INSIGHTS-JOURNAL OF
HEALTH AND REHABILITATION

INSIGHTS-JHR
INSIGHTS-JOURNAL OF HEALTH AND REHABILITATION

IMPACT OF WORK ENVIRONMENT ON NECK PAIN IN ADULT POPULATION

Original Research

Warda Afifa[1]*, Muhammad Tahir Akram[2], Osama Khan[3], Syed Muhammad Taseer Hussain Shah[4], Sain Memon[5], Zonera Khalid[6], Rimsha Saeed[1], Kiran Bibi[5]
[1]Physiotherapist, University of Sargodha, Pakistan.
[2]Physiotherapist, Patients' Aid Foundation, Jinnah Postgraduate Medical Centre (JPMC), Karachi, Pakistan.
[3]Physiotherapist, Memon Medical Institute and Hospital, Karachi, Pakistan.
[4]Student, Ziauddin College of Rehabilitation Sciences, Karachi, Pakistan.
[5]Lecturer, Ziauddin College of Physical Therapy (ZCPT), Ziauddin University, Pakistan.
[6]Visiting Lecturer, Bolan Medical and Health Sciences, Quetta; Consultant, Sajid Hospital, Quetta, Pakistan.
Corresponding Author: Warda Afifa, Physiotherapist, University of Sargodha, Pakistan, drwardaafifa@gmail.com
Acknowledgement: The authors express gratitude to all participants and institutions involved in this study.

Conflict of Interest: None
Grant Support & Financial Support: None

ABSTRACT

Background: Neck pain is one of the most prevalent musculoskeletal complaints affecting the adult population, particularly those engaged in sedentary occupations. With the rise in computer-based jobs, poor posture and prolonged sitting have emerged as significant contributors to cervical discomfort. This study was designed to assess the prevalence and severity of neck pain among employees working in software houses, offices, and other high-risk occupational environments in Bahawalpur, Pakistan.

Objective: To determine the prevalence and severity of neck pain among adult employees working in various occupational settings in Bahawalpur.

Methods: A cross-sectional study was conducted over a duration of three months. A total of 192 participants were recruited using a convenience sampling technique from occupations identified as high-risk, including software professionals, office staff, healthcare workers, drivers, and factory workers. Data were collected through a structured questionnaire, and the intensity of neck pain was evaluated using the Numeric Pain Rating Scale (NPRS), where participants rated their pain on a scale from 0 to 10. Data were analyzed using SPSS version 26, with findings presented in frequencies and percentages.

Results: Out of 192 participants, 147 (76.6%) were aged 21–30 years, and 45 (23.4%) were aged 31–40 years. The sample included 124 (64.6%) males and 68 (35.4%) females. Overall, 131 participants (68.2%) reported experiencing neck pain. Among them, 70 (36.5%) reported mild pain, 51 (26.6%) had moderate pain, and 10 (5.2%) experienced severe or worst pain. A total of 61 (31.8%) participants reported no pain.

Conclusion: There is a high prevalence of neck pain among employees working in sedentary occupations in Bahawalpur, with mild pain being the most frequently reported. These findings underline the need for ergonomic awareness and preventive strategies in workplace settings.

Keywords: Adult, Cross-Sectional Studies, Employees, Neck Pain, Occupational Health, Prevalence, Risk Factors.

© 2025 et al. Open access under CC BY License (Creative Commons). Freely distributable with appropriate citation.

