

A cross-sectional study to assess the impact of ergonomics among desk job workers in Western India.

¹Dr. Rajan Upadhyay, Assistant Professor, Department of Community Medicine, Prasad Institute of Medical Sciences, Lucknow, Uttar Pradesh, India.

Corresponding Author: Dr. Rajan Upadhyay, Assistant Professor, Department of Community Medicine, Prasad Institute of Medical Sciences, Lucknow, Uttar Pradesh, India.

Citation this Article: Dr. Rajan Upadhyay, “A cross-sectional study to assess the impact of ergonomics among desk job workers in Western India”, IJMSIR- June - 2023, Vol – 8, Issue - 3, P. No. 286 – 291.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Background: Corporate world face multiple challenges to sustain the health and performance of its employees along with evolving era of industrialization. The shift of industrialization resulted in significant rise in desk job workers and eventually sedentary lifestyle. The nature of desk job in current culture involve work with an average 8 hours/day.

Aim: The study was undertaken to estimate the prevalence of musculoskeletal disorders (MSD) among desk job workers, and to assess the impact of ergonomic hazards at the workplace. It will address the most ignored aspect of employee’s health; Ergonomics.

Methodology: 310 desk job workers from various corporate offices in the Western India were interviewed. A preformed, pretested and semi-structured questionnaire was used to obtain data pertaining to the work pattern, workplace furniture, and MSD. Data was analyzed using MS office Excel and Epi Info.

Results: The results revealed that 76% of the respondents suffered from at-least one MSD at their workplace. Majority of the respondents reported lower back pain (64.8%) followed by neck pain (58.4%), ankle pain (41.6%) and shoulder pain (40%) respectively.

73.8% of the desk workers had not undergone any type of ergonomics training during their tenure. Majority (90%) of the employees felt that storage and printer placement were not satisfactory.

Conclusion: Static posture; old and ill maintained chair and desk; lack of frequent stretching and regular break; and non-receipt of ergonomic training were stated as the most common causes for the MSD ($p < 0.05$).

Keywords: Desk job workers, Ergonomics, Musculo skeletal disorders, Workplace design.

Introduction

An office is a place in an organization where professional or administrative work takes place. Job duties vary by industry, but typically include computer use, telephone, email, and fax communication, and record and file keeping in the form of software and hardware. The characteristics of an office, including people, building space, equipment, furniture, and the environment, must work together in order for employees to feel healthy, comfortable, and work efficiently and productively. Currently, at least 50% of the world's population uses some form of Office to work. ^[1]

Work pattern is changing rapidly with new developments in technology, making our jobs easier, but these

developments come along with new challenges for managers and employers. ^[2] Office workers often spend more than 8 hours per day at their workstations. ^[3] Therefore, the office environment plays an important role in the daily life of many people. Office furniture and office environment are important physical conditions that deserve more attention. ^[4] Workplace design and furniture have a significant impact on posture of the worker, which contributes to physical symptoms. ^[5] According to survey conducted in United States; nearly one in five workers was not satisfied with the work environment leading to job dissatisfaction. ^[6] Pain, muscle tightness, joint stiffness and swelling in the various joints and muscle group are the main characteristics of musculoskeletal disorders (MSD). It can eventually elicits a disability. ^[1] Hence, there is emerging evidence that MSD can pose a major challenge to public health and an economic burden to health insurance schemes, employers and worker.

Ergonomics is the science and technology of fitting the activities and work environment to the needs of people to improve the performance. The practice of proper ergonomic standards improve human-work interaction, comfort, health, and safety. Awkward prolonged static postures contributes to musculoskeletal disorders in office workers. Recent study shows that only designing a workplace in ergonomically safe way is not adequate. In addition to designing it requires training and behavioral guidance. ^[7]

Ahmedabad, a mega city in western India has witnessed rise in corporate offices on a great scale in recent decade or two. Employees in these corporates also face similar challenges. However there was no study reported in the city to highlight the concern areas. Therefore, this study was conducted with the following objectives: To estimate the prevalence of musculoskeletal disorders and to

identify ergonomic deficiencies in workplace and their impact assessment on employee's health.

