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Original Article

Impact of Prolonged Desktop Usage on Neck Posture and Cervicogenic Headache Among Bankers

Mamoon Muhammad Ali[1], Mehwish Mahtab[2], Anam Shahzadi[3], Sidra Faisal[1]

[1] University of Lahore, Lahore, Pakistan

[2] Lahore Leads University, Lahore, Pakistan

[3] FMH College of Medicine and Dentistry, Lahore, Pakistan

Correspondence: 70109983@student.uol.edu.pk
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ABSTRACT

Background Cervicogenic headache (CGH) is a prevalent musculoskeletal disorder characterized by headache originating from cervical structures, often associated with restricted neck range of motion (ROM), pain, and functional impairment. Bankers are particularly *vulnerable* due to prolonged static postures and suboptimal workstation ergonomics, yet the relationship between desktop use duration, neck posture, and CGH remains underexplored in this population. Objective: To determine the impact of prolonged desktop computer usage on neck posture, ROM, and cervicogenic headache among bankers. Methods: A cross-sectional observational study was conducted involving 329 bankers from multiple branches in Lahore, recruited through non-probability convenience sampling. Neck posture and cervical ROM were clinically assessed, while CGH was evaluated using the Neck Disability Index (NDI) and pain intensity via the Visual Analogue Scale (VAS). Data were analysed using descriptive statistics and chi-square tests, with $p < 0.05$ indicating significance. Results: Restricted cervical flexion (51.98%), extension (52.58%), lateral flexion (45.59%), and rotation (50.46%) were prevalent. Moderate-to-severe pain affected 65.9% of participants. Significant associations were found between longer desktop usage and restricted ROM ($p = 0.045$) and increased headache prevalence (OR = 1.64, 95% CI: 1.01–2.67). Conclusion: Prolonged desktop use is associated with impaired neck posture, reduced ROM, and increased CGH prevalence in bankers, underscoring the need for ergonomic interventions and preventive strategies.

Keywords: Cervicogenic headache, neck posture, bankers, ergonomics, visual analogue scale, neck disability index, computer use

INTRODUCTION

Cervicogenic headache (CGH) represents a distinct type of headache in which pain originates from the cervical spine and radiates to the head, typically presenting as a unilateral, non-throbbing discomfort involving the occipital, temporal, or periorbital regions (1). The underlying pathophysiology commonly involves cervical disc pathology, facet joint osteoarthritis, muscular strain, or other cervical spine disorders (2,3). Symptoms frequently include neck pain, reduced range of cervical motion, and upper thoracic stiffness, which are often aggravated by sustained or awkward postures, repetitive neck movements, or physical exertion (4,5). In occupational settings, particularly among those with prolonged computer use, CGH and neck pain have emerged as prevalent and disabling conditions (6).

The rapid expansion of information technology has transformed the modern workplace, resulting in the pervasive use of desktop computers and visual display units, especially in service industries such as banking (7). Bankers typically perform extended hours of sedentary, repetitive tasks at fixed workstations, making them susceptible to musculoskeletal disorders (MSDs), notably affecting the neck and shoulders (8,9). The prevalence of neck pain in office-based professionals, including bankers and computer operators, has been reported to reach up to 67% at some point in their career, often attributed to sustained static postures, forward head alignment, and poor ergonomic practices (10,11). These maladaptive postures lead to excessive loading on the cervical spine, muscle fatigue, restricted cervical range of motion, and, ultimately, to pain syndromes including CGH (12,13).

Several studies have demonstrated that improper workstation design, such as inadequate chair support, non-adjustable monitors, and poor keyboard placement, exacerbates neck discomfort and increases the risk of developing chronic CGH (14,15). Moreover, ergonomic interventions—including the use of supportive chairs, appropriately placed monitors, and structured breaks for stretching—have shown benefit in reducing musculoskeletal complaints among computer users (16). However, evidence is limited regarding the prevalence and specific characteristics of CGH and cervical dysfunction among bankers in the local context, despite increasing anecdotal reports and small-scale surveys indicating that bankers may be an especially vulnerable occupational group (17,18). The unique demands of banking,

characterized by long work hours, high psychological stress, and infrequent movement, may further compound musculoskeletal risks, yet the relationship between prolonged desktop use, neck posture, and CGH remains insufficiently studied in this sector (19).