INTRODUCTION

Neck pain is a prevalent musculoskeletal complaint that frequently arises in the occipital region, extending towards the upper back and anteriorly beneath the mandible. Its origins are often traced to the posterior and inferior part of the head, particularly around the nuchal lines and down to the first thoracic vertebrae, manifesting as a dull, aching discomfort that can impair routine functioning (1). Anatomically, the neck—or cervix, as referred to in Latin—is a transitional zone between the skull and torso, supported by the cervical spine and surrounded by critical neurovascular structures. Despite its flexibility, the neck is particularly vulnerable to strain and injury due to its wide range of motion (2). With the rapid evolution of technology and increasing dependence on electronic devices, the prevalence of neck pain has seen a considerable rise, especially among individuals engaged in computer-intensive professions such as software engineering, office work, and academic research. These individuals are often required to spend extended periods—frequently exceeding four hours daily—in sedentary positions, which significantly increases their risk for developing postural syndromes and musculoskeletal pain (3). Evidence suggests that workers who adopt non-ergonomic postures, particularly forward head and rounded shoulder alignment, are prone to muscular overuse, resulting in mechanical strain, spasm, and associated symptoms such as paraesthesia and dysphasia (4). Poorly designed workstations, prone device usage, and prolonged static postures contribute to abnormal spinal alignment and postural fatigue. Over time, this leads to an imbalance in the neck and shoulder musculature, including hyperactivity of the upper trapezius and weakness of stabilizing muscles such as the rhomboids and lower trapezius. These postural abnormalities, often categorized under Upper Crossed Syndrome (UCS), are characterized by increased cervical lordosis, thoracic kyphosis, and scapular winging, leading to compromised mechanical stability and referred pain patterns (5,6). The resulting degeneration and impingement of neural structures can further exacerbate discomfort, affecting both quality of life and productivity (7).

Epidemiological data indicate a wide variation in the global prevalence of neck pain, with figures ranging between 16.7% and 75.1%, and Asia reporting comparatively higher incidence rates (8). Gender also appears to play a contributory role, with females more likely to experience higher musculoskeletal loads and susceptibility to postural strain. Moreover, prolonged sitting and repetitive movements increase the mechanical demand on cervical structures, inducing inflammatory changes in the bursa and tendons, and potentially contributing to conditions such as degenerative disc disease or cervical spondylosis (9). While acute neck pain may resolve within four weeks, a significant proportion of individuals transition into moderate (4–12 weeks) or chronic (>12 weeks) phases without appropriate ergonomic intervention and muscular rehabilitation (10). These chronic manifestations are particularly debilitating as they disrupt sleep, limit physical activity, and reduce work performance. Consequently, understanding the underlying pathophysiology and contributing occupational risk factors becomes critical for developing preventative strategies and therapeutic interventions. Given the increasing burden of neck pain among individuals engaged in computer-based occupations, this study aims to investigate the prevalence and contributing ergonomic risk factors of neck pain in software engineers, providing insights for targeted preventive and rehabilitative measures.

METHODS

This cross-sectional observational study was conducted to evaluate the prevalence and risk factors of neck pain among individuals employed in high-risk occupations in Bahawalpur, Pakistan. The study focused primarily on workers in sedentary professions, including software engineers, office staff, healthcare professionals, drivers, and factory workers. Among the 14 software houses and workplaces included in the study, each had an estimated workforce of approximately 27 employees. However, not all employees were included in the sample. Instead, a total of 192 participants were selected using a convenience sampling technique, which is a non-probability method. While this approach allowed for practical recruitment within limited resources and time, it is acknowledged that it may introduce selection bias and limit generalizability of the findings. Inclusion criteria were defined as adults aged 20 to 50 years who had been employed in their respective roles for at least six consecutive months and reported experiencing at least one episode of neck pain within the past month. Participants with a history of spinal surgery, diagnosed systemic musculoskeletal or neurological disorders (such as rheumatoid arthritis or cervical radiculopathy), or traumatic injuries to the cervical spine were excluded to reduce confounding factors (3,4). Prior to data collection, all participants provided written informed consent, ensuring voluntary participation and confidentiality of the data collected.

© 2025 et al. Open access under CC BY License (Creative Commons). Freely distributable with appropriate citation.

INSIGHTS-JHR
INSIGHTS-JOURNAL OF HEALTH AND REHABILITATION

A structured self-administered questionnaire was used for data collection. The questionnaire was designed to capture demographic information, occupational background, duration of daily screen exposure, ergonomic work habits, frequency and pattern of neck pain symptoms, and associated postural behaviors. To ensure content validity and clarity, the questionnaire was developed based on a review of existing literature and was pretested in a pilot group not included in the final sample. Data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 26. Descriptive statistics, including means, frequencies, and percentages, were used to summarize participant characteristics and symptom patterns. Results were presented in the form of tables and graphical illustrations for better comprehension and visual interpretation. The study received approval from the relevant Institutional Review Board (IRB), adhering to ethical standards outlined in the Declaration of Helsinki.

