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ORIGINAL RESEARCH

A Cross-Sectional Study of Ergonomic Risk Factors Among Computer-Using University Employees

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Abstract

Background: Today, millions of computer users around the globe have musculoskeletal disorders (MSDs), highlighting the significant rise in office employees experiencing these conditions and the urgent need for intervention.
Objective: To investigate the ergonomic risk factors and their relationship with musculoskeletal disorders among computer-using administrative staff in a Nigerian University.
Methods: A cross-sectional study of 142 administrative staff of Redeemer's University, Ede, Nigeria, was conducted. Data on respondents' general characteristics were gathered through a self-developed questionnaire. Data on MSDs were derived from the Nordic Musculoskeletal Questionnaire (NMQ), while ergonomic data were collected using the Rapid Office Strain Assessment (ROSA) method.
Results: The highest prevalence rates of MSDs were in the neck (51.4%) and lower back (42.3%) regions. The mean ROSA score at workstations for the chair section was 5.01±1.35, the monitor and telephone section was 2.54±1.05, and the mouse and keyboard section was 2.73±0.84. The mean final ROSA score was 5.06±1.32, indicating that most of the employees were at high risk of musculoskeletal complaints. The chair section was identified as the most significant factor raising the risk level. There was a significant positive and moderate correlation between ROSA final score and MSDs at the neck (r = 0.469) and low back (r = 0.309).
Conclusion: MSDs are prevalent among computer-using office workers, and there is a significant relationship between MSDs and workstation ergonomics. The parameters associated with the chair section should receive priority attention to reduce and eliminate MSDs among university administrative staff who use computers.

Keywords: Anatomical body region, Musculoskeletal disorders, Nordic Musculoskeletal Questionnaire, Rapid Office Strain Assessment.

Introduction

Globally, computers have revolutionised the way people work and learn, fundamentally changing education, communication, and workplace practices. [1] The computer is an essential work tool of the university employees, helping them achieve the desired organisational outcomes and conduct day-to-day activities, with positive effects on the accuracy and efficiency of their work.[2] Studies conducted in Nigeria,[3] Bangladesh,[4] Jordan,[2] and beyond, demonstrated the widespread use of computers. However, the widespread use of computers in contemporary academic and professional environments has increased the risk of musculoskeletal disorders (MSDs) among computer users.[2] MSDs comprise several conditions affecting the human musculoskeletal system.[5] Other common names for MSDs are repetitive motion injury, repetitive stress injury, overuse injury, soft tissue disorders, occupational overuse syndrome and many more; all of these terms broadly describe the nature of these disorders.[6]

A Global Burden of Disease (GBD) 2019 data analysis showed that approximately 1.71 billion people globally live with MSDs.[7] MSDs are also the most significant contributor to years lived with disability (YLDs), accounting for 17% of all YLDs globally – approximately 149 million YLDs – with low back pain the leading contributor to the global burden of musculoskeletal disorders (570 million prevalent cases globally, accounting for 7.4% of all YLDs).[7] Studies in Nigeria, Ethiopia, Iran and other nations demonstrated MSDs prevalence rates among computer users to be as high as 77%. [5,8-11]

MSDs happen when a person is too fatigued, and their body cannot recover fast enough. As a result, the fatigue generated continues to outpace recovery, and the resulting musculoskeletal imbalance remains untreated.[12] If the treatment is not initiated correctly, various acute MSDs may develop, displaying several symptoms like tenderness, inflammation, swelling, and warmth.[13] The commonly reported MSDs linked to computer use include low back pain, neck pain, carpal tunnel syndrome, tendonitis, and ligament sprain. At the same time, the commonly affected body regions are the neck, shoulders, upper back, wrists, and hands. [14,15] These affected areas are of significant concern among computer users, which may impair performance and quality of life by causing pain, discomfort, decreased functioning, and psychological distress. [4] Studies across various workplace settings, including universities, demonstrate that MSDs can lead to absenteeism, reduced productivity, and even job loss. [2,8,11] Research has shown a strong relationship between the development of MSDs and poor workstation ergonomics among computer users, particularly in office settings. [2.4]

