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ORIGINAL ARTICLE

JMHRS JOURNAL OF MODERN HEALTH AND REHABILITATION SCIENCES

Prevalence of Kyphotic Posture and its Association with Sitting Hours among Computer Users

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ABSTRACT

Background: Prolonged sitting and computer based occupational activities have been increasingly associated with postural abnormalities and musculoskeletal dysfunction. Kyphotic posture is a common spinal deviation that may develop due to sustained sedentary behavior and poor ergonomic practices.

Objective: To determine the prevalence of kyphotic posture among computer users and evaluate its association with sitting duration in information technology professionals.

Methods: A descriptive cross-sectional study was conducted among 377 computer users aged 20–50 years working in the IT sector of Islamabad and Rawalpindi between March and May 2024. Participants were recruited using convenience sampling. Data were collected through a demographic questionnaire, the International Physical Activity Questionnaire (IPAQ), and the Occiput-to-Wall Distance (OWD) test. Kyphotic posture was categorized as normal, mild, moderate, or severe based on OWD measurements. Statistical analysis was performed using SPSS version 23. Spearman correlation was applied to assess the relationship between sitting duration and kyphotic severity.

Results: Out of 377 participants, 289 (76.7%) were male and 88 (23.3%) were female, with a mean age of 30.49 ± 8.1 years. Kyphotic posture prevalence was 87.0%, including mild (32.4%), moderate (45.9%), and severe (8.8%) categories, while only 13.0% demonstrated normal posture. Most participants reported sitting for 6–10 hours daily. A statistically significant association was identified between sitting duration and kyphotic severity ($p = 0.032$).

Conclusion: Kyphotic posture was highly prevalent among computer users and demonstrated a significant association with prolonged sitting duration.

Keywords: Computer Users, Ergonomics, Information Technology Workers, Kyphosis, Musculoskeletal Disorders, Sedentary Behavior, Sitting Duration.

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Disclaimers

Conflict of Interest: None declared

Data/Supplements: Available on request.

Funding: None

Ethical Approval: STMU/IRB/23-022

Study Registration: N/A

Acknowledgments: N/A

Article Info

Received: 12 January 2026, *Accepted:* 10 March 2026,

Published Online: 20 March 2026

How to Cite: Fatima F, Mariam S, Basit A, Jamshaid Z, Anjum H. Prevalence of Kyphotic Posture and Its Association With Sitting Hours Among Computer Users. J Mod Health Rehab Sci. 2026;3(1):181.
Available from: https://jmhrs.com/index.php/jmhrs/article/view/181

Introduction

The human spine is a highly specialized anatomical structure composed of vertebrae, intervertebral discs, ligaments, and supporting musculature that collectively contribute to postural stability, weight transmission, mobility, and protection of the nervous system. Structurally, the vertebral column is divided into cervical, thoracic, lumbar, sacral, and coccygeal regions, each maintaining a specific curvature essential for biomechanical efficiency and balance. Proper spinal alignment minimizes mechanical stress on musculoskeletal tissues and preserves functional integrity during daily activities (1). Disturbances in spinal curvature may alter load distribution across the vertebral segments, potentially leading to pain, fatigue, impaired mobility, and long-term postural dysfunction. Among these alterations, thoracic kyphosis represents a clinically important condition characterized by an exaggerated posterior curvature of the thoracic spine that may arise due to muscular imbalance, poor posture, degenerative changes, or prolonged static positioning (2).

Kyphosis is considered physiological within a normal curvature range however, excessive thoracic curvature, commonly referred to as hyper kyphosis, may contribute to substantial functional limitations and musculoskeletal discomfort (3). Individuals with increased thoracic kyphotic posture frequently demonstrate associated postural deviations such as rounded shoulders, forward head posture, reduced spinal mobility, and altered scapular positioning. These biomechanical adaptations may compromise respiratory mechanics, reduce physical performance, and increase susceptibility to chronic spinal pain syndromes. Previous literature has highlighted the significance of kyphotic deformities not only in aging populations but also among younger adults exposed to occupational risk factors and sedentary behaviors (4,5). Furthermore, progressive kyphotic alignment has been associated with impaired balance, reduced quality of life, elevated risk of falls and musculoskeletal disability (6).

