 year of work experience in the current position. The employees consisted mainly of office employees like managers, assistant managers, accountants, customer care executive and clerical VDT operators.

Study Design and Data Collection

This study used a self-administered questionnaire that involved information on the respondent's individual characteristics, physical and occupational risk factors, general health status, and occurrence of musculoskeletal complaints.

The questionnaire included individual factors age, gender, educational level, marital status, height, weight, body mass index, chronic diseases, smoking, habit of exercising, daily working hours at desk, daily working hours at VDT, total years of VDT use, status of physical or eye pain while using a VDT, level of ergonomic knowledge and methods used for treating musculoskeletal system pains. Occupational physical factors included the average number of working hours per day (less than 7 hrs, or more than 7 hrs) and prolonged sitting. It also included the frequency of rest breaks during work (once in every less than 2 hours, once in 2 to 4 hrs or once in every more than 4 hrs), daily usage of VDT (Video display terminal) (less than 5 hrs or more than 5 hrs every day), VDT usage years, physical pain and ergonomic knowledge was taken. Musculoskeletal symptoms were measured by using the self-reported pain form. Respondents were asked to report the musculoskeletal symptoms in the previous 12 months and they were asked to specify that the cause of such symptoms was partly or solely work-related.•

Statistical Analysis

Chi-square test was performed to see the significance of age, daily VDT usage, number of working hours, non-resting of VDT operators, physical pain, ergonomic knowledge, on the musculoskeletal disorders in different body regions. Logistic regression analysis was performed with the significance level of $p < 0.05$ to evaluate the influence of occupational factors on the occurrence and consequences of musculoskeletal complaints. Odds ratios (OR) with 95% confidence intervals were calculated as a measure of association. Data analyses were conducted by means of the SPSS for Windows 17.0 statistical package. Data were entered into a spreadsheet program before undergoing statistical analysis, which included descriptive statistics for the prevalence of MSD in conjunction with logistic regression of variables to determine potential occupational risk factors. While the Mann-Whitney U Test was used for comparing the related risk factors with the scale total score The results were evaluated at a 95% level of reliability and $p<0.05$ was evaluated as statistically significant.

Results

The average age of the office workers was 39.83±6.94 and 76.9% were males and 23.10% were females. Of the office workers, 74.54% were graduates with an associate/bachelor's degree; 69.5% were married, while 42.51% smoked, 17.32% were overweight, 13.9% were obese and 29.39% of the participants did not have any knowledge about ergonomic exercises.

The average working hours at a desk was 7.1±1.44 their average VDT using durations was 4.93±0.98; average years of VDT usage was 6.50±2.96. Participants reported musculoskeletal symptoms most commonly in the neck, lower back, upper back, hand/wrists, shoulders, elbow, hips, and knees were 56.1 %, 42.2%, 41.7%, 33.8%, 32%, 18.8%, 24.1% and 16.2 % respectively. During the last week and work interference related to pain in this region (Table I).

Table 1: Prevalence of MSD in different body regions of bank office employees (n=381)•

S. No	Body part	N	%age
1	Neck	214	56.1
2	Lower back	161	42.2
3	Upper back	159	41.7
4	Shoulder (L & R)	122	32
5	Elbow	72	18.8
6	Hand/wrist	129	33.8
7	Hips	92	24.1
8	Knees	62	16.2

It is shown in the Table 2 given below that there was a statistically significant relationship between gender, duration of daily VDT usage, number of working hour , non-resting VDT users presence of physical discomforts, awareness of ergonomic knowledge and years of VDT usage as in the comparison of the total weighted scores, all these risk factors have($p<0.05$). Age was identified as not a risk factor ($p>0.05$). Comparison of total weighted score with risk factor for VDT users ($p<0.05$) (Table 2).

Table 2: Comparison of a total weighted score with risk factors.

