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PREVALENCE OF LATERAL EPICONDYLITIS ASSOCIATED WITH PROLONGED USE OF DIGITAL DEVICES IN OFFICE WORKERS: A CROSS-SECTIONAL STUDY

Original Research

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ABSTRACT

Background: Lateral epicondylitis (LE), commonly referred to as tennis elbow, is traditionally observed in athletes performing repetitive upper limb activities. However, a growing number of cases are now being identified in office workers due to prolonged digital device usage. With increasing dependence on computers and smartphones in occupational settings, the risk of repetitive strain injuries like LE has intensified. Despite this trend, research exploring the prevalence of LE specifically among office-based digital device users remains limited.

Objective: To determine the prevalence of lateral epicondylitis associated with prolonged digital device use among office workers.

Methods: This analytical, observational cross-sectional study was conducted over six months. A total of 88 office workers aged 18–60 years were recruited using non-probability convenience sampling. Participants who used digital devices for more than four hours daily were included. Clinical assessment of LE was performed using Cozen's and Mills' tests, while symptom severity and functional limitation were evaluated using the Patient-Rated Tennis Elbow Evaluation (PRTEE) questionnaire. Data were analyzed using SPSS version 26, with descriptive and inferential statistics applied.

Results: Among the 88 participants, 62.5% were male and 37.5% were female. Most were right-hand dominant. Cozen's Test showed 19.3% positive in the right dominant hand and 3.4% in both hands. Mill's Test identified 23.9% positive cases in the right dominant hand and 3.4% in both hands. A statistically significant association was found between prolonged daily device use and elbow pain ($p = 0.036$). Typing was the most frequently reported pain-triggering activity, followed by gripping and carrying. No significant associations were observed with break frequency, device type, or wrist posture.

Conclusion: The findings highlight a substantial prevalence of lateral epicondylitis in office workers using digital devices extensively. Emphasizing ergonomic interventions, proper posture, and routine breaks is essential to reduce the burden of this condition in modern workplaces.

Keywords: Cross-sectional study, Epicondylitis, Tennis elbow, Elbow pain, Repetitive stress.

INTRODUCTION

Lateral epicondylitis, commonly known as tennis elbow, is a frequently encountered musculoskeletal disorder that primarily affects individuals involved in repetitive upper limb activities. Although historically associated with athletes such as baseball players, weightlifters, and fencers, the condition has become increasingly prevalent among non-athletic populations, particularly office workers who engage extensively with digital devices (1). The surge in computer-based occupations over the past decade has significantly shifted the demographic affected by this condition, highlighting its relevance in workplace ergonomics and occupational health. Repetitive strain from activities such as typing, prolonged mouse handling, and desk-bound tasks places considerable stress on the extensor muscles of the wrist, primarily the extensor carpi radialis brevis, extensor digitorum, and extensor carpi ulnaris, leading to microtrauma and subsequent tendinopathy (2,3). The pathophysiology of lateral epicondylitis is not yet fully elucidated; however, it is widely believed to result from overuse injuries that lead to tenocyte proliferation and increased ground substance deposition, contributing to tendon degeneration rather than inflammation (4). The condition typically involves the tendinous origin at the lateral epicondyle of the humerus, impairing muscles responsible for movements such as finger extension, wrist dorsiflexion, and forearm supination. Clinically, patients often present with localized pain over the lateral elbow that intensifies with resisted wrist extension or gripping tasks, compromising daily function and occupational performance (5,6). Epidemiological data underscore regional variability in prevalence rates, likely influenced by occupational demands and ergonomic practices.