The rapid expansion of technology driven occupations has substantially increased the duration of sedentary work, particularly among information technology professionals and computer users. Prolonged sitting, repetitive screen exposure, and static postures maintained during computer related tasks contribute to biomechanical stress on the cervical and thoracic spine. Continuous forward flexion of the trunk and neck while working at poorly adjusted workstations may promote adaptive shortening of anterior musculature and weakening of postural stabilizers, ultimately encouraging kyphotic postural changes (7). Extended computer use has also been associated with increased prevalence of musculoskeletal disorders involving the neck, shoulders, and upper back, particularly in occupational environments lacking ergonomic support. These postural abnormalities often develop gradually and may remain unrecognized until discomfort or functional impairment becomes clinically evident (2,8).

In occupational health research, postural deviations such as kyphosis are increasingly recognized as important indicators of musculoskeletal strain and ergonomic imbalance. Objective assessment methods are essential for early identification of spinal curvature abnormalities in working populations. The Occiput to Wall Distance (OWD) test is a practical, non-invasive clinical screening tool frequently used to evaluate thoracic kyphosis by measuring the distance between the occiput and a vertical wall during upright standing. This assessment provides a simple yet reliable measure for detecting postural deviations and estimating kyphotic severity (9). In parallel, the International Physical Activity Questionnaire (IPAQ) offers a standardized approach for evaluating physical activity levels and sedentary behaviors, including sitting duration, which may contribute to spinal dysfunction (10). Combined use of these tools allows researchers to explore potential relationships between physical inactivity, occupational sitting patterns, and spinal posture (11).

With the increasing reliance on computer based occupations, particularly within the expanding information technology sector in Pakistan, understanding the prevalence and determinants of kyphotic posture has become increasingly relevant. Despite growing concern regarding sedentary lifestyles and musculoskeletal health, limited local evidence exists regarding the burden of kyphotic posture among computer users and its relationship with prolonged sitting duration. Identification of occupational risk factors is essential for designing preventive ergonomic interventions and workplace health strategies. Therefore, this study aims to determine the prevalence of kyphotic posture among computer users employed in the IT sector and to evaluate the association between sitting duration and kyphotic severity, thereby contributing to the growing body of evidence in occupational musculoskeletal health research.

Materials and Methods

This study was conducted using a descriptive cross-sectional research design to determine the prevalence of kyphotic posture and its association with sitting duration among computer users employed in the information technology sector. The study was carried out in various IT industries located in Islamabad and Rawalpindi over a period of ten weeks, from March 8 to May 17, 2024. Ethical approval was obtained prior to data collection from the Institutional Review Board of Shifa International Hospital under approval number STMU/IRB/23-022. The study was performed in accordance with the ethical principles. All participants were informed about the objectives, procedures, confidentiality, and voluntary nature of participation before enrollment, and written informed consent was obtained from each participant.

ISSN Number: 3079-0727 (Print) 3079-0735 (Online)

A total of 377 participants aged between 20 and 50 years were included in the study. Participants were recruited through convenient non-probability sampling from different information technology workplaces. Both male and female computer users were considered eligible if they were routinely engaged in occupational computer use involving desktop or laptop devices. Individuals with a documented history of spinal deformity, previous spinal surgery, and musculoskeletal trauma affecting posture, congenital spinal abnormalities, or neurological disorders influencing spinal alignment were excluded from participation. Recruitment was conducted through direct workplace visits and communication with organizational representatives to facilitate participant accessibility.

Data collection was performed using a structured assessment approach consisting of three instruments. Demographic information was obtained through a self-developed questionnaire that recorded variables such as age, gender, occupational role, and work-related sitting duration. Physical activity levels and sedentary behavior were evaluated using the International Physical Activity Questionnaire (IPAQ), a validated tool widely used for measuring physical activity patterns and sitting time across occupational populations (10). Sitting duration was recorded in hours per day to assess sedentary exposure among participants.

