Original Article

Prevalence and Determinants of Musculoskeletal Disorders among Information Technology Sector Employees of Ahmedabad, Gujarat

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Abstract:

Introduction: Employees of Information Technology (IT) sectors are always at higher risk of Musculoskeletal Disorders (MSDs), as multiple risk facors known to be associated with MSDs like poorly designed computer work station, lack of knowledge and attitude for ergonomic posture, long working hours with out sufficient rest breaks and sadentory life style are common in IT workers of India. Aim:To study association of MSDs with occupational and lifestyle related factors. Methodology: For execution of present cross sectional study, from Ahmedabad (Gujarat, India) based IT industry 184 employees of were enrolled through simple random sampling method. With the usage of pre-tested semiclosed questionnaire sociodemographic, life style and occupation related details were collected. Prevalence of MSDs for different body parts assessed though Modified Nordic Questionnaire. Rapid Office Strain Assessment (ROSA) score was used for assessment of ergonomic suitability of workstation. SPSS 17.0 software was used for detailed statistical analysis. Result: Among IT workers high prevalence of MSDs (66.8%) was observed. Highest prevalence of MSDs reported for lower back (32.6%), neck (32.1%) and upper back (29.9%). Association of MSDs were observed with their Body Mass Index (BMI), exercise habit and job tenure of the workers. Poor ergonomic design (ROSA score > 4) of computer work station and usage of laptop (compared to desktop) were found associated with high prevalence of MSDs. Conclusion: To reduce burden of MSDs, administrative interventions in terms of improving workstation design and regulation of work hours required. Also, training programmes for sensitization regarding workplace ergonomics and healthy life style to be arranged for IT workes.

Key words: Information Technology, Musculoskeletal disorders, ROSA score, risk factors

Introduction:

Information technology (IT) has contributed enormously to the economic growth of both developed and developing countries and India is no exception to this1- 3. The country has seen an exponentially rise in the number of workers directly and indirectly employed in this profession in the last couple of decades4. In view of the increased demand in the IT profession, the country continues to produce trained human resources. However, with increasing human resources but saturated job demand, the currently employed IT professionals are exposed to job insecurity and occupational stress. Hence the IT professionals engage for long hours in their job, in order to secure their job and salary. The professionals while being glued to their workplace, are exposed to occupational hazards such as poor ergonomic work place dynamics, constant ocular strain and reduced breaks[5-9]. In addition to occupational hazards at workplace, sedentary lifestyle, increased consumption of high calorie with low fiber diet and reduced recreational activities as a result of extended work during weekends (work from home) accentuates the risk of musculoskeletal disorder among IT professional[10–13]. The MSDs among IT professional commonly involve neck, shoulder, hand, wrist, cervical, thoracic and lumbar regions[14-19]. Long working hours, reduced recreational (physical) activities and poor ergonomic (workstation) arrangements are associated with increased MSDs, additionally individual psychosocial and physiological factors potentially aggravate MSDs[7,8,18,20-22].

In India, limited studies have explored association of MSDs with workstation related ergonomic risk factors. “Rapid Office

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Strain Assessment" (ROSA) is a composite score to evaluate the ergonomic risk associated with working at computer workstation. The ROSA score involves estimating the risk score of workstation by considering the sitting position i.e. the chair, computer screen, mouse, key board and phone and lastly the average duration of work on everyday basis. Present study intends to explore the prevalence of MSDs among IT workers and study the association between MSDs and factors such as physiological, ergonomic and other occupational hazards.

Methodology:

A cross sectional observational study was executed during Jan'19-Jun'19 among employees of an IT industry situated in West Zone of the Ahmedabad city (Gujarat, India). Based on the previous reports of 59.3% prevalence of MSDs among IT professional, sample size for current study was estimated with Open Epi software to be 176, assuming 10% refusal / missing data and 95% CI 18, 25. A list of employees (n=430) with their name and job profile/ designation were received from employer of industry. Desired number of study subjects who fulfil inclusion and exclusion criteria of study were selected with simple random sampling method. Participants with more than two years of job tenure in IT sector and engaged with computer related work for at least two hours a day were included in the study. Whereas, participant with major operative history in last on year, bony skeletal abnormality and not willing to provide informed written consent were excluded from study. Prior to initiation of study Institutional Ethical Committee (IEC) approval was received.

An individual selected IT worker was interviewed by trained staff and details pertaining to sociodemographic profile, life style and occupational factors were documented on pre standardized semi closed questionnaire. Modified Nordic questionnaire was used to determine prevalence of musculoskeletal problems.26 Frequency of MSDs with respect to individual body part involvement were noted for last one year and last seven days separately. Rapid office strain assessment checklist (ROSA) was used to identify and quantify the ergonomic risks involved with working at computer workstation 27. To identify appropriate score for each component of workstation on site visits and observations were carried out for each worker through data collection team. Individual with score of ≥ 4 was regarded as high risk and prone to ergonomic hazard of the workstation. Basic anthropometric details of each participant were taken for calculation of Body Mass Index (BMI) and based on Asian population standard BMI values were categorized.28,29 Socioeconomic class of workers were determined by Modified BG Prasad Classification (updated as per consumer price index of year 2019).30 Data was recorded using Microsoft Excel 2010 program, while the descriptive and analytical statistical tests were executed with Statistical Package for Social Sciences Version 17.0 application.31 For all analytical statistical tests value of $p < 0.05$ were regarded as statistically significant.