Material & Methods

Study Design

This is a cross-sectional descriptive study conducted to study the health and impact of ergonomic assessment among the office workers. The study was carried out in corporate offices situated in Ahmedabad.

Sample size & Study participants

Considering 71.9% prevalence ^[8] of musculoskeletal disorders among office worker; a total of 310 corporate office employees, ageing between 22-55 years participated in the study. Only office employees working on desk with experience of more than one year were enrolled in the study.

Data Collection tool

A preformed, pre-tested and semi-structured questionnaire was used to obtain data. A questionnaire involves areas like the socio-demographic data, work pattern, design of workplace furniture, and MSD. It also covers areas like comfort at the workplace, and training for the use of office furniture. An insight and impact about the research was communicated to them beforehand and consent was obtained from all of the respondents before starting the data collection process.

Data Analysis

Statistical analysis was performed using standard descriptive statistical tests with the help of MS Office Excel and Epi Info. Frequency distribution and percentages were computed for the tables. To test the null hypothesis; statistical test of significance like Chi-square was used. $P < 0.05$ was used to define the statistical significant association.

Results

The present descriptive study enrolled 310 desk job workers. The study participant include 230 (74.2%) male

and 80 (25.8%) female workers. The age of worker varies from 22 years to 55 years. The work experience varies from 1 year to 35 years. The mean age of study subjects was 37 years whereas mean job experience of participants was 10.9 years. Looking in to relationship status of workers; 238 (76.8%) were married while 60 (19.3%) were unmarried. 12 (3.9%) of the study participants were separated or divorced.

Table 1: Socio-demographic profile of study participants

Variable	Frequency (N)	Percentage (%)
Sex		
Male	230	74.2
Female	80	25.8
Age (In Years)		
21 – 30	85	27.4
31 – 40	119	38.4
41 – 50	81	26.1
51 – 60	25	8.1
Experience (In Years)		
< 10	176	56.8
> 10	134	43.2
Marital status		
Married	238	76.8
Unmarried	60	19.3
Separated/ Divorced	12	3.9
Total	310	100

Table 2: Musculoskeletal disorders and its distribution pattern

Variable	Frequency (N)	Percentage (%)
Prevalence of MSD	235	75.8
Low backache	201	64.8
Neck pain	181	58.4
Shoulder pain	124	40
Ankle pain	129	41.6

Table 2 describes the prevalence of musculoskeletal disorder and respective location of pain. In our study; 235 subjects were suffering from at least one MSD out of 310 total population. Hence reported prevalence of MSD is 75.8%. Almost two third (64.8%) participants were suffering from low backache followed by neck pain (58.4%), ankle pain (41.6%) and shoulder pain (40%).

Table 3: Characteristics of problematic workplace design as per response

Variable	Frequency (N)	Percentage (%)
Work desk	184	59.3
Chair	122	39.3
Absent footrest	292	94.2
Light/ glare	82	26.4
Storage & Printer	279	90

Table 3 describes the design of workplace and the respective problem it presents. On asking about discomfort at workplace; 59.3% of the cases reported a problem with desk while 39.3% of the cases reported issue with chair design or height adjustment. Majority (94.2%) of the workers were not using footrest either due to unavailability or due to unawareness. 90% of the subjects think that storage space and printer are awkwardly positioned. 26.4% of the population faced vision discomfort due to poor light or glare.

We evaluated ergonomic impact assessment with help of measuring association with MSD. To derive the association; Chi square test was used. $P < 0.05$ was used as a level of significance. Workplace design like uncomfortable work desk and chair are significantly associated with MSD ($p < 0.001$). Those who were not taking regular break and stretching during their day at office were also suffering from MSD. This association was also statistically significant ($p < 0.001$). Work experience of more than 10 years is also a risk factor for MSD ($p < 0.001$). In our study; Ergonomic training has

also been reported as an effective preventive measure against MSD ($p < 0.001$).

