



Article

Prevalence of Musculoskeletal Disorders Among Computer Users of Lahore City Through Standardized Nordic Questionnaire

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Cite this Article

Received	2025-04-22
Revised	2025-05-18
Accepted	2025-05-20
Published	2025-05-22
Conflict of Interest	None declared
Ethical Approval	Respective Ethical Review Board
Informed Consent	Obtained from all participants
Data/supplements	Available on request.
Funding	None
Authors' Contributions	UR, HK, MF, MJ, and SAS contributed to concept, design, data collection, analysis, and manuscript drafting.

ABSTRACT

Background: Musculoskeletal disorders (MSDs) are a significant occupational health concern among computer users, yet local prevalence data from developing urban settings like Lahore remain scarce, limiting evidence-based preventive strategies. **Objective:** This study aimed to determine the prevalence and anatomical distribution of MSDs among computer users in Lahore, focusing on frequency, functional limitation, and healthcare utilization using validated assessment tools. **Methods:** A descriptive cross-sectional study was conducted among office workers aged 20–40 years ($n = 353$) who used computers for at least six hours daily over the preceding year, excluding those with trauma or pre-existing musculoskeletal disease. Participants were recruited from software houses and computer shops using direct and email invitations, and completed the Standardized Nordic Questionnaire to assess MSD symptoms. Ethical approval was obtained in compliance with the Declaration of Helsinki. Data were analyzed using SPSS v16.0, employing descriptive statistics and the Pearson Chi-Square test to evaluate associations. **Results:** The overall prevalence of MSDs was highest in the shoulder (46.78%) and neck (44.74%), followed by lower back (25.42%), upper back (23.29%), and other regions. A substantial proportion reported activity limitations and healthcare consultations, underscoring the clinical impact. **Conclusion:** MSDs are prevalent among computer users in Lahore, particularly in the shoulders and neck, highlighting the need for workplace ergonomic interventions and preventive health policies to reduce occupational morbidity.

Keywords: Musculoskeletal Disorders, Computer Users, Prevalence, Ergonomics, Occupational Health, Cross-Sectional Studies, Lahore

INTRODUCTION

Musculoskeletal disorders (MSDs) encompass a wide range of injuries and conditions affecting the muscles, tendons, joints, and nerves of the human body, often resulting in pain, discomfort, and functional limitations (1). These disorders are a leading cause of disability globally, contributing significantly to reduced work productivity and quality of life. Despite their prevalence, MSDs are often ambiguously categorized, being variously described as cumulative trauma disorders, overuse injuries, or degenerative joint diseases (2). Current research highlights a higher prevalence of MSDs among women compared to men, indicating potential gender-specific risk factors or exposures (2). The rapid proliferation of computer technology in both professional and personal settings has led to a notable increase in the incidence of MSDs, particularly among individuals with prolonged computer use (3). The modern workplace has

evolved to demand extensive computer use, which is associated with several work-related musculoskeletal problems, particularly in the neck, shoulders, and back (4). Frequent and extended use of input devices such as the mouse further elevates the risk for specific conditions, including carpal tunnel syndrome (5). Manifestations of MSDs among computer users often include pain, numbness, and tenderness in the neck, shoulders, back, and wrists, with postural abnormalities such as thoracic hyperkyphosis and lower limb misalignments becoming increasingly common as a result of prolonged static sitting and poor ergonomic practices (6). Office workers are particularly vulnerable due to their extended hours at workstations, with neck, back, and wrist pain emerging as prevalent complaints that limit daily functioning (7). These disorders not only impair individual well-being but also impose a significant economic

burden through increased absenteeism and reduced workplace productivity (8). Several studies suggest that the development of MSDs among computer users is multifactorial, with key contributors including sustained awkward postures, insufficient rest breaks, poorly designed workstations, and excessive workload (9, 10). Ergonomic interventions, such as optimal workstation design and education regarding posture and movement, have been shown to effectively mitigate these risks (11, 12). Nonetheless, there remains a substantial knowledge gap regarding the specific prevalence and risk profile of MSDs among computer users in rapidly developing urban centers, particularly in regions where ergonomic awareness and preventive practices may be limited. Moreover, the comorbidity of MSDs with other chronic conditions can further diminish physical function, highlighting the importance of a holistic approach to workplace health (13).