RESULTS

Out of the total 192 participants recruited from software houses, offices, and various work environments, the majority belonged to the younger age group. Specifically, 147 participants (76.6%) were between 21 and 30 years of age, while the remaining 45 (23.4%) were aged between 31 and 40 years. Regarding gender distribution, 124 participants (64.6%) were male, and 68 (35.4%) were female, reflecting a male-dominant occupational representation in the selected work environments. In terms of professional experience, 127 individuals (66.1%) reported having 6 months to 4 years of job experience, followed by 35 (18.2%) with 4 to 7 years, and 30 (15.6%) with 7 to 10 years of experience. Analysis of working hours revealed that 36 participants (18.8%) worked for 1 to 4 hours daily, 109 (56.8%) for 5 to 8 hours, and 47 (24.5%) for 9 to 12 hours per day. These findings suggest that a significant portion of the study population was exposed to prolonged sitting and screen time—recognized risk factors for the development of neck pain. Pain intensity was assessed using the Numeric Pain Rating Scale (NPRS). Among all respondents, 61 individuals (31.8%) reported no pain, whereas 70 (36.5%) experienced mild pain. Moderate pain was reported by 51 participants (26.6%), while 10 individuals (5.2%) experienced severe to worst pain, indicating that nearly one-third of the sample population suffered from a degree of discomfort potentially affecting occupational functionality.

Analysis of ergonomic and occupational factors revealed key associations relevant to the study objective. Participants who reported using non-adjustable chairs showed a higher percentage of moderate to severe neck pain compared to those using adjustable seating. Similarly, individuals working with monitors positioned either above or below eye level experienced greater severity of neck pain than those whose screens were ergonomically aligned at eye level. Furthermore, participants with non-ergonomic workstation setups demonstrated a greater likelihood of reporting higher pain scores, supporting the role of poor workplace ergonomics in contributing to musculoskeletal discomfort. Correlation analysis indicated a weak positive relationship between pain severity and job experience ($r = 0.102$), suggesting that longer durations in the same occupational environment may lead to cumulative stress on cervical structures. However, there was minimal correlation observed between working hours and pain severity ($r = 0.010$), and a slight negative correlation between working hours and job experience ($r = -0.061$). These findings suggest that although job tenure may slightly influence the intensity of neck pain, the duration of daily screen exposure alone may not be a strong standalone predictor without considering posture and workstation ergonomics.

Table 1: Age

Variable	Category	Frequency	Percent
Age	21-30 yrs	147	76.6
	31-40 yrs	45	23.4
	Total	192	100.0

Table 2: Gender

Variable	Category	Frequency	Percent
Gender	Males	124	64.6
	Females	68	35.4
	Total	192	100.0

© 2025 et al. Open access under CC BY License (Creative Commons). Freely distributable with appropriate citation.

INSIGHTS-JHR
INSIGHTS-JOURNAL OF HEALTH AND REHABILITATION

Table 3: Job Experience

Variable	Category	Frequency	Percent
Job Experience	6months-4 yrs	127	66.1
	4-7 yrs	35	18.2
	7-10 yrs	30	15.6
	Total	192	100.0

Table 4: Working Hours

Variable	Category	Frequency	Percent
Working Hours	1-4 hr	36	18.8
	5-8 hr	109	56.8
	9-12 hr	47	24.5
	Total	192	100.0

Table 5: Pain Scale

Variable	Category	Frequency	Percent
NPRS	0 (No pain)	61	31.8
	1-3 (Mild pain)	70	36.5
	4-6 (Moderate pain)	51	26.6
	7-10 (Worst pain)	10	5.2
	Total	192	100.0

Table 6: Association Between Ergonomic Factors and Neck Pain Severity

	0	01-Mar	04-Jun	07-Oct
No	29.703	37.624	29.703	2.97
Yes	39.56	39.56	19.78	1.099
Above	24	46	30	0
Below	44.444	30.556	25	0
Eye level	35.849	37.736	22.642	3.774
Ergonomic	29.412	40	29.412	1.176
Non-ergonomic	38.318	37.383	21.495	2.804

© 2025 et al. Open access under CC BY License (Creative Commons). Freely distributable with appropriate citation.