Table 4: Ergonomic impact assessment and association with MSD

Variable	MSD		X ²	P-value
	Present (N=235)	Absent (N=75)		
Uncomfortable work desk design	169	15	63.5	< 0.001
Uncomfortable chair setting	113	9	31	< 0.001
No regular break at periodic interval	224	4	236.6	< 0.001
No stretching in between task	173	22	47.8	< 0.001
Work experience of > 10 years	121	13	27	< 0.001
Non-receipt of ergonomic training	229	65	13.5	< 0.001

Discussion

In present study; we tried to evaluate association of ergonomics and musculoskeletal disorders among 310 corporate employed workers. In our study; the estimated prevalence of MSD was 75.8%. Comparable to our study; 80% prevalence of MSD was reported by Chandwani A. et al. in a study done among similar set up of Mumbai corporates. [9] Looking in to international studies; rates of 68.1% [10] and 69.6% [11] have been reported among Turkish desk job workers. Similarly, other studies have reported high prevalence rates of 74% among Brazilians [12] and 80% in a Kuwaiti population. [13] Such high prevalence of musculoskeletal disorder elicits difficulties during desk job working. Such huge

number of MSD affected employees indicates underlying problem with ergonomics and workplace design.

Chinedu et al. reported lower back (58.1%) as the most reported body regions affected by MSD followed by wrists/hands (53.0%) and shoulders (50.2%). [8] Similar findings at the lower back (51.1%) and shoulders (49.2%) have been reported among bank office workers. [13] Contrary to our study, a lower back pain was reported least among civil service office workers. [14] Akodu et al. supports our finding by revealing a similar MSD rate of 48% at the shoulder. [15] In our study; almost two third (64.8%) participants were suffering from lower backache followed by neck pain (58.4%), ankle pain (41.6%) and shoulder pain (40%). High incidence of lower backache across most of the studies indicate lack of proper lumbar support in chair. High prevalence of neck pain revealed that most of the workers are not taking frequent neck stretching exercise during working hours. Absent foot rest lead to ankle pain among corporate employees.

In present study 59.3% of the cases reported a problem with work desk while 39.3% of the cases reported issue with chair design or height adjustment. Majority (94.2%) of the workers were not using footrest either due to unavailability or due to unawareness. 90% of the subjects think that storage space and printer are awkwardly positioned. In a Mumbai based study; 41.3% employees were dissatisfied with the chair, 18.8% with the work desk, and majority (47.5%) of the respondents reported that they have to adopt awkward posture as the footrest was not provided. [9] non-availability of footrest make employees adopt slouched static posture for long hours causing backache and ankle pain. The problems related to posture can thus be associated with uncomfortable design of the chair, work desk and placement of utility equipment and furniture among office workers. Similarly; Shikdar A et al. reported 33% of employees

were dissatisfied with chair type and design. ^[16] In a large-scale USA based survey; 90% of the respondents believed that better workplace design and office layout result in improved overall employee performance. ^[6]

In present study; workplace design like poor arrangement of work desk and chair are significantly associated with MSD ($p < 0.001$). No regular break and stretching during their day at office were also suffering from MSD. Senior employees with experience of more than 10 years were more likely exposed to MSD ($p < 0.001$). In our study; Ergonomic training has also been reported as an effective preventive measure against MSD ($p < 0.001$). Similar to our finding; Shikdar et al. reported that most employees (82%) had not received any ergonomics training. Among those who had, 54% were dissatisfied with it. No formal structured training program was found in the office except for some IEC materials. Although it is recommended that a short break must be taken frequently, most of the employees spent over 4 hours a day without proper rest breaks. ^[16] Omokhodion and Sanya also reported that MSD was significantly higher among senior workers. ^[14] A British study conducted in 2018 also supports our finding as it revealed significantly higher rates of MSD among older workers in diverse occupations. ^[17] A cross-sectional study conducted in Ethiopia revealed higher prevalence of MSD among females ($p = 0.004$), old age ($p = 0.028$), long working hours ($p = 0.003$) and senior employees ($p = 0.014$). ^[8]

Conclusion

The study revealed that there is an unmet need of sanitization among corporate office employees about workplace ergonomics resulting in high prevalence of MSD. Prolonged hours of working in static and awkward posture, with old ill maintained chair, desk and under table storages were stated as the most common causes for the MSD. Office employees were seldom provided

structured formal training about proper way of utilizing office furniture.