Results:

A total of 184 IT workers were included in study and their socio-demographic, clinical & occupational description is reported at Table-1. To note, majority of participants (> 70%) had BMI in the unhealthy range and prone for non-communicable diseases.

Table-1: Basic sociodemographic and job profile details of IT industry workers (n=184)

Variable	Numbers	%
Age (in completed years)		
18-24	22	12.0
25-34	98	53.3
35-44	55	29.8
≥45	9	4.9
Gender		
Male	123	66.8
Female	61	33.2
Marital status		
Unmarried	52	28.3
Married	129	70.1
Divorced	2	1.1
Widow/er	1	0.5
Family type		
Nuclear	48	26.1
Joint	136	73.9
Modified BG Prasad socioeconomic classification		
Upper Class	153	83.1
Upper Middle Class	22	12.0
Middle Class	6	3.2
Lower Middle Class	3	1.6
Body Mass Index (BMI)		
Underweight	6	3.3
Normal	44	23.9
Overweight	34	18.5
Pre obese	63	34.2
Obese	37	20.1

About 66.8% (123) workers reported of MSDs in the last one year. Axial system MSDs were common as compared to para-axial MSDs (involving wrist, elbow, shoulder, thigh, ankle and feet) (Table -2). About 32.6%, 32.1% and 29.9% workers reported MSDs involving lower back, neck and upper back respectively. Further, axial system MSDs were more common reasons for restricting individual's daily activities during the previous year including previous week as compared to the paraxial MSDs [Table-2].

Engagement in recreational (physical) activities and unhealthy BMI were significant determinants for MSDs among the study participants. While neither gender nor age of workers were significantly associated with MSDs. Workers engaged with recreational physical activity ≥ 2 days / week had reduced odds of MSDs as compared to those engaged for < 2 days/ week [Table-3]. Further, the odds of MSDs were

Table-2: Prevalence of Musculoskeletal Disorders (MSDs) among IT workers as per Modified Nordic Questionnaire (N= 184)

Body part	Workers with MSDs in a year		Workers prevented from work because of MSDs in a year		Workers with MSDs in last seven days	
	Number	%	Number	%	Number	%
Neck	59	32.1	27	14.7	45	24.5
Shoulder	41	22.3	20	10.9	32	17.4
Elbow	15	8.2	6	3.3	5	2.7
Wrist and Hand	44	23.9	20	10.9	29	15.8
Upper back	55	29.9	25	13.6	40	21.7
Lower back	60	32.6	25	13.6	43	23.4
Hip and Thigh	38	20.7	17	9.2	23	12.5
Knee	37	20.1	14	7.6	12	6.5
Ankle and Feet	44	23.9	14	7.6	22	12.0
Total	123	66.8	86	46.7	54	29.3

Table-3: Distribution of MSDs prevalence as per different physiological factors of IT workers

Variable	MSDs Present (n=123)		MSDs Absent (n=61)		Level of Sign.	Odds Ratio (95% CI)
	No.	%	No.	%		
Age in completed years						
18-24	12	54.5	10	45.5		1.00
25-34	63	64.3	35	35.7	$\chi2 = 4.62$; $p = 0.2$	1.50 (0.58 - 3.82)
35-44	40	72.7	15	27.3		2.22 (0.79 - 6.21)
≥45	8	88.9	1	11.1		6.66 (0.70 - 62.74)
Gender						
Male	85	69.1	38	30.9	$\chi2 = 0.85$; $p = 0.35$	1.35 (0.71- 2.52)
Female	38	62.3	23	37.7		1.00
Body Mass Index (BMI)						
Underweight	2	33.3	4	66.7	$\chi2 = 16.11$; $p = 0.003$	0.34 (0.06 - 2.09)
Normal	26	59.1	18	40.9		1.00
Overweight	17	50.0	17	50.0		0.69 (0.28 - 1.70)
Pre obese	46	73.0	17	27.0		1.87 (0.83 - 4.24)
Obese	22	86.5	5	13.5		4.4 (1.49 - 13.55)
Physical exercise						
≥ 2 days/ week	82	76.6	25	23.4	$\chi2 = 11.05$; $p = < 0.001$	2.88 (1.52 – 5.42)
< 2 days/week	41	53.2	36	46.8		1.00

higher among workers with technical job profile, laptop usage and long working hours as compared to their respective counter parts. Mean ROSA score observed among the participants was 4.21 ± 1.02. Workers with ROSA score ≥ 4 (high risk group) had significantly (p = 0.02) higher MSD prevalence (77.3%) as compared to the low risk group (61%) [Table-4].