Ergonomics, as a scientific discipline, is dedicated to understanding the interaction between individuals and their working environments; when it comes to computer usage, ergonomics is all about making the most out of how workstations are set up.[16,17] This includes how chairs are adjusted, how high a desk should be, where to put monitors, where to put keyboards and mice, and even how the environment is lit and heated. [16,17] Studies have established the importance of factors like chair design, desk height, and monitor placement in reducing the risk of MSDs. [3,18,19] Beyond the physical elements of the workstation, environmental factors also contribute to ergonomic risk. Insufficient lighting, excessive noise, and extreme temperatures have been linked to increased muscle tension, eye strain, and headaches, increasing the effects of poor workstation design.[20] Furthermore, a lack of regular breaks and exercises, which allow the

body to recover from prolonged static postures, compounds the risk of developing MSDs.[9] Prolonged sitting at the computer workstation is often required by staff, including academic and administrative personnel, for various purposes.[4,21,22] Prolonged sitting may hurt the musculoskeletal health of computer users, with studies showing a high prevalence of MSDs among computer users with prolonged sitting.[23,24] Studies have shown that ergonomic corrections can significantly lower the incidence and severity of MSDs, with studies reporting reductions in MSD symptoms of up to 60% or more. [9,10,25] These interventions can range from simple workstation tweaks like adjusting monitor height to full-scale workplace redesign, including the provision of ergonomic furniture and equipment. [3,26] This is essential because the existing body of research underscores the clear link between ergonomic risk factors and the development of MSDs. [2,20]

Computers have become an integral part of everyday work within the university system.[27,28] This widespread use of computers in the university system, especially among the administrative staff, in addition to ergonomic risk factors (such as prolonged sitting in inappropriate, awkward, and static postures on the computer workstation), has increased the risk of MSDs in computer users.[2,4] The presence of these MSDs has further led to impaired performance and reduced quality of life by causing pain, discomfort, decreased functioning, and psychological distress.[4] Ergonomics plays a vital role in preventing MSDs by promoting an optimal fit between individuals and their work environments.[16] Despite this critical role, the university system is still characterised by a high prevalence of MSDs.[29,30] Therefore, this study investigated ergonomic risk factors and their relationship with musculoskeletal disorders among computer-using administrative staff in a Nigerian University.

Methods

Study design, setting and population

This was a descriptive, cross-sectional study. The study population was the administrative staff of the Redeemer's University, Ede, Osun State, Nigeria, who are regular computer users. For this research, a regular computer user was defined as an individual who spends a minimum of two hours per day for five working days in a week, interacting with a computer for work or study-related tasks.

Redeemer's University is a faith-based, privately owned University in Nigeria. The university currently has a student population of about 5000 and a staff of about 600, excluding all forms of casual workers. The university presently has eight faculties and, in addition, internationally reputable institutes.

Inclusion Criteria

All active administrative staff members who regularly used computers for a minimum of two hours per day for five working days in a week were included in the study.[4]

Exclusion Criteria

Administrative staff members with Computer usage of less than two hours per day, with a previous diagnosis of medical conditions unrelated to computer use that significantly contributed to musculoskeletal problems (such as rheumatoid arthritis, recent injury) were excluded from the study. In addition, physically disabled staff members and pregnant women were excluded from the study.

Sampling technique/sample size

A non-probability purposive sampling was used to recruit participants for this study. Participants who met the inclusion criteria and consented to participate were included in the study. The minimum sample size for the study was

calculated using the following sample size formula:

$n = N (1 + N(e)^2$ (Yamane's Formula)

Where:

N = 250 and e = 0.05

Therefore, $n = 250/ (1+ 250 (0.05)^2) = 154$.

Data collection instrument

A socio-demographic data questionnaire was used to collect information on respondents' general characteristics, including age, sex, the number of hours spent at the computer workstation per day, taking a break every 2 hours of computer use, and years of work experience. The Rapid Office Strain Assessment (ROSA) tool was used to assess ergonomic risk factors. This ergonomic assessment tool is designed to quickly provide a quantitative assessment of the risks associated with computer use at a computer workstation. It is based on Canadian guidelines developed by a panel of experts and assesses awkward postures and risk factors related to the use of peripherals during office work.