In the context of Lahore—a major urban center experiencing rapid digitization and expansion of IT-related occupations—the burden of MSDs among computer users is of particular relevance. Factors such as prolonged daily screen time, insufficient ergonomic training, and a lack of workplace interventions contribute to an increased risk of MSDs in this population (14, 15). Although international research has established the association between computer use and MSDs, local data from Lahore remains scarce. There is a pressing need for region-specific research to quantify the prevalence of MSDs and inform targeted prevention strategies within the local workforce. Previous studies in other countries have documented a high prevalence of musculoskeletal complaints among computer users, but the extent to which these findings apply to Pakistani office environments, with their unique socio-economic and ergonomic contexts, is largely unknown (16, 17). Given this background, the present study seeks to address the gap in local evidence by assessing the prevalence of musculoskeletal disorders among computer users in Lahore city using the standardized Nordic Questionnaire. By identifying the most commonly affected body regions and associated risk factors, this study aims to provide data that can inform ergonomic interventions and occupational health policies tailored to the needs of computer users in this region. The central research question guiding this study is: What is the prevalence and distribution of musculoskeletal disorders among computer users in Lahore city, and which body regions are most frequently affected?

MATERIALS AND METHODS

This study was a descriptive cross-sectional observational analysis conducted to determine the prevalence of musculoskeletal disorders (MSDs) among computer users in Lahore city. Participants were recruited from various software houses and computer shops within the city, focusing on office workers engaged in computer-related occupations. Eligibility for inclusion required participants to be between 20 and 40 years of age, of either gender, who reported working on computers for a minimum of six hours per day for at least the previous one year. Individuals with a history of trauma, existing musculoskeletal disease, or those who worked fewer than the specified hours were excluded from the study. Participant recruitment was accomplished through direct meetings and electronic mail

invitations, with all eligible individuals informed about the study objectives and procedures. Prior to data collection, written informed consent was obtained from all participants, who were assured of the confidentiality and voluntary nature of their involvement. All responses and identifying information were handled in compliance with the ethical standards set forth by the Declaration of Helsinki. The primary outcome of interest was the prevalence of MSDs in various anatomical regions among computer users, as assessed through the validated Standardized Nordic Questionnaire. This instrument, recognized for its reliability and ease of administration, allowed for the systematic collection of data regarding musculoskeletal symptoms experienced in the previous twelve months and the last seven days. The questionnaire assessed trouble in specific body regions—such as the neck, shoulders, upper back, elbows, wrists/hands, lower back, hips/thighs, knees, and ankles/feet—capturing details regarding pain, discomfort, activity limitations, physician visits, and symptom frequency.

The estimated sample size was 383 participants, calculated using Rao software to ensure statistical power and representativeness. Ultimately, data were gathered from 388 respondents, of whom 353 met the criteria and provided complete data, resulting in a response rate of 92.16%. The assessment did not include any follow-up period, as data were captured at a single point in time through self-administered questionnaires. All study procedures were conducted with strict adherence to ethical standards, ensuring that participation was entirely voluntary and confidentiality of the participants' data was rigorously maintained. For data analysis, the collected responses were coded and entered into the Statistical Package for the Social Sciences (SPSS) version 16.0. Descriptive statistics, including frequencies and percentages, were calculated for all categorical variables. The Pearson Chi-Square test was used to analyze associations between participant characteristics and the prevalence of MSDs in different body regions. All statistical analyses were conducted using two-tailed tests, with significance defined at a conventional alpha level. The study did not employ any methods for imputation of missing data or adjustment for confounding variables, as all included cases provided complete information for the primary outcomes (3).

RESULTS

A total of 388 participants were approached, and 353 eligible computer users completed the study questionnaire, yielding a response rate of 92.16%. Among the respondents, 69.67% were male and 30.33% were female. The majority (90.4%) reported work experience between 1 and 10 years, while the remaining 9.6% had 11 to 20 years of experience.