Table-4: Distribution of MSDs prevalence as per different occupational factors of IT workers

Variable	MSDs Present (n=123)		MSDs Absent (n=61)		Level of Sign.	Odds Ratio (95% CI)
	No.	%	No.	%		
Job profile of worker						
Technical	82	74.5	28	25.5	$\chi2 = 7.37$; $p = 0.025$	2.60 (0.91 - 7.39)
Admin	32	56.1	25	43.9		1.13 (0.38 - 3.37)
Marketing	9	52.9	8	47.1		1.00
Duration of job in IT sector (Years)						
≤ 4	40	51.9	37	48.1	$\chi2 = 0.85$; $p = 0.35$	1.00
5 to 8	48	75.0	16	25.0		2.77 (1.35 - 5.70)
>8	35	81.4	8	18.6		4.04 (1.66 - 9.84)
Working hours in a week						
≤ 48 hours	64	62.7	38	37.3	$\chi2 = 1.73$; $p = 0.18$	1.00
>48 hours	59	72.0	23	28.0		1.52 (0.81 - 2.85)
Type of computer usage						
Desktop	80	62.5	48	37.5	$\chi2 = 3.58$; $p = 0.058$	1.00
Laptop	43	76.8	13	23.2		1.98 (0.96 - 4.06)
Frequency of breaks during shift						
0-3 break	78	65.5	41	34.5	$\chi2 = 0.25$; $p = 0.61$	1.18 (0.61 - 2.26)
≥ 4 break	45	69.2	20	30.8		1.00
ROSA score						
Low risk (1-4)	72	61.0	46	39.0	$\chi2 = 5.04$; $p = 0.024$	1.00
High risk (5-10)	51	77.3	15	22.7		2.17 (1.09 - 4.30)

Discussion:

Present study explored the prevalence of MSDs and their associated factors among IT workers using a cross sectional study. Present study identified MSDs prevalence of 66.8% among the study participants. The results are supported by similar studies in the past, wherein the prevalence ranged between 59% to 90% 6,[14-18,21,22,24,32,33]. Axial system MSDs are common among the IT professionals as compared to the paraxial MSDs. Further, these (axial) MSDs are severe, so as to hinder their routine activities. Results from previous studies describing axial system MSDs are frequent, is consistent with our study findings. Additionally, the cited prevalence of MSDs involving neck, lower back, shoulder and distal upper arm are in line with previous studies.[8,13,19,24]

IT employees spend maximum time with their workstations and have relatively sedentary lifestyle. In order to meet the work demands, IT professional spend more time around their computers and additionally indulge in binging high calorie junk food to cope the stress. Such lifestyles on long term result in unhealthy BMI and obesity which is reflected in present study. Previous studies have suggested recreational physical activities to prevent MSDs in these population.[8,20]

Workstation design has a major influence on the body posture, hence ergonomically poor designed workstation is a risk for MSDs. Poor ergonomic workstation design and posture at work, additionally accentuated by long duration of work with infrequent relaxing breaks are risk factors of MSDs.10 To measure the ergonomic suitability of computer workstation, a unique tool 'ROSA score' was employed in present study and more than four ROSA score regarded as unsatisfactory (high risk of MSDs). Current study reported significantly higher prevalence of MSDs among high risk group as compared to low risk group. Consistent relation between MSDs and ROSA is reported earlier studies, supporting the study findings[34,35].

Present study, observed higher MSDs among laptop users as compared to those using desktop computers. Laptop users often lean forward and strain their eyes as compared to desktop users, possibly contributing to the increased MSDs. Ergonomically designed sitting arrangement with neck (cervical), Lower back (lumbar), arm, wrist foot support / rest could potentially reduce the related MSDs among the laptop users. Further, ergonomic keyboards and mouse usage should be encouraged among IT professionals' engaged with laptops for longer durations.

Most IT professionals commonly experience time bound activities, however individuals with poor coping mechanism undergo tremendous performance and monitoring pressure, resulting in psychological stress.9 These workers are often

drowned with hectic schedule and demanding job, thereby skipping the dedicated micro-breaks, resulting in heightened muscle tension aggravating the MSDs [6,8,36,37].

Long working hours, infrequent breaks, lack of training / knowledge/ attitude on correct posture, repetitive moments, compromised workstation design, psychosomatic stress, and many other factors commonly experienced by IT professionals, cumulatively result in the MSDs on long term. These are probable explanation for the higher MSDs reported among advanced age (work duration) and higher job tenure in the present and Basu R et al (2014) study.[15]

The results of present study are alarming signal to both IT employees as well their firm leaders. The results hint the need for adopting right posture, frequent breaks and regular recreational physical activities by the employee. While the firm authorities should offer appropriate designs of workstations, prefer desktop computers for regular usage and conduct regular training / workshops on work hygiene, ergonomics, nutrition, methods of reducing stress, etc.38 Improved ergonomic work environment will definitely promote positive health and minimize sickness absenteeism, which ultimately will improve the quality and quantity of work.

Conclusion :

High prevalence of MSDs were reported among IT workers and the MSDs are found significantly associated with potentially modifiable individual and occupational factors. Along with right attitude of workers, commitment of employer for provision of ergonomically designed workplace are equally essential to reduce the MSDs. Implementing various ergonomic measures as preventive strategies have key role in reduction of MSDs burden which indirectly reduce sickness absenteeism and increase work productivity.

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