The ROSA tool evaluates ergonomic risk factors and musculoskeletal disorders among computer users. The typical ROSA score ranges from 1 to 10, with higher scores indicating a greater risk of musculoskeletal problems. Low risk (1-4): These scores suggest a workstation setup with minimal ergonomic deficiencies and a lower risk of potential MSDs. The workstation could benefit from adjustments to improve comfort and potentially reduce MSD risk. High risk (5-10): these scores suggest workstations with significant ergonomic deficiencies and a higher risk of MSDs. Further ergonomic evaluation and intervention are likely recommended to address these issues. Inter-observer reliability was good for the keyboard and ROSA final scores (ICC > 0.5) and excellent for the keyboard and mouse scores (ICC> 0.75).[31]

The Nordic Musculoskeletal Questionnaire (NMQ) was used to collect information on MSDs prevalence and sites. This Nordic musculoskeletal questionnaire can be used either as a questionnaire or in the form of a structured interview. To facilitate completion and identify specific body parts, a marked body map is provided. In the particular use of identifying MSD, the basic question pattern has been modified to meet the survey's specific purpose. Body-region-specific questions are combined in a modified form to collect the data. This part of the questionnaire consists of nine body-region-specific questions, organised into six sections. The first section of the questionnaire is intended to identify the occurrence of MSD. If the response to the first section is negative, the subject can skip the other sections of the same body part. The second section identifies whether the particular MSD is causing work interference. The third section identifies pain in the body part in the last seven days. The fourth section asks if the subject has ever hurt the body part in an accident. Duration of the MSD is identified in the fifth section. The sixth section evaluates whether the subject has consulted the medical practitioner due to the persistence of the problem. The NMQ is a valid, reliable, and widely used instrument, with test-retest reliability and specificity scores ranging from 66% to 92% and 71% to 88%, respectively. [32 - 34]

Ethical consideration

Ethical approval was obtained from Redeemer's University Research Ethics Committee (RUN/REC/2024/184). Thereafter, the individual consent of the participant was obtained. The questionnaire was distributed to the selected staff by hand and collected via the same means.

Data analysis

All statistical analyses were performed using IBM SPSS Statistics (version 26.0, IBM SPSS Statistics, Armonk, USA). Descriptive statistics of frequencies, means, standard deviations, and percentages were used to summarise data on general characteristics, ROSA score and prevalence of MSDs in different body regions. A

Spearman's rho correlation analysis was used to determine the relationship between ROSA scores and the prevalence of MSDs across different body regions. The level of statistical significance was set at $p < 0.05$.

Results

One hundred and forty-two computer-using administrative staff participated in this study. The participants comprised 71 (50%) males, and the mean age was 34.78±6.69 years, with most participants aged 31 - 40 years. More than half (83; 58.5%) indicated they do not take a break every two hours of computer use. The average computer usage hours of the respondents were 4.78±1.76 hours, and the average work experience was 5.99±3.64 years (Table I).

Table I: General characteristics of participants

Variable	*Frequency (n)*		*Percentage*
Gender			
Male	71		50
Female	71		50
Total	142		100
Regular Break			
Yes	59		41.5
No	83		58.5
Total	142		100
Variable	**Minimum**	**Maximum**	**Mean ± SD**
Age (years)	21.00	54.00	34.78 ± 6.69
Hours spent daily on the computer	2.00	10.00	4.80 ± 1.73
Work Experience (years)	1.00	20.00	5.99 ± 3.64

Table II shows the chair section and ROSA final score, indicating that the workstations were poorly designed, resulting in a high risk (ROSA final score ≥ 5) of having MSDs. The participants' MSDs distribution by body regions is shown in Figure 1.

Table II: Assessment of physical exposure to MSDs with ROSA among computer users

Variable	*Minimum*	*Maximum*	*Mean ± SD*
Chair (Height and pan depth; Armrest and back support)	2	7	5.01 ± 1.35
Monitor and Telephone	1	5	2.54 ± 1.05
Mouse and Keyboard	2	6	2.73 ±0.84
ROSA final score	2	7	5.06 ± 1.32

ROSA – Rapid Office Strain Assessment

Table III shows that the discomforts/pain at the neck (r = 0.465, r = 0.469), shoulder (r = 0.231, r = 0.222), wrist/hand (r = 0.217, r = 0.206), upper (r = 0.214, r = 0.226) and lower back (r = 0.310, r = 0.309), ankle/feet (r = 0.189, r = 0.166) were positively correlated with both the chair section and ROSA final score respectively.