The overall prevalence of musculoskeletal disorders (MSDs) among computer users in Lahore is summarized in Table 1. The most commonly reported site of discomfort was the shoulder (46.78%), followed by the neck (44.74%), lower back (25.42%), upper back (23.29%), hips/thighs (15.08%), wrists/hands (10.90%), elbows (10.13%), knees (8.35%), and ankles/feet (2.62%). A detailed breakdown of symptom occurrence, activity limitations, physician visits, and recent symptoms (past 7 days) for each body region is presented in Table 2. More than half of the participants with neck pain reported being prevented from

normal activities (54.11%), while 40.79% visited a physician for this complaint. Recent (last 7 days) symptoms were most frequent in the neck (43.91%), shoulders (33.99%), and lower back (22.38%).

Of the 353 participants, 246 (69.67%) were male and 107 (30.33%) were female. Regarding work experience, 319 (90.4%) reported 1–

10 years of experience, and 34 (9.6%) had 11–20 years of experience. Detailed stratification of MSD prevalence by gender or work experience was not available in the provided data set. The Pearson Chi-Square test was utilized to assess associations between participant characteristics and the presence of MSDs across various body regions.

Table 1. Prevalence of Musculoskeletal Disorders by Anatomical Region Among Computer Users

Body Region	Prevalence (%)	95% Confidence Interval (approx.)
Shoulders	46.78	[41.6, 51.9]
Neck	44.74	[39.6, 49.9]
Lower Back	25.42	[21.0, 29.9]
Upper Back	23.29	[19.1, 27.7]
Hips/Thighs	15.08	[11.7, 19.0]
Wrists/Hands	10.90	[8.0, 14.4]
Elbows	10.13	[7.3, 13.6]
Knees	8.35	[5.8, 11.7]
Ankles/Feet	2.62	[1.2, 4.9]

Note: Confidence intervals are approximated using binomial distribution for illustrative purposes.

Table 2. Distribution of Musculoskeletal Symptoms, Activity Limitation, Physician Visits, and Recent Symptoms by Body Region

Body Region	Trouble in Last 12 Months (%)	Activity Limitation (%)	Physician Visit (%)	Trouble in Last 7 Days (%)
Neck	59.77	54.11	40.79	43.91
Shoulders	49.86	43.43	31.16	33.99
Upper Back	29.18	24.36	19.55	20.10
Elbows	11.33	10.20	9.07	9.92
Wrists/Hands	13.88	12.18	8.22	9.35
Lower Back	29.18	28.05	22.10	22.38
Hips/Thighs	19.55	17.00	11.90	11.90
Knees	9.92	9.63	6.80	7.06
Ankles/Feet	3.97	2.83	1.13	2.55

Although individual p-values for these associations are not provided in the original dataset, descriptive comparisons suggest higher prevalence rates for shoulder, neck, and lower back complaints. The absence of a significant proportion of recent or recurrent physician visits for most symptoms may reflect underutilization of healthcare or normalization of musculoskeletal complaints in this working population. No imputation for missing data was required, as all analyzed cases contained complete responses for the key variables. No advanced statistical analyses such as post hoc tests or effect size calculations were applicable based on the available information. The prevalence estimates for shoulder (46.78%) and neck (44.74%) pain in this cohort represent a substantial occupational health burden, aligning with previously reported international findings for office and computer-based workers.

While some anatomical sites (e.g., ankles/feet, 2.62%) showed low prevalence, clinically significant impacts are apparent for the most affected sites due to frequent activity limitations and physician consultations. The data indicate a need for targeted ergonomic and occupational interventions in this population to address these high-burden musculoskeletal complaints.

In summary, this study demonstrates that nearly half of computer users in Lahore report significant musculoskeletal symptoms, predominantly affecting the shoulders and neck, with notable proportions experiencing activity limitations and

seeking medical care. These findings underscore the clinical and occupational significance of MSDs in this occupational group and highlight the necessity for comprehensive preventive strategies in the workplace.

DISCUSSION

The present study demonstrates a high prevalence of musculoskeletal disorders (MSDs) among computer users in Lahore, with nearly half of respondents reporting symptoms in the shoulder and neck regions, and significant proportions affected in the lower back, upper back, and other anatomical sites.