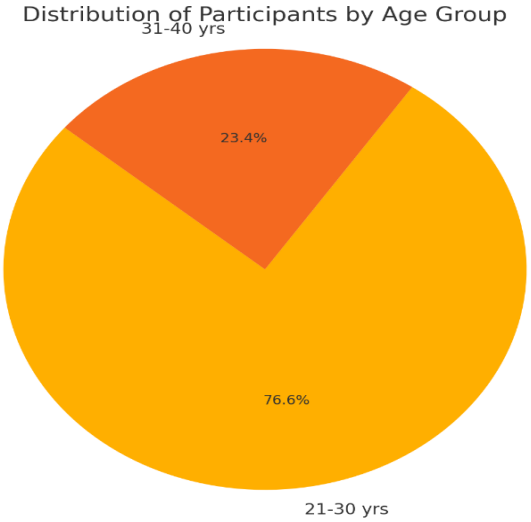

Figure 1 Distribution of Participants by Age Group

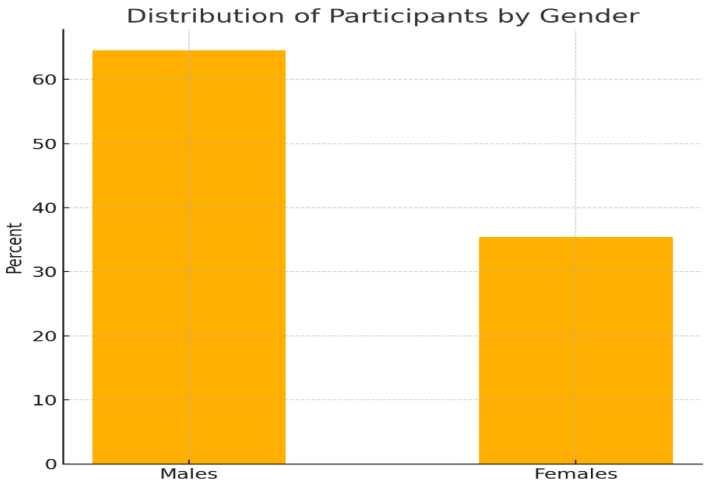

Figure 2 Distribution of Participants by Gender

DISCUSSION

The findings of this study highlighted a considerable prevalence of neck pain among employees working in software houses, offices, and various professional environments in Bahawalpur, with 68.2% of participants reporting pain of varying severity. Among these, 36.5% experienced mild pain, 26.6% moderate pain, and 5.2% the most severe category of pain, based on the Numeric Pain Rating Scale (NPRS). These results underscore the growing musculoskeletal burden linked to prolonged computer use and sedentary occupational postures. Compared to earlier research, the observed prevalence falls within the expected range, although there is some variation likely influenced by differing methodologies, occupational settings, and geographic populations. Several previous studies reported similar or slightly higher prevalence rates. For instance, studies investigating computer users and office professionals have recorded neck pain prevalence rates of 64.6% to 72% (6,7,11,12). In contrast, a lower prevalence of 28% was reported in a population of general computer users, suggesting that job nature, workload intensity, and ergonomic awareness play critical roles in symptom development (13,14). One study identified mild and moderate pain prevalence among software developers as 44.38% and 55%, respectively, aligning with the current study's findings that mild to moderate pain constituted the majority of complaints. Another comparative report from a freelancing population noted even higher rates of moderate (38%) and severe (28%) neck pain, further illustrating the occupational variability and individual susceptibility to musculoskeletal strain (15,16).