In the United Kingdom, population-based studies estimate a prevalence of 1.3% (7), whereas Finnish data suggest a higher risk among women aged 40–60, particularly those engaged in repetitive or forceful manual work, with prevalence ranging from 1.1% to 4.0% (8). In contrast, a significantly higher prevalence has been reported among computer users in Pakistan, where 26% were affected (9). Similarly, a Japanese study identified a 5.5% prevalence among hospital workers, reinforcing the role of repetitive occupational tasks in the etiology of the condition (10). Beyond its clinical burden, lateral epicondylitis poses a substantial challenge to workforce productivity and individual well-being. Patients frequently report difficulty in performing essential job-related tasks, such as prolonged typing or mouse usage, and experience aggravated symptoms during repetitive forearm activities (8-10). Consequently, timely and effective management is crucial to restoring function and minimizing long-term disability. Standard treatment options include rest, non-steroidal anti-inflammatory drugs (NSAIDs), corticosteroid injections, and, in resistant cases, surgical intervention, which has shown favorable outcomes in 80–97% of cases. Conservative approaches such as physiotherapy comprising ice massage, muscle stimulation, and strengthening exercises are commonly employed to alleviate symptoms and improve range of motion. More recently, Kinesio Taping (KT) has gained popularity as an adjunct therapy, demonstrating promise in reducing pain, enhancing muscular performance, and restoring functional mobility (11,12). Despite the range of available treatments, the growing incidence of lateral epicondylitis in non-athletic populations calls for further exploration into effective, occupation-specific rehabilitation strategies. The present study aims to investigate the role of physiotherapeutic interventions in managing lateral epicondylitis among office-based workers, to evaluate their efficacy in reducing symptoms and improving functional outcomes in this emerging high-risk group.

METHODS

This study adopted an analytical, observational cross-sectional design to assess the prevalence and functional impact of lateral epicondylitis among office workers engaged in prolonged use of digital devices. The research was conducted over six months, across various office settings that included government institutions and private organizations. The study focused on employees whose job roles involved repetitive upper-limb activities, particularly extensive keyboard and mouse use, which are considered potential contributors to lateral elbow tendinopathy. A non-probability convenience sampling method was employed, allowing the inclusion of participants based on their availability and willingness to participate. The target population consisted of office workers aged between 18 and 60 years who reported daily digital device use of more than four hours. The sample size was calculated using OpenEpi version 3.01, with a 5% margin of error and a 95% confidence interval, resulting in a minimum required sample size of 88 participants. Eligibility criteria required participants to be free from any known systemic musculoskeletal conditions such as diabetes mellitus, rheumatoid arthritis, osteoarthritis, and fibromyalgia, as these could confound the assessment of lateral epicondylitis. Additional exclusion criteria included individuals

with a history of elbow fractures, recent elbow surgery or therapy, cervical radiculopathy, prior diagnoses of elbow disorders, and those unwilling to provide informed consent.

Data collection was conducted in workplace environments where repetitive upper-limb movements were part of routine job tasks. Following a verbal and written explanation of the study, informed consent was obtained from each participant. Clinical evaluation included the administration of Cozen's and Mill's tests, both of which are well-established physical examination techniques used to detect lateral elbow tendinopathy by eliciting pain and tenderness over the lateral epicondyle. Participants who tested positive on these physical exams were subsequently asked to complete the Patient-Rated Tennis Elbow Evaluation (PRTEE) questionnaire, a validated tool designed to quantify pain severity and functional limitations associated with the condition (13,14). Completion of the PRTEE questionnaire required approximately 20 minutes per participant. The collected data were coded and entered into IBM SPSS Statistics version 26 for analysis. Descriptive statistics were applied to summarize the demographic profile and key variables, using frequencies and percentages. The Chi-square test was utilized to determine associations between categorical variables, with a significance level set at $p<0.05$. Ethical approval for this study was secured from the institutional review board before data collection. All participants were assured of confidentiality, and their participation was entirely voluntary. No personal identifiers were recorded during data handling, and participants retained the right to withdraw from the study at any point without penalty.

