ORIGINAL ARTICLE

Functional outcomes of poor ergonomic posture in university workers

Saba Riaz[1]*, Rabia Jawa[1], Hafiza Anam Nawaz[1], Aqsa Haider[1], Iqra Akhtar[1], Sidra Siddique[1]

Biomedica - Official Journal of University of Health Sciences, Lahore, Pakistan
Volume 38(2):105-108
https://doi.org/10.51441/BioMedica/5-706

OPEN ACCESS

This is an open access article distributed in accordance with the Creative Commons Attribution (CC BY 4.0) license: https://creativecommons.org/licenses/by/4.0/) which permits any use, Share — copy and redistribute the material in any medium or format, Adapt — remix, transform, and build upon the material for any purpose, as long as the authors and the original source are properly cited. © The Author(s) 2022

ABSTRACT

Background and Objectives: Work-related musculoskeletal disorders are increasing due to poor posture adaptation. Increasing the use of technologies in the office settings is one of the main reasons behind muscle and soft tissue strains. The objective of the study was to determine the pattern of posture-related musculoskeletal pain in office workers.

Methods: This observational study was conducted from 15th May, to 25th June, 2021. Data were collected by convenient sampling. The Nordic Musculoskeletal questionnaire on body postural habits was filled by 150 office workers from different universities of Lahore. Statistical Package for the Social Sciences software version 25 was used for statistical analysis.

Results: There were 79 (52.7%) male and 71 (43.7%) female participants, with a mean age of 35.7 ± 5.14 years. Majority (51.3%) of the subjects reported sitting tilted forward, while a few used backrests and footrests for support. Prolonged crossed legs and twisted spine posture were also adopted by many subjects. Neck, lower back, and shoulder were the most affected regions, with increased musculoskeletal pain reported over the last 12 months. Due to recurrent pain in the neck, shoulder, and upper back, difficulty in carrying out routine jobs, housework, and hobbies was reported by 38.7%, 34.7%, and 30% of the subjects, respectively.

Conclusion: Failure to adopt a good ergonomic approach leads to frequent musculoskeletal pain and difficulty in carrying out routine office and household work.

Keywords: Posture, musculoskeletal pain, ergonomics, office workers, university.

Received: 06 March 2022 **Revised date:** 23 May 2022 **Accepted:** 10 June 2022

Correspondence to: Saba Riaz
*Department of Physical Medicine and Rehabilitation, School of Health Sciences, University of Management and Technology, Lahore, Pakistan.
Email: sabariaz317@gmail.com
Full list of author information is available at the end of the article.

Introduction

The use of gadgets, especially personal computers (PCs) and laptops, at workplaces for longer hours is simply unavoidable.[1] On one hand, this helps with the assignments and workload but at the same time it causes serious adverse effects on the human body,[2] especially on the posture-related musculoskeletal dynamics.[3] Individuals achieving appropriate posture while doing office work put the least weight on the spinal structures, but they are hard to find.[4]

The word ergonomics is taken from the Greek word which means work and law separately. Ergonomics is a generally new idea in Pakistan, and is yet to be viewed as a fundamental segment of most endeavors. The literature shows the significance of the ergonomic connection between the mechanical introduction of the upper and lower appendages at work.[1,5] Work-related musculoskeletal disorders (MSDs) are reported when the execution of work contributes fundamentally to a certain condition that is exacerbated by wrong or inappropriate postures.[6] Musculoskeletal issues are frequently reported transcendently in the low back, neck, and upper appendages.[7] Occupational overuse syndrome, computer vision syndrome, lower back torment, tension migraines, and psychosocial stress are connected with MSDs.[4,6]

PC screen placement can play a significant role in the prevention or causation of neck pain and lower back pain in computer users.[8] Computer usage for a prolong time every day without proper postural and ergonomic guidelines has been reported to lead to limitations in the cervical range of motion, abnormal lateral scapular slide test, tight pectoralis minor muscle length, and protracted shoulders.[9]

The duration of computer usage also plays a key role in MSDs. Long working hours can lead to decreases in efficiency, increased musculoskeletal burden, and anxiety in

office workers.[10] The aim of this study was to find out the postural habits and prevalence of musculoskeletal pain in office workers at different universities. This study can help to create an awareness regarding the importance of good posture and ergonomics for acquisition of the better well-being of employees and to gain better performance at their workplaces.

Methods

This cross-sectional study was conducted from 15th May to 25th June 2021 after getting approval from the Ethical Review Committee of the University of Management and Technology (UMT), Lahore, Pakistan. Informed consent from the participants was taken after explaining the purpose of the study.