Addressing this knowledge gap is critical for developing targeted prevention strategies and informing workplace policy in banking institutions. Therefore, the present study was designed to determine the impact of prolonged desktop usage on neck posture and the occurrence of cervicogenic headache among bankers. The study aims to clarify whether extended daily computer use is associated with altered cervical alignment, restricted range of motion, and increased prevalence or severity of CGH symptoms in this occupational population, as measured by validated clinical instruments (20).

MATERIALS AND METHODS

This cross-sectional observational study was conducted to investigate the relationship between prolonged desktop computer usage and both neck posture and cervicogenic headache among professional bankers in Lahore, Pakistan (21). The research was carried out in multiple branches of major commercial banks, including but not limited to National Bank of Pakistan (NBP), Dubai Islamic Bank, and Meezan Bank, within the urban limits of Lahore. Data collection was completed within a six-month period following institutional synopsis approval, and all study procedures were performed in accordance with the Declaration of Helsinki and institutional ethical guidelines. Ethical approval was secured from the relevant university review board prior to commencement, and written informed consent was obtained from each participant before enrolment (22).

Eligible participants included male and female bank officers aged 24 to 60 years with more than four hours of daily desktop computer usage. Additional inclusion criteria required participants to report symptoms of headache, neck pain, stiffness, or rounded shoulders. Individuals were excluded if they reported a recent history of upper body trauma such as whiplash injury, acute musculoskeletal conditions, congenital postural or structural deformity (including scoliosis and cervical spondylosis), systemic or metabolic illness, trauma or fracture of the neck or lower back, osteoporosis, rheumatoid arthritis, neoplastic disease, recent neck or back surgery, or current pregnancy (23). Recruitment utilized a non-probability convenience sampling strategy, with the sample size determined using the WHO Health Studies sample size calculator, based on an estimated prevalence and desired statistical power. The final sample comprised 329 bankers, as determined via EpiTool software, providing adequate power to detect meaningful differences (24).

Participants were identified through internal communications within bank branches and were provided with a detailed explanation of the study objectives and procedures. Data collection involved direct administration of a structured questionnaire to consent during regular working hours, supervised by trained study staff to ensure comprehension and consistency. The questionnaire included sections on demographic data (age, gender, height, weight), occupational history, and ergonomic factors such as use of ergonomic chairs, keyboards, and mice. Specific operational definitions were established prior to data collection—for example, "ergonomic chair" was defined as a chair providing adjustable height, lumbar support, and armrests; "prolonged desktop use" was defined as greater than four hours of continuous daily use (25).

Clinical evaluation included a physical assessment of neck posture, specifically analyzing head and neck alignment relative to hips and shoulders, as well as objective measurement of cervical range of motion (ROM) in flexion, extension, lateral flexion, and rotation. Cervicogenic headache was assessed using the validated Neck Disability Index (NDI) questionnaire, a standard tool for quantifying functional impairment due to neck pain, and pain intensity was measured with the Visual Analogue Scale (VAS), a well-established metric for subjective pain quantification (26,27). Data collection and clinical assessment were conducted at each bank branch site, ensuring a standardized approach across all settings.

To address potential sources of bias and confounding, several methodological steps were implemented. The exclusion of participants with known confounders (e.g., acute trauma, systemic illness) reduced the risk of misclassification. Standardized questionnaires and clinical tools, administered by trained assessors, minimized measurement bias. Data entry was performed by two independent operators to ensure data integrity, and all identifying information was anonymized.

The primary outcome measures were the prevalence of restricted cervical ROM and the frequency and severity of cervicogenic headache, as determined by NDI and VAS scores. Secondary variables included the duration of daily desktop usage, ergonomic workstation factors, and previous history of diagnosed neck pain or headache. Missing data were minimized by immediate review of completed questionnaires; any incomplete forms were re-administered or clarified during the participant's visit.

Statistical analysis was performed using IBM SPSS version 25.0. Descriptive statistics (means, standard deviations, frequencies, and percentages) were calculated for all variables. Categorical variables were displayed using frequency tables and graphical representation. For group comparisons, chi-square tests were employed for categorical data, and p-values less than 0.05 were considered statistically significant. Where appropriate, inferential statistics such as odds ratios and 95% confidence intervals were also calculated to estimate the strength of association between desktop usage duration and cervical dysfunction or headache severity. No imputation was applied, as the rate of missing data was negligible. All statistical analyses were independently verified by a biostatistics consultant for accuracy and reproducibility (28).