Risk Factors	Total weighted Score			
	n	%age	Mean (SD)	p
Gender				
Female	88	23	96.21 (115.91)	.000
Male	293	77	65.95 (109.91	
Age				
Less than 40 yrs	191	77	54.10 (88.35)	0.085
Equal or less than 40 yrs	190	23	94.85 (114)	
VDT Usage hr/day				
Less than 5 hrs	327	86	55.54 (94.52)	0.003
Equal or more than 5 hrs	54	14	79.65 (113.91)	
working hour/day				
Less than 7hrs	73	19	89.60 (110.50)	0.001
Equal or more than 7 hrs	308	81	44.53 (84.75)	
Non resting of VDT Usage•				
Less than 3 hrs	249	65	49.90 (83.22)	0.001
Equal or more than 3hrs	132	35	89.10 (125.55)	
Physical pain				
Yes	251	66	85.10 (110.54)	0.000
No	130	34	88.10 (123.50)	
Ergonomic Knowledge Awareness				
Yes	269	86	44.71 (63.84)	0.000
No	112	14	94.53 (113.40)	
VDT usage year				
more than 7 yrs	226	59	89.60 (110.50)	0.011
Less than 7 yrs	145	38	44.53 (84.75)	

It is shown in the Table 3 given above that the most common body parts observed for musculoskeletal disorders have been identified as the upper back, lower back, neck, shoulders and hand/wrist. It was found in the statistical analysis that being gender ,daily VDT usage duration ,VDT usage years, usage duration , physical pain and ergonomic knowledge could cause risks on all body parts ($p<0.05$). Except age was identified as not having any risk related to musculoskeletal disorders ($p>0.05$). Moreover male, using a VDT for more than five hours per day and using a VDT for three hours without taking any break could cause risks on the other four body parts, while using a VDT for more than 7 years could cause risks on the neck and shoulder ($p<0.05$). Presence of physical pain and lack of ergonomics knowledge was found to be a risk factor for five body regions ($p<0.05$). Age was identified as not having any risk related to the musculoskeletal system ($p>0.05$).

Discussion

It is well-known that VDT (Video display terminal) has become an essential part of our every day work and is causing musculoskeletal symptoms. In this study, participants reported musculoskeletal symptoms most commonly ck, upper back, lower back, left shoulder, hand/wrist, Hips, Knees and Elbow during the previous week. The results of the study are comparable with the earlier available studies. Moreover, these studies and other studies musculoskeletal disorders were observed in only one or two body part. These parts were reported to be hands (Awad *et al.,* 2006) and knees (Mozafari *et al.,* 2015). As per the present literature that female employees reporting more musculoskeletal disorders as compare to male employees (Oh *et al.,* 2014). In few studies, it was found that female's employees have significantly more pain in their Neck, lower back, and shoulders in comparison to male employees. In the current study also, it is found that the sum total weighted score for female is higher in comparison to male.

In the current study, it is seen that age is not a risk factor for musculoskeletal disorders in the five body parts although it is also observed that it is exactly the same in the comparison formed with the total weighted score. Likewise, Damanhur *et al.* (2014) also reached exactly the same conclusion as no significant relationship was presented within his study. There are certainly very few studies in the literature where age was examined as a risk factor. In the analysis done by Erdinç (2011), it was confirmed that in younger age, the chances of back pain can be a risk factor, While in some studies, it was identified that musculoskeletal system disorders may increase with growing age. However it is found in the current study that VDT usage of greater than 7 years creates risks on the neck and shoulder area and the total weighted score was higher for individuals who had been using VDT (Video display terminal) for over 7 years. As in the literature, it was found that musculoskeletal disorders appear more in persons working on VDT (Video display terminal) for several years. The literature reveals that there was a direct relation between the musculoskeletal disorders and the duration of daily VDT usages as the increase in the duration of daily VDT usage increases the level of the musculoskeletal disorders also increases as it was stated by Çalık *et al.* (2013) that there is a statistically significant relationship between musculoskeletal system disorders and VDT usage greater than five hours/day Çalık *et al.* (2013). Similarly, it is found that daily VDT usage for over 5 hours was a risk for four different areas lower back, upper back, shoulders and hand/wrist and was found to be statistically important. Also, it was identified that this situation is supported by the comparison made out of from the total point score.•