Recommendations

The standard ergonomics guidelines for the workplace design and comfortable furniture set up should be laid down by the organization. Ergonomics education should be imparted on regular basis in form of computer screen saver, display on in house LED screens and reminder mailers. Formal structured ergonomics training at induction is the need of hour among developing Indian workspaces.

Limitations and future studies

The use of a self-report questionnaire is prone to response bias, which might had influenced the findings of the study. Further longitudinal studies across multi-disciplinary office settings can provide deeper insights on MSD.

Acknowledgements

Author would like to thank the employers of corporate offices for allowing to collect data on an anonymous basis for betterment of their employees.

References

1. Vimalnathan K., Babu R. A Study on the Effect of Ergonomics on Computer Operating Office Workers in India. *Journal of Ergonomics*, 2017, 21657556.
2. O'Neill M. *New Workplace Ergonomics Research: Emerging Risks and Solutions*. 2013, Knoll Topic Brief, Knoll Inc., New York, NY.
3. Mani K, Provident I, Eckel E. Evidence-based ergonomics education: Promoting risk factor awareness among office computer workers. *Work*. 2016, 55(4):913-922.
4. Samani SA. The Impact of Personal Control over Office Workspace on Environmental Satisfaction and Performance. *Journal of Social Science and Humanities*, 2015, 1(3): 163-172.

5. Lu H, Aghazadeh A. Risk factors and their interactions in VDT workstation systems. In: Proceedings of the Human Factors and Ergonomics Society 40th Annual Meeting. Santa Monica, CA, USA: Human Factors and Ergonomics Society; 1996. p. 637–41.
6. Gensler. The Gensler Design + Performance Index, The U.S. Workplace Survey. 2006. www.gensler.com.
7. Davis K, Kotowski S, Sharma B, Herrmann D, and Krishnan A. Combating the Effects of Sedentary Work: Postural Variability Reduces Musculoskeletal Discomfort, in Proceedings of the Human Factors and Ergonomics Society, 2009, 53rd Annual Meeting.
8. Okezue OC, Anamezie TH, Nene JJ, Okwudili JD. Work-Related Musculoskeletal Disorders among Office Workers in Higher Education Institutions: A Cross-Sectional Study. *Ethiop J Health Sci.* 2020 Sep; 30(5):715-724.
9. Chandwani A, Chauhan MK, Bhatnagar A. Ergonomics assessment of office desk workers working in corporate offices. *Int J Health Sci Res.* 2019; 9(8):367-375.
10. Celik S, Celik K, Dirimese E, Tasdemir N, Arik T, Buyukkara I. Determination of pain in musculoskeletal system reported by office workers and the pain risk factors. *Int J Occup Med Environ Health* 2018; 31(1):91–111.
11. Ardahan M, Simsek H. Analyzing musculoskeletal system discomforts and risk factors in computer-using office workers. *Pak J Med Sci* 2016; 32(6):1425–29.
12. Quemelo P, Gasparato F, Vieira E. Prevalence, risks and severity of musculoskeletal disorder symptoms among administrative employees of a Brazilian company. *Work* 2015;52(3):533–40.
13. Akrouf Q, Crawford J, Al-Shatti A, Kamel M. Musculoskeletal disorders among bank office workers in Kuwait. *Eastern Med Health J* 2010;16(1):94–100.
14. Omokhodion FO, Sanya AO. Risk factors for low back pain among office workers in Ibadan, Southwest Nigeria. *Occup Med* 2003; 53:287–289.
15. Akodu A, Akinfeleye A, Atanda L, Giwa S. Work-related musculoskeletal disorders of the upper extremity with reference to working posture of secretaries. *SA J Occup Ther* 2015;45(3):16–22.
16. Shikdar AA, Al-Kindi MA. Office Ergonomics: Deficiencies in Computer Workstation Design. *International Journal of Occupational Health and Ergonomics.* 2007, 13(2): 215-223, 1080-3548.
17. Health and Safety Executive. Work related musculoskeletal disorders in Great Britain (WRMSDs). Annual Statistics 2018. Available at <http://www.hse.gov.uk/statistics/causdis/musculoskeletal/index.htm>.