These findings corroborate prior international reports, underscoring the global occupational health burden posed by computer-related MSDs in office environments (3,4). Notably, the observed prevalence rates for shoulder and neck pain—46.78% and 44.74%, respectively—are slightly lower than those reported by Hormozgan University, where shoulder, neck, and back complaints were found in 62.1%, 54.9%, and 53.1% of participants, respectively.

While variations may reflect differences in work practices, ergonomic awareness, or cultural perceptions of pain, the consistently high rates across diverse populations highlight the universal risks associated with prolonged computer use (24). Comparative analysis with studies from other regions reveals

both similarities and divergences. For example, research by Rajinder Kumar Moom among bank and office employees in India reported the highest prevalence of low back pain (40.4%), followed by neck pain (38.6%), emphasizing that while the anatomical distribution may differ, the pattern of multi-site involvement is consistent with our findings (12). In contrast, a large-scale Iranian meta-analysis reported an even higher prevalence of upper and lower back complaints (78%) and neck symptoms (68.1%) among computer users (25). Such differences may arise from varying ergonomic standards, duration and intensity of computer use, or methodological variations, including questionnaire sensitivity and cultural factors influencing health reporting.

Mechanistically, these MSDs are largely attributable to sustained static postures, repetitive movements, and inadequate ergonomic support inherent in prolonged computer work (6). The high prevalence of shoulder and neck symptoms may result from forward head posture, rounded shoulders, and prolonged muscle loading without adequate rest or movement, exacerbated by workstation design and lack of regular breaks (9,10). The lower prevalence of complaints in the lower limbs and ankles suggests that upper body involvement predominates in populations engaged primarily in seated, computer-based work. Moreover, activity limitation and healthcare utilization rates among those with MSDs highlight the clinical relevance of these conditions, with substantial impacts on quality of life and productivity.

This study advances current understanding by providing region-specific data from Lahore, a rapidly developing urban center where digitalization is reshaping occupational health risks. The use of a standardized and validated assessment tool, the Nordic Questionnaire, enhances the comparability and reliability of the findings. However, several limitations must be acknowledged. The cross-sectional design precludes causal inference, and reliance on self-reported symptoms introduces potential for recall and reporting bias. The sample, though robust in size, was limited to selected software houses and computer shops in Lahore, which may affect generalizability to other urban or rural settings. Moreover, the absence of clinical examinations or objective ergonomic assessments limits the precision of MSD diagnosis and the identification of contributing workplace factors. Gender- and experience-specific prevalence analyses were not possible due to the available data, representing an additional gap.

Despite these limitations, the study offers important implications for occupational health practice. The significant burden of MSDs among computer users calls for the implementation of targeted ergonomic interventions, including workplace modifications, posture education, and scheduled breaks to mitigate risk. Organizational policies should promote regular ergonomic assessments and employee training to foster a culture of musculoskeletal health. Future research should employ longitudinal designs to establish causal relationships and evaluate the effectiveness of intervention strategies. Studies incorporating objective ergonomic evaluations, broader occupational categories, and diverse demographic groups would enhance the generalizability and translational value of future findings. Moreover, qualitative research into barriers to

ergonomic compliance and healthcare-seeking behavior among computer users could provide valuable insights for tailored intervention development.

In conclusion, the present study highlights the substantial prevalence and impact of MSDs among computer users in Lahore, particularly in the shoulders and neck. These findings reinforce the urgent need for workplace-based preventive strategies and inform future research directions to address this pervasive occupational health challenge (3,4,6,12,24,25).

CONCLUSION

This study found a substantial prevalence of musculoskeletal disorders among computer users in Lahore, with shoulders and neck being the most frequently affected regions, followed by the lower back, upper back, and other anatomical sites. These findings highlight the significant occupational health risks associated with prolonged computer use and underscore the urgent need for effective ergonomic interventions, workplace education, and regular screening to prevent and manage MSDs among this growing workforce. From a clinical perspective, targeted preventive strategies are essential to reduce disability, improve quality of life, and sustain productivity in computer-dependent occupations. The results also underscore the importance of further research to explore causal factors, assess the long-term effectiveness of ergonomic and behavioral interventions, and inform policy development for healthier work environments in urban populations.

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