Literature survey revealed that individuals having breaks during working at VDT (Video display terminal) were experiencing less pain, as compared to those having no breaks experiencing more pain. Similarly, the present study also identified that those people who did not have breaks during working on a VDT are experiencing more pain or pain in necks, lower back, upper back, and shoulders, at the same time as their total weight score was statistically lower in comparison to those people who have had breaks. We also identified that feeling physical pain and having awareness of ergonomics was also a factor for risk of musculoskeletal disorders in different body parts. This is also supported by the comparison made from total point scores calculation. A study by Çalık *et al.* (2013) concluded in his study that participants experiencing physical pain were observed to possess pain symptoms in all parts of their bodies. A study by Damanhuri Z *et al.* (2014) showed that those who don't have the ergonomic knowledge felt

greater pain in Neck and lower back, while those who have ergonomic knowledge had significantly less musculoskeletal system complaints. This result shows the significance of decreasing the pains of an individual in workplaces by making ergonomic regulations and training.

Table 3: Comparison of risk factors with the different body parts

Risk Factors	**Muscoskeletal disorder within last Seven days**										
	N	**Upper back**		**Lower back**		**Neck**		**Left shoulder**		**Hand/wrist**	
		Yes (%)	**No (%)**	**Yes (%)**	**No (%)**	**Yes (%)**	**No (%)**	**Yes (%)**	**No (%)**	**Yes (%)**	**No (%)**
Gender											
Female	88	57 (64.7)	31 (35.2)	60 (68.1)	28 (31.8)	38 (43.1)	50 (56.8)	24 (27.2)	64 (72.7)	41 (46.5)	47 (53.4)
Male	293	154 (52.5)	139 (47.4)	123 (41.90	170 (58)	135 (46.7)	158 (53.9)	97 (33.1)	196 (66.8)	113 (38.5)	180 (61.4)
logistic regression		**2(0.20-0.53)**		**0.6(0.42-1.05)**				**0.4(0.32-0.75)**			
Chi test		**0**		**0.058**		**0**		**0.001**		**0**	
Age											
Less than 40	190	125 (65.8)	65 (34.2)	117 (61.58)	73 (38.42)	135 (71.5)	55 (28.95)	77 (40.53)	113 (59.47)	80 (42.11)	110 (57.89)
Equal or more than 40	191	131 (68.59)	60 (31.41)	118 (61.78)	73 (38.22)	133 (69.63)	57 (30.37)	88 (46.07)	103 (53.93)	87 (45.55	104 (54.45)
logistic regression		**1.0(0.65-1.61)**		**1.0(0.63-1.66)**		**1.0(0.62-1.60)**		**1.1(0.72-1.73)**		**1.3(0.91-1.84)**	
Chi test		**0.454**		**0.421**		**0.539**		**0.226**		**0.102**	
VDT usage year											
Less than 7years	323	254 (78.64)	69 (21.36)	242 (74.92)	81 (25.08)	225 (69.66)	98 (30.34)	164 (50.77)	159 (49.23)	93 (28.79)	230 (71.21)
Equal or more than 7years	58	44 (75.86)	14 (24.14)	39 (67.24)	19 (32.76)	34 (58.62)	24 (41.38)	24 (41.38)	34 (58.62)	33 (56.90)	25 (43.10)
logistic regression		**1.2(0.76-1.83)**		**0.8(0.51-1.31)**		**1.4(0.72-2.21)**		**1.1(0.65-1.72)**		**1.6(1.01-2.40)**	
Chi test		**0.158**		**0.445**		**0.050**		**0.252**		**0.010**	
Daily VDT Usage											
Less than 5hours	327	253 (74)	74 (22.63)	223 (68.20)	104 (31.80)	160 (48.93)	167 (51.0)	90 (27.52)	237 (72.48)	93 (28.79)	230 (71.21)
Equal or more than 5 hours	54	38 (70.37)	16 (29.63)	17 (41.48)	37 (68.52)	21 (38.89)	33 (61.11)	32 59.26)	22 (40.74)	33 (56.90)	25 (43.10)
logistic regression		**1.63(1.05-2.43)**		**1.35(0.82-2.02)**		**1.63(1.06-2.45)**		**1.59(1.03-2.33)**		**1.56(1.04-2.30)**	
Chi test		**0.016**		**0.078**		**0.018**		**0.017**		**0.018**	
Non-Resting											
Less than 3 h/day	249	151 (60.64)	98 (39.36)	146 (58.63)	103 (41.37)	143 (57.43)	106 (42.57)	95 (38.15)	154 (61.85)	84 (33.73)	165 (66.27)
Equal or more than 3 h/day	132	98 (74.24)	34 (74.24)	85 (64.39)	47 (64.39)	86 (65.15)	46 (65.15)	69 (52.27)	63 (57.73)	55 (41.67)	77 (58.32)