Interestingly, some disparities in reported severity highlight the multifactorial nature of neck pain. While one regional study observed a higher percentage of moderate and severe neck pain (42.1% and 6.9%, respectively), the present research found a larger portion of participants within the mild to moderate range, potentially suggesting the benefit of workplace health policies or intermittent activity that may be protective against severe progression (17,18). Another comparative study, which identified a prevalence of 60%, emphasized the impact of workstation ergonomics and body posture—an aspect also addressed in this study, revealing associations between poor ergonomic habits and increased pain severity (19,20). The strength of the present study lies in its focus on a specific occupational group within a defined geographical area, allowing for targeted recommendations. Additionally, the incorporation of ergonomic variables and correlation analysis added depth to the interpretation of risk factors. However, several limitations were noted. The use of convenience sampling may have introduced selection bias, limiting the generalizability of the findings beyond the study population. Furthermore, the study relied on self-reported data, which may be affected by recall bias or subjective interpretation of pain severity. The absence of stratification by job roles or assessment of physical activity levels may have further masked potential associations. Despite these limitations, the study contributes valuable insights into the burden of work-related neck pain and reinforces the importance of ergonomic interventions. Future research should consider employing longitudinal designs to assess the progression of neck pain over time and to evaluate the effectiveness of specific preventive measures. Incorporating objective clinical assessments, ergonomic audits, and broader sample diversity would also strengthen the external validity of findings and inform occupational health policy with greater precision.

© 2025 et al. Open access under CC BY License (Creative Commons). Freely distributable with appropriate citation.

CONCLUSION

The study concluded that neck pain is a significant occupational health concern among software employees in Bahawalpur, with a notably high occurrence of symptoms related to poor posture and prolonged screen exposure. Mild neck pain emerged as the most commonly reported complaint, while severe cases were comparatively fewer. These findings emphasize the pressing need for ergonomic awareness and preventive strategies in technology-driven workplaces. The study highlights the importance of incorporating posture-corrective interventions and ergonomic workstation setups to reduce the burden of musculoskeletal disorders and enhance employee well-being and productivity.

AUTHOR CONTRIBUTION

Author	Contribution
Warda Afifa*	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Muhammad Tahir Akram	Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published
Osama Khan	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published
Syed Muhammad Taseer Hussain Shah	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Sain Memon	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Zonera Khalid	Substantial Contribution to study design and Data Analysis Has given Final Approval of the version to be published
Rimsha Saeed	Contributed to study concept and Data collection Has given Final Approval of the version to be published
Kiran Bibi	Writing - Review & Editing, Assistance with Data Curation

REFERENCES

1. Ojukwu CP, Okpoko CG, Okemuo AJ, Ede SS, Ilo IJ. Breastfeeding-related neck pain: prevalence and correlates among Nigerian lactating mothers. Int Health. 2023;15(4):383-8.
2. Global pattern, trend, and cross-country inequality of early musculoskeletal disorders from 1990 to 2019, with projection from 2020 to 2050. Med. 2024;5(8):943-62.e6.
3. Ren S, Jiang X, Wang S, Wong AYL, Bi X, Wang X. The prevalence and factors associated with neck and low back pain in patients with stroke: insights from the CHARLS. BMC Public Health. 2024;24(1):2362.
4. Resnik L, Borgia M, Clark MA. The Prevalence and Impact of Back and Neck Pain in Veterans With Upper Limb Amputation. Am J Phys Med Rehabil. 2021;100(11):1042-53.

© 2025 et al. Open access under CC BY License (Creative Commons). Freely distributable with appropriate citation.