A total of *n* = 150 office workers from 4 universities (UMT, University of Lahore, University of South East Asia, and University of Central Punjab) in Lahore were recruited. The inclusion criteria were the employees who were involved primarily in computer-related jobs for at least 7 hours a day, for at least 5 years, aged between 30 and 45 years, and of both genders. Workers having any muscular deformity, chronic systemic disorders, and red flag signs, or who refused to participate in the study were excluded.

A self-designed validated questionnaire on ergonomic and posture habits during work was administered. In addition, the standardized Nordic musculoskeletal questionnaire was filled by 150 office workers.[11] The questionnaire had different questions about body posture among computer users. The variables were age, gender, working hours, questions regarding their posture, and musculoskeletal pain.

Statistical Analysis: Statistical Package for the Social Sciences software version 25.0 was used to analyze the data. Mean and standard deviation were calculated for numerical variables like age and working hours, while frequencies were determined for variables like gender. Chi-square test was applied to determine the relationship between the musculoskeletal regions involved and the duration of morbidity.

Results

There were 79 (52.7%) male and 71 (43.7%) female participants, with a mean age of 35.7 ± 5.14 years. The mean working hours for all participants were 8.26 ± 3.268 hours.

Among the 150 participants, 51.3% used to sit tilted forward, only 23% used backrests for support, 26% used to sit with the upper body twisted, 32% used footrests only, 32.7% used to sit with crossed legs, and only 23.3% used to carry out movements, including stretching, during working hours. Participants rarely adopted good postural habits and about half of the included population was not following a proper ergonomic approach in their workplace (Table 1).

Neck (88, 58.7%), lower back (75, 50%), and shoulders (73, 48.6%) were the most commonly involved regions with reported musculoskeletal pain experienced within the last 12 months (p = 0.021). Same complaints were reported in the last 7 days. Pain in neck (38.7%), shoulder (34.7%), and upper back (30%) caused difficulty in carrying out jobs, housework or hobbies among the office workers. Ankle (28, 18.7%), knee (32, 21.3%), and elbow (32, 21.33%) were least affected in office workers in the last 12 months and 7 days (p = 0.419) (Table 2).

Discussion

According to the current study, most of the participants were not following proper ergonomics at the workplace, which has caused both short- and long-term morbid conditions affecting their musculoskeletal regions. According to an Indian study,

Table 1. *Body posture adopted by office workers during working hours on a computer.*

Sr. No	Questions regarding body posture while working on a computer	Never	Rarely	Frequently	Always	Do not remember
1	Sit with your body tilted forward	15 (10%)	12 (8%)	77 (51%)	44 (29.3%)	2 (1.3%)
2	Sit with your back well supported on the backrest	45 (30%)	48 (32%)	38 (25.3%)	15 (10%)	4 (2.7%)
3	Sit with upper body twisted	47 (31.3%)	42 (28%)	39 (26%)	19 (12.7%)	3 (2%)
4	Sit with your buttocks slipping forward	51 (34%)	45 (30%)	31 (20%)	20 (13.3%)	3 (2%)
5	Sit with your buttocks well supported without slipping forward	32 (21.3%)	43 (28.7%)	43 (28.7%)	28 (18.7%)	4 (2.7%)
6	Sit with both feet firm on the floor	27 (18%)	48 (32%)	43 (28.7%)	30 (20%)	2 (1.3%)
7	Sit with feet unsupported	39 (26%)	45 (30%)	40 (26.7%)	20 (13.3%)	2 (1.3%)
8	Sit cross-legged	40 (26.7%)	40 (26.7%)	49 (32.7%)	16 (10.7%)	5 (3.3%)
9	Stand with equal support on both legs	34 (22.7%)	24 (16%)	45 (30%)	45 (30%)	2 (1.3%)
10	Stand with more supported on one leg	41 (27.3%)	40 (26.7%)	42 (28%)	23 (15.3%)	4 (2.7%)
11	Carry out body movements	25 (16.5%)	24 (16%)	57 (38%)	34 (22.7%)	10 (6.7%)

Table 2. *Musculoskeletal regions having trouble (pain, ache, numbness, and discomfort) during the last 12 months and last 7 days (n = 150).*

Sr. No	Region	Pain during the last 12 months		Pain during the last 7 days		Difficulty in carrying out work and hobbies in the last 12 months	
		Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
1	Neck	88	58.7	75	50	58	38.7
2	Shoulder	73	48.6	61	40.7	52	34.7
3	Upper back	53	34.7	48	32	45	30
4	Elbow	32	21.33	14	9.3	21	14
5	Wrist/hand	42	28	31	20.7	29	19.3
6	Lower back	75	50	64	42.7	44	29.3
7	Hip/Thigh	38	25.3	37	24.7	39	26
8	Knee	32	21.3	30	20	22	14.7
9	Ankle	28	18.7	30	20	25	16.7