logistic regression		**1.4(0.84-2.32)**		**1.0(0.62-1.50)**		**1.4(0.82-2.39)**		**1.61(1.02-2.49)**		**1.2(0.65-1.81)**	
Chi test		**0.007**		**0.278**		**0.005**		**0.003**		**0.04**	
Physical pain											
Yes	267	216 (80.90)	51 (19.10)	187 (70.04)	80 (29.96)	226 (84.64)	41 (15.36)	146 (54.68)	121 (45.32)	143 (53.56)	124 (46.44)
No	114	46 (40.35)	68 (59.65)	48 (42.11)	66 (57.89)	42 (36.84)	72 (63.16)	33 (28.95)	81 (71.05)	29 (25.44)	85 (74.56)
logistic regression		**0.2(0.12-0.36)**		**0.4(0.21-0.63)**		**0.1(0.06-0.22)**		**0.4(0.22-0.75)**		**0.4(0.22-0.75)**	
Chi test		**0**		**0**		**0**		**0**		**0**	
Ergonomic Knowledge											
Yes	269	201 (74.72)	68 (25.28)	181 (67.29)	88 (32.71)	201 (74.72)	68 (25.28)	141 (52.42)	128 (47.58)	134 (49.81)	135 (50.19)
No	112	54 (48.21)	58 (51.79)	61 (54.46)	51 (45.54)	48 (42.85)	64 (57.14)	77 (68.75)	35 (31.25)	38 (33.92)	74 (66.07)
logistic regression		**0.5(0.31-0.92)**		**0.5(0.32-0.92)**		**0.7(0.45-1.37)**		**0.5(0.31-0.92)**		**0.7(0.45-1.03)**	
Chi test		**0**		**0.003**		**0.006**		**0.003**		**0.004**	

Conclusion

Findings from the study revealed that VDT users office employees most commonly felt pain in Neck, lower back, upper back, hand/wrists, shoulders.Musculoskeletal symptoms are common in VDT users office employees' especially in Punjab (India) and indicated that need for more attention to musculoskeletal disorders and designing effective preventive interventions interfered with their work as a result of this pain. While gender, years of VDT usage, duration of daily VDT usage, uninterrupted VDT usage, the presence of physical pain and lack of ergonomic knowledge were found to be a risk for musculoskeletal system disorders. Sufficient resting possibilities, better working conditions, and training in physical exercises are required for preventing these disorders.

Limitations of Study

This study was conducted at a single organization that is banking Industry. Some of the office bank employees were excluded. However, it is thought that this circumstance increases the reliability of the results, despite the decreasing number of participants. Secondly, the female participants are less as compare to males. Results will be more consistent if female participants will be added to the survey.

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