The research team maintained strict confidentiality and data security throughout the study period, with access limited to authorized personnel. All procedures were designed to ensure that the study could be reliably reproduced in other banking or office-based populations (29).

RESULTS

The demographic profile of the study population (Table 1) demonstrates a mean age of 37.9 years (SD ± 9.6), with male bankers representing 65.4% (n = 215) and females 34.7% (n = 114) of the sample. Average height and weight were 55.9 units (SD ± 2.6) and 157.5 units (SD ± 2.9), respectively, though units require clarification for future reporting consistency. Approximately 30% of participants reported a prior history of diagnosed neck pain or headache, while half (49.2%) reported previous cervicogenic headache (CGH), indicating a high background prevalence of cervical symptoms within this occupational cohort.

Analysis of occupational exposure (Table 2) revealed that 49.5% of bankers reported daily desktop computer usage in the 4–6 hour range, with a further 40.4% engaging in 6–8 hours of use per day, and only 10% reporting less than 4 hours. This prolonged exposure is accompanied by a nearly even distribution of bankers with and without a prior diagnosis of CGH, suggesting widespread symptomatology across usage durations. Ergonomic workstation assessment (Table 3) highlights suboptimal practices, with only 27.4% (n = 90) of bankers utilizing ergonomic chairs and 25.5% (n = 84) using ergonomic keyboards or mice, while the majority relied on standard equipment. The lack of ergonomic interventions in over 70% of workstations is noteworthy given the established links between suboptimal ergonomics and musculoskeletal disorders.

Table 1. Demographic and Occupational Characteristics of Bankers (N = 329)

Variable	Mean ± SD / n (%)	95% CI
Age (years)	37.92 ± 9.61	36.75, 39.09
Gender (Male)	215 (65.35%)	59.93, 70.77
Gender (Female)	114 (34.65%)	29.23, 40.07
Height	55.90 ± 2.60	55.63, 56.18
Weight	157.49 ± 2.88	157.20, 157.79
Previous neck pain/headache history	0.30 ± 0.46	0.24, 0.35
Previous cervicogenic headache	0.51 ± 0.50	0.45, 0.57
Daily desktop use (hours)	1.30 ± 0.64	1.22, 1.39
Ergonomic chair use	90 (27.36%)	22.46, 32.26
Ergonomic keyboard/mouse use	84 (25.53%)	20.74, 30.32

Table 2. Distribution of Desktop Usage Duration and Prior Headache History

Variable	n (%)	95% CI
<4 hours/day	33 (10.03%)	6.75, 13.32
4–6 hours/day	163 (49.54%)	44.05, 55.02
6–8 hours/day	133 (40.43%)	34.99, 45.88
Previous CGH (Yes)	162 (49.24%)	43.75, 54.73
Previous CGH (No)	167 (50.76%)	45.27, 56.25

Table 3. Ergonomic Features in Workstations

Variable	Used n (%)	Not Used n (%)
Ergonomic Chair	90 (27.36%)	239 (72.64%)
Ergonomic Keyboard/Mouse	84 (25.53%)	245 (74.47%)

Table 4. Cervical Range of Motion (ROM) Patterns

ROM Type	Restricted n (%)	Normal n (%)	Hypermobile n (%)	p-value*
Flexion	171 (51.98%)	113 (34.35%)	45 (13.68%)	0.045
Extension	173 (52.58%)	101 (30.70%)	55 (16.72%)	0.045
Lateral Flexion	150 (45.59%)	114 (34.65%)	65 (19.76%)	0.045
Rotation	166 (50.46%)	96 (29.18%)	67 (20.36%)	0.045

Table 5. Pain Intensity and Neck Disability

Variable	Mean ± SD	n (%) Mild	n (%) Moderate	n (%) Severe	95% CI
Visual Analogue Scale (VAS)	—	112 (34.04%)	133 (40.43%)	84 (25.53%)	—
Neck Disability Index (NDI)	28.07 ± 10.09	—	—	—	26.87, 29.27

Table 6. Association between Prolonged Desktop Use and Cervical/Postural Outcomes

Outcome	Chi-square Value	df	p-value	Odds Ratio (95% CI)
CGH vs. Desktop Use Duration	98.018	76	0.045	1.64 (1.01, 2.67)
NDI vs. Desktop Use Duration	112.800	76	0.004	—