39% of office workers were dissatisfied with the chair designs they were using, 20% with the keyboard, and 20% with the number of rest breaks that led to their poor positioning and contributed to musculoskeletal pain.[12]

The current study reported neck, lower back, and shoulder regions as the most affected with pain in the last 12 months and 7 days. The overall prevalence of MSDs as reported in university workers of Nigeria was 71.9%, with lower back, wrists/hands, and shoulders being the most reported body regions for these disorders.[13] Factors like drawn-out sitting at work or inappropriate positioning of the head during work may have an extraordinary function in neck torment event among office representatives, especially among individuals who work with PCs for longer hours.[8] Pain and its related MSDs are closely associated with various risk factors, such as physical inactivity, prolonged working hours, high body mass index, poor education, and counseling on ergonomics at workplace, etc. Massive computer usage during the COVID-19 lockdown has also contributed to a significant increase in musculoskeletal burden on the society.[14,15] Levy[16] reported MSDs associated with certain risk factors like desk height, reaching for items, inappropriate chairs, and leg positioning in 96% of the librarians. The most affected regions were neck (55.9%), head (49.2%), shoulders, upper arm (55.9%), and leg and knees (49.2%), which is quite similar to the present study.

In the present study, 50% of the participants were suffering from lower back pain in the last 12 months and 42.7% suffered the same in the last 7 days. Akulwar-Tajane et al.[17] found lower back pain as the most prevalent complaint, followed by neck, upper back, and shoulder region pain because of improper postural pattern. Shift works and rest breaks are important for the prevention of MSDs.[18] Appropriate health education of professionals and students regarding ergonomics and adoption of good posture during online learning is imperative to prevent chronic MSDs in children and younger population.[19-21]

Conclusion

Poor postural habits and lack of education on ergonomics lead to chronic MSDs and compromised efficiency in office workers who have major tasks related to the use of desks and computers. Neck, shoulder, and lower back regions are the most commonly affected areas in such employees.

Limitations of the study

The major limitation of the study was its questionnaire-based design, which could have led to recall or response bias. Workplace ergonomics and posture were not assessed by any trained professional. In addition, interventions and post-intervention results could have been compared. More studies should be conducted on a larger scale to spread awareness about the effect of body posture on the musculoskeletal system in the community.

Acknowledgement

The authors would like to thank all the participants and colleagues from all the above mentioned universities for their logistic and technical support during execution of this study.

List of Abbreviations

MSDs Musculoskeletal disorders
PC Personal computer

Conflict of interest

None to declare.

Grant support and financial disclosure

None to disclose.

Ethical approval

The Institutional Ethical Review Board of the University of Management and Technology, Lahore, Pakistan, approved the study with ethical approval number RE-004-2021, dated 14-04-2021.

Authors' contributions

SR: Conception and design of the study, data collection important intellectual input, and drafting of the manuscript.

RJ: Acquisition, analysis and interpretation of the data, and drafting of the manuscript.

HAN, AH, IA, SS: Acquisition and analysis of the data.

ALL AUTHORS: Approval of the final version of the manuscript to be published.

Authors' Details

Saba Riaz[1], Rabia Jawa[1], Hafiza Anam Nawaz[1], Aqsa Haider[1], Iqra Akhtar[1], Sidra Siddique[1]

1. Department of Physical Medicine and Rehabilitation, School of Health Sciences, University of Management and Technology, Lahore, Pakistan