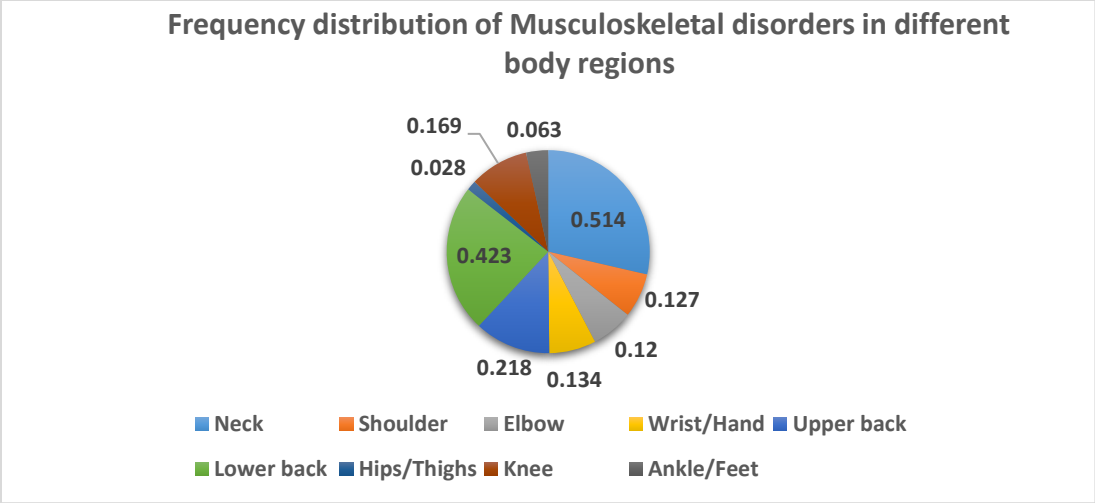

Figure 1: Frequency distribution of Musculoskeletal disorders in different body regions

Table III: Correlation between participants' Musculoskeletal Disorders and the final ROSA score

Body regions	*Chair score*	*Monitor and Telephone score*	*Mouse and Keyboard score*	*Final ROSA score*
	r (p-value)	**r (p-value)**	**r (p-value)**	**r (p-value)**
Neck	0.465 (0.001)**	-0.009 (0.915)	0.072 (0.392)	0.469 (0.001)**
Shoulder	0.231 (0.006)**	0.089 (0.292)	0.129 (0.125)	0.222 (0.008)**
Elbow	0.143 (0.089)	0.098 (0.245)	-0.137 (0.104)	0.133 (0.114)
Wrist/hand	0.217 (0.010)*	0.050 (0.557)	-0.076 (0.371)	0.206 (0.014)*
Upper back	0.214 (0.010)*	-0.095 (0.261)	0.037 (0.659)	0.226 (0.007)**
Low back	0.310 (0.001)**	-0.024 (0.778)	0.122 (0.147)	0.309 (0.001)**
Hips/Thighs	-0.057 (0.501)	0.009 (0.918)	0.138 (0.103)	-0.034 (0.692)
Knee	0.079 (0.349)	0.049 (0.561)	0.040 (0.637)	0.103 (0.222)
Ankle/feet	0.189 (0.024)*	-0.023 (0.783)	-0.066 (0.437)	0.166 (0.048)*

****Correlation was significant at the 0.01 level (2-tailed). *Correlation was significant at the 0.05 level (2-tailed)**

Discussion

It is essential to recognise that computer use has become part of everyday activities, and the increasing prevalence of MSDs and the associated burden for both employee and employer cannot be ignored. [11,35] Therefore, identifying the ergonomic risk factors among computer users will help to devise necessary interventions to reduce the prevalence of associated MSDs and also reduce work absenteeism and increase work productivity. According to the findings of the present study, the neck had the highest prevalence of MSDs. The recorded mean ROSA scores indicate that most employees are at high risk of musculoskeletal complaints. The most crucial factor in the present study, raising the risk of MSDs, was the chair section.