Kyphotic posture was assessed using the Occiput-to-Wall Distance (OWD) test, a non-invasive clinical screening method commonly utilized to evaluate thoracic kyphosis and postural alignment (9). During assessment, participants were instructed to stand upright against a wall with heels, buttocks, and shoulders touching the wall surface while maintaining a neutral head position. The distance between the occiput and the wall was measured using a standard ruler. Each participant underwent three consecutive measurements, and the average value was recorded to minimize measurement variability and improve reliability. Based on OWD findings, participants were categorized into four kyphotic posture classifications: normal (≤2 cm), mild (2.1–5 cm), moderate (5.1–8 cm), and severe (>8 cm).

Data collection was conducted in person by the research team to ensure standardization of procedures and consistency of measurements. Questionnaires were completed under supervision to minimize missing responses and improve data accuracy. All collected data were anonymized and coded to maintain participant confidentiality. Completed questionnaires and assessment forms were securely stored and accessed only by authorized research personnel. Statistical analysis was performed using Statistical Package for Social Sciences (SPSS) version 23. Descriptive statistics including frequencies, percentages, means, and standard deviations were used to summarize demographic characteristics, sitting duration, and kyphotic posture categories. Normality of data distribution was assessed prior to inferential analysis. As the data were found to be non-normally distributed, Spearman's rank correlation test was applied to evaluate the association between sitting duration and kyphotic severity. A p-value of less than 0.05 was considered statistically significant for all analyses.

Results

A total of 377 participants were included in the analysis. The study population consisted predominantly of males, with 289 male participants (76.7%) and 88 female participants (23.3%). The mean age of the participants was 30.49 ± 8.1 years, indicating that the majority of respondents belonged to a relatively young working-age population involved in prolonged computer-based occupations. The assessment of thoracic kyphotic posture using the Occiput-to-Wall Distance (OWD) test demonstrated that only a small proportion of participants exhibited normal posture, while the majority presented varying degrees of kyphotic deviation. Moderate kyphosis was the most frequently observed category, followed by mild kyphosis. Severe kyphotic posture was identified in a smaller subset of participants.

Table 1: Demographic Characteristics of Study Participants (N = 377)