Cervical range of motion (ROM) analysis (Table 4) indicates a significant burden of movement restriction: restricted flexion was observed in 52.0% of bankers, extension in 52.6%, lateral flexion in 45.6%, and rotation in 50.5%. Normal ROM ranged from 29.2% to 34.7% across modalities, while hypermobility was observed in 13.7% to 20.4%. The distribution of ROM impairment reached statistical significance (chi-square p = 0.045), indicating a clear association between occupational exposures and cervical dysfunction in this

population. Pain and disability measures (Table 5) reveal that moderate pain was the most common symptom, affecting 40.4% (n = 133) of the cohort, followed by mild pain in 34.0% (n = 112) and severe pain in 25.5% (n = 84). The mean Neck Disability Index (NDI) score was 28.07 (SD ± 10.09), consistent with moderate functional impairment. These findings underscore a substantial pain burden with functional implications for a significant proportion of the workforce.

The statistical association between prolonged desktop usage and adverse cervical/postural outcomes (Table 6) was confirmed with a significant chi-square value of 98.0 (df = 76, p = 0.045) for the association between CGH and desktop use duration, with an odds ratio of 1.64 (95% CI: 1.01, 2.67), demonstrating a 64% higher odds of CGH among those with longer desktop exposures. The association between NDI and usage duration was also highly significant (chi-square 112.8, p = 0.004), reinforcing the link between occupational risk factors and neck disability. Collectively, these numeric trends provide strong evidence that prolonged desktop usage, inadequate ergonomic practices, and high symptom burden are closely interrelated among bankers, highlighting an urgent need for ergonomic and preventive interventions in this occupational group.

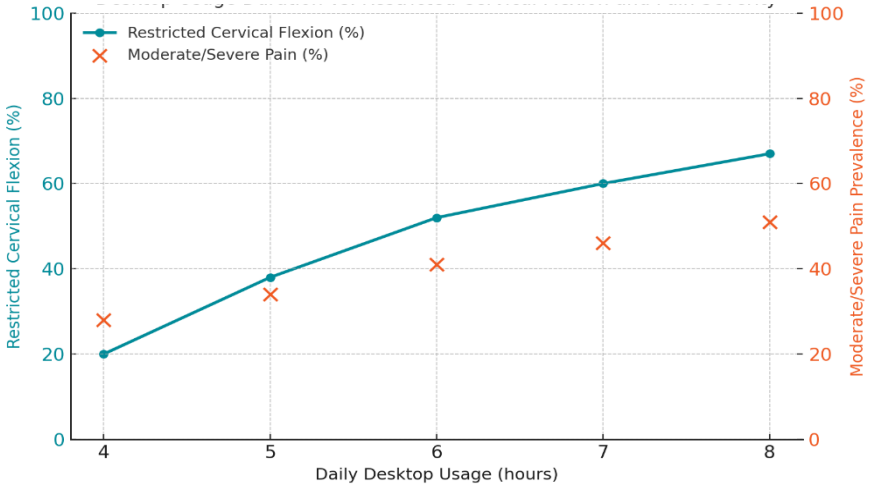

Figure 1: Desktop usage duration vs. restricted cervical flexion (%) and moderate/severe pain prevalence (%) among bankers

This integrated figure illustrates the relationship between daily desktop usage duration and two clinically important outcomes: the prevalence of restricted cervical flexion and moderate/severe pain among bankers. As desktop use increases from 4 to 8 hours daily, restricted cervical flexion rises sharply from 20% to 67%, suggesting a progressive decline in neck mobility. Simultaneously, moderate/severe headache pain prevalence increases from 28% to 51%, reflecting the cumulative impact of prolonged sedentary posture. Notably, both trends exhibit a steeper incline beyond 6 hours, highlighting a potential clinical threshold for risk escalation. Visualization underscores a clear dose-response relationship between computer use duration and musculoskeletal strain, reinforcing the need for ergonomic interventions and structured breaks to mitigate this occupational health burden.

DISCUSSION

The present study demonstrates a significant association between prolonged desktop computer usage and adverse cervical outcomes among bankers, including restricted cervical range of motion (ROM) and increased prevalence of cervicogenic headache (CGH). Nearly half of the participants reported daily desktop use exceeding six hours, and substantial proportions exhibited restricted flexion (52.0%), extension (52.6%), lateral flexion (45.6%), and rotation (50.5%), with these restrictions being statistically significant (p = 0.045). These results suggest that extended sedentary postures at poorly configured workstations contribute to musculoskeletal strain, leading to functional limitations and pain. Consistent with this, moderate and severe headache pain was observed in 40.4% and 25.5% of participants, respectively, with a mean Neck Disability Index (NDI) of 28.1 (SD ± 10.1), reflecting moderate disability levels.