The NMQ outputs showed that MSDs were widespread among the participants, with the

highest prevalence of MSD symptoms at the neck (51.4%), lower back (42.3%), and upper back (21.8%). MSD symptoms at the shoulder, wrist/hand, and ankle/feet also had contributions of 12.7%, 13.4% and 6.3% respectively. The reason for neck pain could be inappropriate workstation design, inappropriateness of the office equipment and improper positioning of the monitor screen, resulting in an awkward neck position, and this is done for a prolonged time while sitting. Upper and lower back pain and discomfort could be a result of the inappropriateness of the backrest, prolonged seating time, incorrect seating position and non-adjustable or wrong adjustment of the adjustable chair. Shoulder pain and discomfort could be a result of chair-table height incompatibility, inappropriate distance of the mouse to the keyboard and improper placement of the mouse and keyboard. The outcome in this study is similar to findings in other studies. [36-39]

The mean ROSA chair section score showed a high risk of ergonomic risk factors. The chair section includes chair height and depth, as well as armrest and back support sections. The reason for this high-risk level result could be the lack of appropriate height and depth in the chairs, as well as the lack of armrests and back supports in most of them. In addition, the chair score shows a significant relationship with pain in the neck, shoulder, wrist/hand, upper and lower back, and ankle/foot regions. This implies that most of the computer users were using inappropriate chairs, placing undue tension on the body regions, which might have been responsible for the occurrence of pain. Studies have shown that many employees do not use appropriate ergonomic chairs, and this has been associated with the development of MSDs. [36,37,40] According to the Work Health Professionals,[41] a proper ergonomic chair should feature adjustable lumbar support, height, backrest angle, seat depth, armrests and seat tilt to support natural spinal curvature and promote comfortable, healthy posture for extended periods.

This study also reveals that the mean ROSA score of the chair section was higher than that of other sections (mouse and keyboard, monitor and telephone). The ROSA scores of the different sections showed a lower risk level than those of the chair section. This observation agrees with the findings of the study by Khaya [36] in which other sections of the mouse and keyboard, and the monitor and phone, had lower mean scores than the chair section. The reason for this pattern could be that the parameters associated with the chair section are germane to the development of MSDs and should be given priority over other sections (of mouse and keyboard, monitor, and telephone).

ROSA section on mouse and keyboard, monitor and telephone showed no significant relationship with the development of MSDs in the body region. This agrees with a previous study by Iram *et al.* [37], in which monitor and telephone scores showed no significant association. However, other previous studies have established a significant association between monitor and telephone use and complaints of pain or discomfort in the neck and shoulder regions. [36,40] The possible reason for the difference in the outcomes is that the monitor was not low, and the employees had earphones available to attend to phone calls. In addition, the study results showed that the mouse and keyboard section was not significantly associated with complaints of pain in the lower arm, wrist, or hand. This differed from other studies that established significant associations between the variables. [36, 37, 40] The reason for this could be that the participants in the present study did not use the mouse and keyboard for an extended period of time. Extensive use of the mouse and keyboard during work, which leads to consistent muscle contraction, has been linked to the development of MSDs in the wrist and hand. [42,43]

The final ROSA score reveals the level of risk among the employees. The final ROSA score in this study was 5.06, indicating a high risk. This result was similar to those of other studies, in which the final ROSA score was at a high-risk level. [18, 44] This shows a worse condition of workstations in which the employees are working, exposing them to high ergonomics risks linked to the development of MSDs. Strong relationships were observed between ROSA final score and complaints of pain in the neck, shoulder, wrist/hand, upper and lower back, and ankle/feet. Performing computer-related work for long hours without breaks can lead to pain or discomfort in various parts of the body. Inappropriateness of workstations, wrong matching of workstation (e.g. monitor, chair, table, telephone) to employee can trigger discomfort in the neck, shoulder, upper and lower back, wrist/hand and even ankle/feet regions. According to Iram *et al.* [37], discomforting positions such as inadequate positioning of the chair and table, and inappropriate viewing angle of the monitor screen have been shown to affect the soft tissue of the body negatively, thereby causing muscle stress, weakness, fragility and fatigue, and eventually resulting in muscular pain. In addition, poor or inappropriate workstations and misuse of office equipment will put employees in awkward working positions and postures, which have been linked to the occurrence of MSDs in different body regions among computer users. [36,37] To mitigate these concerns and ensure comfort and increased productivity, workstations should be ergonomically designed. Also, educational interventions such as teaching employees to maintain proper posture while working, to use breaks during work, to adjust their chairs, and to use the keyboard and mouse should be encouraged. [18]