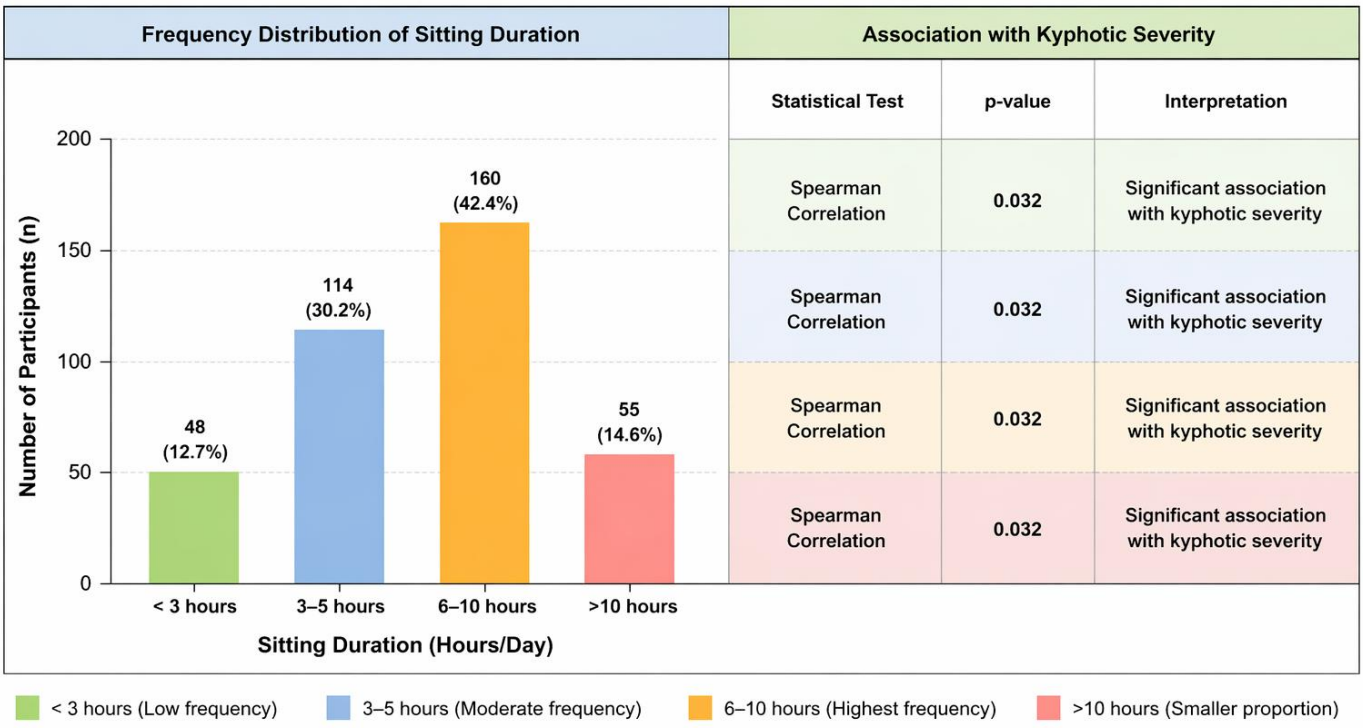
Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	289	76.7
	Female	88	23.3
Age (years)	Mean ± SD	30.49 ± 8.1	—

The findings revealed that 328 participants (87.0%) demonstrated abnormal kyphotic posture, including mild, moderate, and severe classifications. This indicates a high prevalence of postural deviation among IT professionals and computer users included in the study. The majority of participants reported prolonged occupational sitting, with most individuals indicating a sitting duration ranging between 6 and 10 hours per day. This reflects a predominantly sedentary work pattern characteristic of computer-based professions.

To evaluate the relationship between sitting duration and kyphotic posture severity, Spearman's rank correlation analysis was performed. Statistical testing demonstrated a significant association between prolonged sitting duration and increasing severity of kyphotic posture ($p = 0.032$). These findings suggest that greater daily sitting exposure may contribute to worsening thoracic postural alignment. The correlation analysis indicated that individuals with longer sitting durations were more likely to exhibit moderate to severe kyphotic posture. These findings support the hypothesis that sedentary occupational behavior may play a contributory role in the development or progression of thoracic postural abnormalities among computer users.

Table 2: Frequency Distribution of Sitting Duration Among Participants (n = 377)

Kyphotic Classification	OWD Measurement Criteria	Frequency (n)	Percentage (%)
Normal	≤2 cm	49	13.0
Mild	2.1–5 cm	122	32.4
Moderate	5.1–8 cm	173	45.9
Severe	>8 cm	33	8.8



Note: *Spearman correlation was used to examine the association between sitting duration and kyphotic severity. A p-value < 0.05 was considered statistically significant.*

Figure 1: Distribution of Sitting Duration and Its Association with Kyphotic Severity