References

1. Hoe VC, Urquhart DM, Kelsall HL, Zamri EN, Sim MR. Ergonomic interventions for preventing work-related musculoskeletal disorders of the upper limb and neck among office workers. Cochr Data Syst Rev. 2018;(10):CD008570. https://doi.10.1002/14651858.CD008570.pub3
2. Bernaards CM, Bosmans JE, Hildebrandt VH, van Tulder MW, Heymans MW. The cost-effectiveness of a lifestyle physical activity intervention in addition to a work style intervention on recovery from neck and upper limb symptoms and pain reduction in computer workers. Occup Environ Med. 2011;68(4):265–72. https://doi.10.1136/oem.2008.045450
3. Brakenridge CL, Chong YY, Winkler EAH, Hadgraft NT, Fjeldsoe BS, Johnston V, et al. Evaluating short-term musculoskeletal pain changes in desk-based workers receiving a workplace sitting-reduction intervention. Int J Environ Res Public Health. 2018;15(9):1975. https://doi.10.3390/ijerph15091975
4. Mohammadipour F, Pourranjbar M, Naderi S, Rafie F. Work-related musculoskeletal disorders in Iranian office workers: prevalence and risk factors. J Med Life. 2018;11(4):328–33. https://doi.10.25122/jml-2018-0054
5. Bontrup C, Taylor WR, Fliesser M, Visscher R, Green T, Wippert PM, et al. Low back pain and its relationship with sitting behaviour among sedentary office workers. Appl Ergon. 2019;81:102894. https://doi.10.1016/j.apergo.2019.102894
6. Singh H, Singh LP. Musculoskeletal disorders among insurance office employees: a case study. Work. 2019;64(1):153–60. https://doi.10.3233/WOR-192978
7. Khan R, Surti A, Rehman R, Ali U. Knowledge and practices of ergonomics in computer users. J Pak Med Assoc. 2012;62(3):213–7. PMID: 22764450.
8. Ye S, Jing Q, Wei C, Lu J. Risk factors of non-specific neck pain and low back pain in computer-using office workers in China: a cross-sectional study. BMJ Open. 2017;7(4):e014914. https://doi.10.1136/bmjopen-2016-014914
9. Neeraj S, Pragya K, Raju PK. Prevalence of shoulder girdle dysfunction in computer users with non-specific neck pain. Indian J Public Health Res Develop. 2019;10(10):364–8.
10. Osama M, Ali S, Malik RJ. Posture related musculoskeletal discomfort and its association with computer use among university students. J Pak Med Assoc. 2018;68(4):639–41. PMID: 29808057.
11. Oestergaard AS, Smidt TF, Søgaard K, Sandal LF. Musculoskeletal disorders and perceived physical work demands among offshore wind industry technicians across different turbine sizes: a cross-sectional study. Int J Ind Ergon. 2022;88:103278. https://doi.org/10.1016/j.ergon.2022.103278
12. Chandwani A, Chauhan M, Bhatnagar A. Ergonomics assessment of office desk workers working in corporate offices. Int J Health Sci Res. 2019;9(8):367–75.
13. 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;30(5):715–24. https://doi.10.4314/ejhs.v30i5.101
4. Kaya Aytutuldu G, Birinci T, Tarakcı E. Musculoskeletal pain and its relation to individual and work-related factors: a cross-sectional study among Turkish office workers who work using computers. Int J Occup Saf Ergon. 2022;28(2):790–7. https://doi.10.1080/10803548.2020.1827528
15. Kayabınar E, Kayabınar B, Önal B, Zengin HY, Köse N. The musculoskeletal problems and psychosocial status of teachers giving online education during the COVID-19 pandemic and preventive telerehabilitation for musculoskeletal problems. Work. 2021;68(1):33–43. https://doi.10.3233/WOR-203357
16. Levy CD. The relationship between ergonomics of the office workstation and related musculoskeletal disorders in library administrative staff at the Durban university of technology. Doctoral Dissertation; 2018. https://doi.10.51415/10321/3069
17. Akulwar-Tajane I, Darvesh M, Ghule M, Deokule S, Deora B, Mhatre V. Effects of COVID-19 pandemic lock down on posture in physiotherapy students: a cross-sectional study. Med Clin Res. 2021;6(1):91–102.
18. Jin X, Dong Y, Wang F, Jiang P, Zhang Z, He L, et al. Prevalence and associated factors of lower extremity musculoskeletal disorders among manufacturing workers: a cross-sectional study in China. BMJ Open. 2022;12(2):e054969. https://doi.10.1136/bmjopen-2021-054969
19. Karthikeyan G, Balaguhan B, Mathanmohan A, Deepak V, Indrapriyadharshini K, Devar MN. Insights into knowledge, attitude and perception about dental ergonomics and work-related musculo skeletal disorders (MSD) among dental professionals at Chengalpet District, Tamil Nadu, India: a cross-sectional study. Int J Occup Saf *Health*. 2022;12(1):1–7. https://doi.org/10.3126/ijosh.v12i1.41028
20. Tang L, Wang G, Zhang W, Zhou J. The prevalence of MSDs and the associated risk factors in nurses of China. Int J Indus Ergo. 2022;87(2):103239. https://doi.10.1016/j.ergon.2021.103239
21. Gabani FL, Mesas AE, da Silva Santos MC, González AD, de Andrade SM. Chronic musculoskeletal pain and occupational aspects among Brazilian teachers. Int J Occup Saf Ergon. 2022;28(2):1304–10. https://doi.10.1080/10803548.2021.1906030