Strengths and limitations

This study is one of the very first pieces of research evidence on ergonomic risk factors using ROSA and their relationship with MSDs among computer-using university staff in Nigeria. But this study has some limitations. A cross-sectional study design was adopted, which does not infer causality. The use of self-report data collection tools is subject to recall bias and reporting bias. The number of participants in this study was slightly lower than the calculated sample size, which may have underpowered the study and limited the generalizability of the results to other working groups. Further research with a larger sample size and targeted at different work settings is desirable.

Conclusion

The study concludes that MSDs are highly prevalent among computer-using administrative staff of Redeemer's University, Ede, particularly affecting the neck, shoulders, wrist/hand, upper and lower back, and ankle/feet regions. A relationship was observed between MSDs and workstation ergonomics. The ergonomic risk factor level was high, and the parameters associated with the chair section should be given attention to reduce and eliminate MSDs. These findings underscore the critical need for ergonomic interventions to alleviate these risk factors and improve musculoskeletal health among computer users.

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References

1. Autor DH. Why Are There Still So Many Jobs? The History and Future of Workplace Automation. J Econ Perspect 2015;29:3–30. https://doi.org/10.1257/jep.29.3.3
2. Shahwan BS, D'emeh WM, Yacoub MI. Evaluation of computer workstations' ergonomics and its relationship with reported musculoskeletal and visual symptoms among university employees in Jordan. Int J Occup Med Environ Health 2022;35:141-156. https://doi.org/10.13075/ijomeh.1896.01822 .
3. Momodu BAI, Edosomwan JHE, Edosomwan TO. Evaluation of Ergonomics Deficiencies in Nigerian Computer Workstations. J Ergonomics 2014;S4:008. https://doi.org/10.4172/2165-7556.S4-008
4. Kibria MG, Parvez MS, Saha P, Talapatra S. Evaluating the ergonomic deficiencies in computer workstations and investigating their correlation with reported musculoskeletal disorders and visual symptoms among computer users in a Bangladeshi university. Heliyon 2023;9:e22179. https://doi.org/10.1016/j.heliyon.2023.e22179.
5. National Academies of Sciences, Engineering, and Medicine; Health and Medicine Division; Board on Health Care Services; Committee on Identifying Disabling Medical Conditions Likely to Improve with Treatment. Musculoskeletal Disorders. In: Selected Health Conditions and Likelihood of Improvement with Treatment. National Academies Press (US); 2020. Accessed March 24, 2025. https://www.ncbi.nlm.nih.gov/books/NBK559512/
6. Das S, Krishna MM, Shanmugaraja K. Analysis of Musculoskeletal Disorder Risk in Cotton Garment Industry Workers. J Natural Fibers 2023; 20. https://doi.org/10.1080/15440478.2022.2162182
7. Cieza A, Causey K, Kamenov K, Hanson SW, Chatterji S, Vos T. Global estimates of the need for rehabilitation based on the Global Burden of Disease study 2019: a systematic analysis for the Global Burden of Disease Study 2019. Lancet 2021;396:2006-2017. https://doi.org/10.1016/S0140-6736(20)32340-0.
8. Dagne D, Abebe SM, Getachew A. Work-related musculoskeletal disorders and associated factors among bank workers in Addis Ababa, Ethiopia: a cross-sectional study. Environ Health Prev Med 2020;25. https://doi.org/10.1186/s12199-020-00866-5
9. Motamedzadeh M, Jalali M, Golmohammadi R, Faradmal J, Zakeri HR, Nasiri I. Ergonomic risk factors and musculoskeletal disorders in bank staff: an interventional follow-up study in Iran. J Egypt Public Health Assoc 2021;96:34. https://doi.org/10.1186/s42506-021-00097-8.
10. Nwaogazie, IL, Umeadi KK, Bovwe O. Ergonomics Workstation Assessment of Musculoskeletal Disorders in University of Port Harcourt. Int J Trop Dis Health 2016;20, 1–14. https://doi.org/10.9734/IJTDH/2016/29675
11. Demissie B, Bayih ET, Demmelash AA. A systematic review of work-related musculoskeletal disorders and risk factors among computer users. Heliyon 2024;10:e25075. https://doi.org/10.1016/j.heliyon.2024.e25075.
12. Cherney K. Musculoskeletal disorders https://www.healthline.com/health/musculoskeletal-disorders Accessed on March 20, 2025.
13. Talapatra S, Parvez MS, Saha P, Kibria MG, Hoque ASM. Musculoskeletal risk factors assessment based on exploratory factor analysis and fuzzy analytical hierarchy process, Theoretical Issues Ergon Sci 2022;25:1-32 https://doi.org/10.1080/1463922X.2022.2157065
14. Maduagwu MS, Maijindadi RDW, Duniya KI, Oyeyemi AA, Saidu IA. Prevalence and Patterns of Work-related Musculoskeletal Disorders among Bankers in Maiduguri, Northeast Nigeria. Occup Med Health Aff 2014;29:1-6 https://doi.org/10.4172/2329-6879.1000169