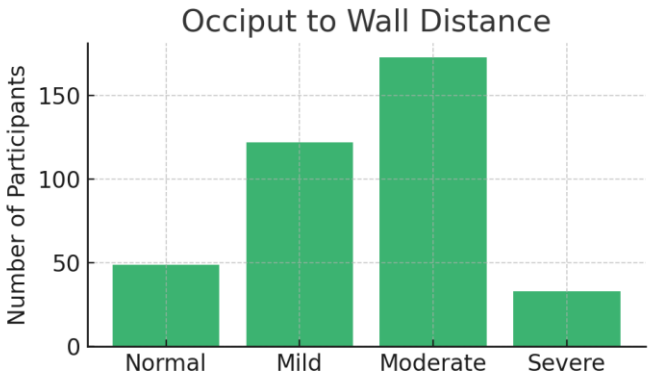


Figure 2: Occiput to Wall Distance

Discussion

The present study demonstrated a high prevalence of kyphotic posture among computer users employed in the information technology sector, with approximately 87% of participants exhibiting abnormal thoracic curvature ranging from mild to severe classifications. Moderate kyphosis represented the most common category, suggesting that prolonged exposure to sedentary occupational environments may contribute to gradual postural adaptation. The findings further revealed a statistically significant association between sitting duration and kyphotic severity, indicating that extended periods of occupational sitting may play an important role in the progression of thoracic postural deviations. These outcomes supported the growing concern regarding musculoskeletal consequences associated with prolonged computer-based work and sedentary occupational behavior.

The observed prevalence of kyphotic posture was consistent with previous research identifying postural abnormalities among individuals engaged in prolonged computer usage. Rehman et al. reported increased thoracic curvature and postural dysfunction among university employees using desktop and laptop devices for extended durations, emphasizing the influence of sustained flexed sitting postures on spinal alignment (11). Similarly, occupational studies examining computer users found that repetitive forward head posture, prolonged trunk flexion,

and insufficient ergonomic support contributed significantly to upper-body musculoskeletal strain and altered spinal biomechanics (2). The current findings aligned with evidence suggesting that modern occupational environments characterized by prolonged screen exposure may predispose individuals to postural adaptations affecting the thoracic spine.

Several biomechanical mechanisms may explain the association between prolonged sitting and kyphotic posture observed in this study. Extended sitting often promotes sustained thoracic flexion, anterior shoulder positioning, and forward head displacement, resulting in muscular imbalance between anterior and posterior postural stabilizers. Chronic shortening of pectoral musculature and weakening of scapular retractors and spinal extensors may progressively alter spinal curvature. Previous investigations have suggested that sedentary work environments contribute to increased loading of passive spinal structures, including ligaments and intervertebral discs, which may eventually compromise postural alignment and functional spinal mechanics (1,4). These physiological adaptations become particularly relevant in occupations requiring prolonged static positioning with limited movement variation.

International evidence has similarly highlighted the relationship between sedentary occupations and musculoskeletal disorders. Chim and Chen identified increased rates of neck pain, thoracic discomfort, and postural abnormalities among remote workers and office employees exposed to inadequate workstation ergonomics and prolonged sitting durations. Their findings suggested that workstation design, screen height, chair support, and frequency of movement interruptions influenced spinal posture and musculoskeletal health outcomes. Comparable observations were reported in studies examining office workers and computer professionals, where prolonged daily sitting exceeding six hours was associated with greater risk of postural dysfunction and spinal discomfort (5,6). The current study reinforced these findings by demonstrating a measurable relationship between sedentary exposure and kyphotic severity.

Another notable strength was the relatively large sample size involving 377 participants from the IT sector, which improved the representativeness of occupational computer users within the selected geographical region. Inclusion of both male and female participants also increased demographic variability. Furthermore, the study addressed an underexplored area within Pakistan's occupational health literature, contributing region-specific evidence regarding kyphotic posture prevalence among information technology workers. This information may support workplace health policy development and ergonomic intervention planning in rapidly expanding digital industries.

Despite these strengths, several limitations should be acknowledged. The cross-sectional design restricted causal interpretation, preventing determination of whether prolonged sitting directly caused kyphotic posture or merely contributed to its progression. Longitudinal studies would be necessary to establish temporal relationships between sedentary exposure and spinal curvature changes. Additionally, convenience sampling may have introduced selection bias, limiting generalizability to broader occupational populations. Self-reported sitting duration collected through questionnaires may also have been subject to recall bias and reporting inaccuracies. Another limitation involved the absence of radiographic confirmation of kyphosis, as OWD screening provides indirect estimation rather than definitive structural diagnosis.