5. King JA, Nelson LD, Cheever K, Brett B, Gliedt J, Szabo A, et al. The Prevalence and Influence of New or Worsened Neck Pain After a Sport-Related Concussion in Collegiate Athletes: A Study From the CARE Consortium. Am J Sports Med. 2024;52(7):1845-54.
6. Damm H, Jönsson A, Rosengren BE, Jehpsson L, Ohlsson C, Ribom E, et al. Prevalence and morbidity of neck pain: a cross-sectional study of 3000 elderly men. J Orthop Surg Res. 2023;18(1):36.
7. Lucasti C, Maraschiello M, Slowinski J, Kowalski J. Prevalence of Back and Neck Pain in Orthopaedic Surgeons in Western New York. J Am Acad Orthop Surg Glob Res Rev. 2022;6(1).
8. Marchesini M, Ippolito C, Ambrosini L, Bignami EG, Fasani M, Abbenante D. Prevalence of Low Back and Cervical Back Pain in Military Helicopter Crews: An Underestimated Italian Problem. J Spec Oper Med. 2021;21(2):67-71.
9. Suri N, Baral SS, Shamim MA, Satapathy P, Choudhary P, Mital A, et al. Prevalence of neck pain among unilateral upper limb amputees: A systematic review and meta-analysis. J Bodyw Mov Ther. 2024;40:934-41.
10. Mukhtar NB, Ibrahim AA, Mohammed J. Prevalence of neck pain and its associated factors in Africa: a systematic review and meta-analysis protocol. BMJ Open. 2023;13(9):e074219.
11. Al-Khazali HM, Younis S, Al-Sayegh Z, Ashina S, Ashina M, Schytz HW. Prevalence of neck pain in migraine: A systematic review and meta-analysis. Cephalalgia. 2022;42(7):663-73.
12. ALABDULKARIM, N., ALJASSER, S., AWWAD, M., ALSHAALAN, H., ALSHAYIE, R., ALIBRAHIM, F. & AWWAD, W. 2022. The point prevalence and factors associated with neck pain. *Journal of Spine Practice (JSP)*, 11–22-11–22.
13. ALHAKAMI, A. M., MADKHLI, A., GHAREEB, M., FAQIH, A., ABU-SHAMLA, I., BATT, T., REFAEI, F., SAHELY, A., QASSIM, B. & SHAMI, A. M. The Prevalence and Associated Factors of Neck Pain among Ministry of Health Office Workers in Saudi Arabia: A Cross Sectional Study. Healthcare, 2022. MDPI, 1320.
14. GHAFFAR, T., FATIMA, T., AZFAR, H., SHOUKET, M., JAVED, H., SIDDIQUE, U. B. & KHALID, A. 2023. Frequency of Work-Related Neck Pain in Freelancers: Work-Related Neck Pain. *THE THERAPIST (Journal of Therapies & Rehabilitation Sciences)*, 62-65.
15. HASSANEN, R. H. & HASSAN, A. K. 2022. Prevalence and Knowledge of Neck Pain among Information Technology Employees at New Assiut city. *Assiut Scientific Nursing Journal,* 10**,** 38-48.
16. KASHIF, M., ANWAR, M., NOOR, H., IRAM, H. & HASSAN, H. M. J. 2020. Prevalence of musculoskeletal complaints of arm, neck and shoulder and associated risk factors in computer office workers. *Physikalische Medizin, Rehabilitationsmedizin, Kurortmedizin,* 30**,** 299-305.
17. MUJIONO, M., UDIJONO, A. & RAHMANINGRUM, F. D. 2023. Description of Work Related Neck Pain Among Employees in State Electricity Company (PLN Indonesia). *Journal of Public Health for Tropical and Coastal Region,* 6**,** 1-6.
18. NASIR, A., SHAUKAT, M., SAJJAD, S. A., RANA, A. A., WASEEM, M. & SYED, H. A. 2022. Prevalence of Neck pain and its effects on Quality of life of Software Engineers in Lahore. *Pakistan Journal of Medical & Health Sciences,* 16, 171-171.
19. NUNES, A., ESPANHA, M., TELES, J., PETERSEN, K., ARENDT-NIELSEN, L. & CARNIDE, F. 2021. Neck pain prevalence and associated occupational factors in Portuguese office workers. *International Journal of Industrial Ergonomics,* 85**,** 103172.
20. RAHIM, S., HAFEEZ, M., RAO, N., GHAURI, M. W. & FARHAN, F. 2022. Intensity and level of disability of neck pain among undergraduate physical therapy students: A Cross Sectional Study. *Foundation University Journal of Rehabilitation Sciences,* 2**,** 52-57.

© 2025 et al. Open access under CC BY License (Creative Commons). Freely distributable with appropriate citation.