15. Kasaw KA, Fisseha GB, Embaye GK, Solomon TG. Work-Related Musculoskeletal Disorders and Associated Factors Among Bankers in Ethiopia. Pain Res Manag 2020:8735169. https://doi.org/10.1155/2020/8735169.
16. Bridger RS. Introduction to human factors and ergonomics (4th ed.). CRC press 2017 https://doi.org/10.1201/9781351228442
17. Edwards C, Fortingo N, Franklin E. Ergonomics. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK580551/ [Updated February 12, 2024].
18. Motamedzadeh M, Jalali M., Golmohammadi R, Javad F, Hamid RZ, Iman N. Ergonomic risk factors and musculoskeletal disorders in bank staff: an interventional follow-up study in Iran. J Egypt Public Health Assoc 2021;96:34 https://doi.org/10.1186/s42506-021-00097-8
19. Soares CO, Pereira BF, Pereira GMV, Marcondes LP, de Campos Gomes F, de Melo-Neto JS. Preventive factors against work-related musculoskeletal disorders: narrative review. Rev Bras Med Trab 2020;17:415–430. https://doi.org/10.5327/Z1679443520190360
20. Sheppard AL, Wolffsohn JS. Digital eye strain: prevalence, measurement and amelioration: BMJ Open Ophthalmol 2018;3:e000146.
21. Nor-Azmi NA, Abdul-Aziz F. The impact of risk factors associated with long-term computer use on musculoskeletal discomfort among administrative staff: A case study. J Modern Manufact Sys Technol 2022;6:7-17. https://doi.org/10.15282/jmmst.v6i2.8557
22. Janc M, Jozwiak Z, Jankowska A, Makowiec-Dabrowska T, Kujawa J, Polanska K. Ergonomics of E-Learning Workstations and the Prevalence of Musculoskeletal Disorders-Study among University Students. Int J Environ Res Public Health 2023;20:3309. doi: 10.3390/ijerph20043309.
23. Jain R, Meena ML, Rana KB. Risk factors of musculoskeletal symptoms among mobile device users during work from home. Int J Occup Saf Ergon 2022;28:2262-2268. https://doi.org/10.1080/10803548.2021.1979318.
24. Choobineh A, Daneshmandi H, Saraj Zadeh Fard SK, Tabatabaee SH. Prevalence of Work-related Musculoskeletal Symptoms among Iranian Workforce and Job Groups. Int J Prev Med 2016;7,130. https://doi.org/10.4103/2008-7802.195851
25. 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. Cochrane Database Syst Rev 2018;10:CD008570. https://doi.org/10.1002/14651858.CD008570.pub3.
26. Skelly DL. Assessment of computer workstations for compliance with ergonomic guidelines: A field study. Work 2021;69:1019-1026. https://doi.org/10.3233/WOR-213532.
27. Haleem A, Javaid M, Qadri MA, Suman R. Understanding the role of digital technologies in education: A review. Sustainable Operations Comp 2022;3:275-285. https://doi.org/10.1016/j.susoc.2022.05.004.
28. Haidar A. Computers in our daily life. Int J Computer Sci Inf Technol Res 2021;9:11-17
29. Meaza H., Temesgen MH, Redae G, Hailemariam TT, Alamer A. Prevalence of Musculoskeletal Pain Among Academic Staff of Mekelle University, Ethiopia. Clinical medicine insights. Arthritis Musculoskelet Disord 2020;13:1179544120974671. https://doi.org/10.1177/1179544120974671
30. Sandeva G, Tsvetkova V, Prakova G. Musculoskeletal Disorders and Associated Workplace Risk Factors in Higher Education Employees. JIMAB 2021;27:4108-4112. https://doi.org/10.5272/jimab.2021274.4108
31. Sonne M, Villalta DL, Andrews DM. Development and evaluation of an office ergonomic risk checklist: ROSA – Rapid office strain assessment. Appl Ergon 2012;43:98-108. https://doi.org/10.1016/J.APERGO.2011.03.008
32. Kuorinka I, Jonsson B, Kilbom A, Vinterberg H, Biering-Sørensen F, Andersson G, *et al.* Standardised Nordic questionnaires for the