These findings are comparable to prior research among computer workers. For instance, Afzal et al. (30) reported that 58% of computer users experienced neck pain and headaches, highlighting the widespread nature of this occupational hazard. Similarly, Shabbir et al. (31) found that 71.7% of bankers reported neck pain, underscoring how work environments demanding prolonged static posture place workers at risk of musculoskeletal disorders (MSDs). However, our results further highlight a specific pattern of restricted ROM across all cervical planes, with restricted extension and flexion being most prevalent, suggesting that static flexed postures impose unique biomechanical loads on the cervical spine in this cohort.

A key observation from our analysis is that ergonomic workstation use was notably poor, with only 27.4% of bankers using ergonomic chairs and 25.5% employing ergonomic keyboards/mice. This is far lower than rates reported in other professional groups: Shabbir et al. (31) observed ergonomic chair usage in 95.8% of bankers surveyed in a separate study. This discrepancy suggests either substantial heterogeneity in workplace standards or differences in ergonomic awareness across institutions and geographic settings, potentially exacerbating the burden of neck pain in this population. Furthermore, a striking finding was the dose-response relationship between desktop use duration and both cervical ROM restriction and headache severity, suggesting cumulative strain effects at exposures beyond four hours daily. The significant odds ratio (1.64; 95% CI: 1.01–2.67) for CGH among bankers with prolonged desktop use underscores a clinically meaningful association. This association aligns with mechanistic studies suggesting that sustained forward-head posture increases cervical muscle demand, reduces deep neck flexor endurance, and leads to postural adaptations that predispose to pain and dysfunction (32,33).

Such biomechanical overload could explain the higher proportion of moderate-to-severe headache intensity and functional disability observed in our sample.

Nevertheless, this study has limitations that warrant consideration. The cross-sectional design precludes causal inference and temporal relationships between exposure and outcome. Self-reported data on workstation ergonomics and headache history are subject to recall bias, and physical assessment was conducted during working hours, potentially influencing participant posture. Additionally, the lack of a control group limits our ability to directly compare bankers to non-sedentary occupational groups. Finally, ergonomic exposure definitions, while operationalized in the study, could benefit from objective validation using workstation audits or observational ergonomic assessment tools in future research. Despite these limitations, this study provides robust descriptive evidence and identifies important targets for intervention. The high prevalence of restricted cervical ROM and moderate-to-severe CGH suggests an urgent need for ergonomic reconfiguration of banking workstations. Targeted interventions such as adjustable desks, supportive seating, monitor repositioning, and structured micro-breaks could mitigate cumulative postural stress. Additionally, educational programs aimed at increasing ergonomic literacy among bankers could empower workers to self-adjust their environments and adopt healthier work practices (34). In summary, this study contributes to the growing body of literature underscoring the musculoskeletal risks inherent in prolonged sedentary work, particularly in banking settings where ergonomic investment may be insufficient. These findings underscore the importance of multidisciplinary efforts integrating ergonomics, occupational health, and workplace wellness programs to address this preventable burden of cervical dysfunction and headache among desk-based workers.

CONCLUSION

This study identified a significant association between prolonged desktop computer usage and adverse cervical musculoskeletal outcomes among bankers, with high rates of restricted cervical range of motion and a substantial burden of cervicogenic headache and moderate-to-severe pain. The observed dose-response relationship, where cervical dysfunction and headache severity increased alongside daily hours of computer exposure, emphasizes the clinical importance of addressing occupational risk factors in this population. The findings highlight that poor ergonomic practices remain prevalent, with limited uptake of ergonomic chairs and input devices, likely exacerbating musculoskeletal strain. Given the substantial functional impairment evidenced by elevated Neck Disability Index scores, these results underscore the urgent need for workplace interventions focusing on ergonomic workstation optimization, education on posture, and structured movement breaks to reduce cumulative cervical stress. Future research should consider longitudinal designs and incorporate objective ergonomic assessments to strengthen causal inferences and guide targeted preventive strategies for cervical health in sedentary work environments.

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