Future research could benefit from incorporating objective postural imaging techniques, biomechanical assessments, and longitudinal follow-up to better evaluate progression of kyphotic changes over time. Inclusion of ergonomic workstation evaluation, psychosocial occupational factors, and physical activity interventions may also provide a more comprehensive understanding of determinants influencing spinal posture. Comparative studies involving different occupational sectors would further clarify whether kyphotic prevalence differs across work environments characterized by varying sedentary demands.

Conclusion

The study concluded that kyphotic posture was highly prevalent among computer users employed in the information technology sector, with prolonged sitting duration showing a significant association with increasing kyphotic severity. These findings highlighted the impact of sedentary occupational behavior on spinal posture and emphasized the need for early screening, ergonomic workplace modifications, and preventive musculoskeletal health strategies.

Authors' Contributions

ICMJE authorship criteria	Detailed contributions	Authors
Substantial Contributions	Conception or Design of the work	1,2,3,5
	Data acquisition	2,3,4
	Data analysis or interpretation	1,3,5
Drafting or Reviewing	Draft the work	5
	Review critically	1,2,5
Final approval	Final approval of the version to be published.	1,2,3,4,5
Accountable	Agreement to be accountable for all aspects of the work.	1,2,3,4,5

References

1. Frost BA, Camarero-Espinosa S, Foster EJ. Materials for the Spine: Anatomy, Problems, and Solutions. Materials. 2019;12(2):253. doi:10.3390/ma12020253.
2. Cramer H, Mehling WE, Saha FJ, Dobos G. Postural Awareness and Its Relation to Pain: Validation of an Innovative Instrument Measuring Awareness of Body Posture in Patients With Chronic Pain. BMC Musculoskelet Disord. 2018;19(1):109. doi:10.1186/s12891-018-2032-1.

3. Koelé, M. C., Lems, W. F., & Willems, H. C. (2020). The clinical relevance of hyperkyphosis: a narrative review. Frontiers in Endocrinology, 11, 5. https://www.frontiersin.org/articles/10.3389/fendo.2020.00005/full
4. Yaman O, Dalbayrak S. Kyphosis and Review of the Literature. Turk Neurosurg. 2014;24(4):455-465. doi:10.5137/1019-5149.JTN.8838-13.0.
5. Ryan SD, Fried LP. The Impact of Kyphosis on Daily Functioning. J Am Geriatr Soc. 1997;45(12):1479-1486. doi:10.1111/j.1532-5415.1997.tb03199.x.
6. Tominaga R, Fukuma M, Yamazaki M, et al. Kyphotic Posture and Fall Risk in Older Adults. Spine. 2016;41(15):1232-1238. doi:10.1097/BRS.0000000000001523.
7. Roghani T, Zavieh MK, Manshadi FD, King N, Katzman W. Age-Related Hyperkyphosis: Update of Its Potential Causes and Clinical Impacts. Aging Clin Exp Res. 2017;29(4):567-577. doi:10.1007/s40520-016-0617-3.
8. Marks DS, Qaimkhani SA. The Natural History of Congenital Scoliosis and Kyphosis. Spine. 2009;34(17):1751-1755. doi:10.1097/BRS.0b013e3181abf1d2.
9. Wongsa S, Chaiamnuay S, Narongroeknawin P. Concurrent Validity of Occiput-to-Wall Distance for Assessing Thoracic Kyphosis. J Clin Trials. 2012;2:116. doi:10.4172/2167-0870.1000116.
10. Lee PH, Macfarlane DJ, Lam TH, Stewart SM. Validity of the International Physical Activity Questionnaire Short Form (IPAQ-SF): A Systematic Review. Int J Behav Nutr Phys Act. 2011;8:115. doi:10.1186/1479-5868-8-115.
11. Rehman A, Ahmad S, Malik AN. Kyphotic Posture in Computer Users: A Cross-Sectional Study Among Occupational Computer Workers. NFC IEFR J Eng Sci Res. 2018;6(1):45-52.

ISSN Number: 3079-0727 (Print) 3079-0735 (Online)