analysis of musculoskeletal symptoms. Appl Ergon 1987;18:233-237. https://doi.org/10.1016/0003-6870(87)90010-x.

33. Odole AC, Olutoge DA, Awosoga O, Mbada CE, Fatoye C, Oyewole OO, *et al.* Musculoskeletal Pain and Postural Abnormalities among Smartphone-Using Digital Natives. J Musculoskelet Disord Treat 2020;6:1-12. https://doi.org/10.23937/2572-3243.1510089
34. Ayanniyi O, Udofia UI. Prevalence and pattern of musculoskeletal pain among undergraduates from a Nigerian university. Afr J Physiother Rehabil Sci 2018;8:28–37. https://dx.doi.org/10.4314/ajprs.v8i1-2.5
35. Gosain L, Ahmad I, Rizvi MR, Sharma A, Saxena S. Prevalence of musculoskeletal pain among computer users working from home during the COVID-19 pandemic: a cross-sectional survey. Bull Fac Phys Ther 2022;27:51. https://doi.org/10.1186/s43161-022-00110-x.
36. Kahya E. Assessment of musculoskeletal disorders among employees working office workplaces in the manufacturing sector. Work 2021;69:1103-1113. https://doi.org/10.3233/WOR-213539
37. Iram H, Kashif M, Sattar M, Bhatti ZM, Dustgir A, Mehdi Z. Ergonomic risk factors among computer office workers for complaints of arm, neck and shoulder and workstation evaluation. Work 2022;73:321-326. https://doi.org/10.3233/WOR-211029
38. Besharati A, Daneshmandi H, Zareh K, Fakherpour A, Zoaktafi M. Work-related musculoskeletal problems and associated factors among office workers. Int J Occ Safety Ergon 2018;26:632–638. https://doi.org/10.1080/10803548.2018.1501238
39. Özkan NF, Kahya E. Assessing ergonomic risks in a university's administrative offices. J Fac Engin Architect Gazi University 2017;32:141-150 http://doi.org/10.17341/gazimmfd.300603
40. Mohammadipour F, Pourranjbar M, Naderi S, Rafie F. Work-related Musculoskeletal Disorders in Iranian Office Workers: Prevalence and Risk Factors. J Med Life. 2018;11:328-333. https://doi.org/10.25122/jml-2018-0054.
41. Work Health Professionals. How do you know if your chair is ergonomic?; 2023 https://www.workhealthonsite.com.au/how-do-you-know-if-your-chair-is-ergonomic/#:~:text=The%20ergonomic%20chair,for%20a%20good%20typing%20posture. Accessed March 12, 2025.
42. Matos M, Pedro MA. Ergonomic Evaluation of Office Workplaces with Rapid Office Strain Assessment (ROSA). Procedia Manufacturing 2015;3:4689-4694. https://doi.org/10.1016/j.promfg.2015.07.562
43. Szeto GPY, Straker LM, O'Sullivan PB. A comparison of symptomatic and asymptomatic office workers performing monotonous keyboard work—2: Neck and shoulder kinematics. Manual Therapy 2005;10:281-291. https://doi.org/10.1016/j.math.2005.01.005
44. Poochada W, Chaiklieng S. Ergonomic Risk Assessment among Call Centre Workers, Procedia Manufacturing 2015;3:4613-4620. https://doi.org/10.1016/j.promfg.2015.07.543.