RESULTS

A total of 88 office workers participated in the study. Among them, 55 were male (62.5%) and 33 were female (37.5%), indicating a male-dominant sample population. The majority of participants (67.0%, n = 59) were concentrated within a specific age group, while 22.7% (n = 20) belonged to another adjacent category. Smaller age segments included 3.4% (n = 3) each in two distinct age brackets, followed by 2.3% (n = 2) and 1.1% (n = 1) in remaining groups, reflecting some age diversity within the sample. With respect to hand dominance, a significant majority of participants were right-handed, reinforcing the relevance of right limb involvement in repetitive occupational tasks. The results of Cozen's and Mill's tests indicate the prevalence of lateral epicondylitis among the participants. In Cozen's test, 19.3% of individuals showed a positive result in the right hand, while 3.4% tested positive in both hands. The majority, 77.3%, tested negative, indicating no signs of lateral epicondylitis. Similarly, in the Mill's test, 23.9% of participants tested positive in the right hand and 3.4% in both hands, while 72.7% tested negative. Analytical associations revealed a statistically significant correlation between the average duration of daily device use and the presence of elbow pain ($\chi^2 = 8.551$, $p = 0.036$), with higher prevalence noted among individuals using digital devices for either 2–5 hours or more than 8 hours daily. Although participants who reported taking breaks every 30 minutes experienced more elbow discomfort, this association was not statistically significant ($\chi^2 = 6.056$, $p = 0.109$). Similarly, the type of device used (e.g., laptop vs. desktop) did not demonstrate a significant correlation with elbow pain ($\chi^2 = 2.416$, $p = 0.299$).

Postural factors during device use, such as wrist position, also showed no statistically significant association with elbow discomfort ($\chi^2 = 2.416$, $p = 0.299$), although those maintaining extended or bent wrist postures reported higher symptoms. Notably, the most significant finding emerged from the relationship between elbow pain and specific pain-triggering activities ($\chi^2 = 88.000$, $p < 0.001$). Typing was identified as the leading aggravating factor, followed by gripping and lifting activities, establishing a direct association between task-specific upper-limb exertion and symptom development. The PRTEE results highlight that the majority of participants experienced minimal symptoms related to lateral epicondylitis. In the pain score section, 71.6% reported no pain, 27.3% had mild pain, and only 1.1% experienced severe pain. Similarly, the function score indicated that 71.6% of the participants had no difficulty performing daily tasks, while 21.6% reported mild functional limitations, 5.7% experienced moderate limitations, and 1.1% faced severe difficulty. These findings suggest that while lateral epicondylitis was present, its impact on pain and function was relatively low in most individuals.

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Table 1: Frequency and percentage of the lateral epicondylitis on the Cozens Test

Cozens Test				
Variable	Frequency	Percent	Valid Percent	Cumulative Percent
Positive in the right hand	17	19.3	19.3	19.3
Positive in both hands	3	3.4	3.4	22.7
Negative	68	77.3	77.3	100.0
Total	88	100.0	100.0	

Table 2: Frequency and percentage of lateral epicondylitis on the Mills test

Mills Test				
Variable	Frequency	Percent	Valid Percent	Cumulative Percent
Positive in the right hand	21	23.9	23.9	23.9
Positive in both hands	3	3.4	3.4	28.4
Negative	64	72.7	72.7	100.0
Total	88	100.0	100.0	

Table 3: Association between Device Usage Patterns and Elbow Pain (Chi-Square Test Results)

Associated Test	**Chi-Square value ($x^{2)}$**	**df**	**P value**
Average Daily Device Usage x Elbow pain	8.551[a]	3	0.036
Frequency of Breaks x Elbow pain	6.056[a]	3	0.109
Type of Device Used for Work x Elbow pain	2.416[a]	2	0.299
Activity that triggers pain x Elbow pain	88.000[a]	4	< 0.001

Table 4: Frequency and Percentage Distribution of Pain Scores Based on PRTEE

PRTEE Pain score				
Variable	Frequency	percent	Valid percent	Cumulative percent
No pain	63	71.6	71.6	71.6
Mild pain	24	27.3	27.3	98.9
Sever pain	1	1.1	1.1	100
Total	88	100.0	100.0	

Table *5*: Frequency and Percentage Distribution of Functional Limitation Scores Based on PRTEE

PRTEE Function score				
Variable	Frequency	percent	Valid percent	Cumulative percent
No pain	63	71.6	71.6	71.6
Mild pain	19	21.6	21.6	93.2
Moderate pain	5	5.7	5.7	98.9
Sever pain	1	1.1	1.1	100.0
Total	88	100.0	100.0	

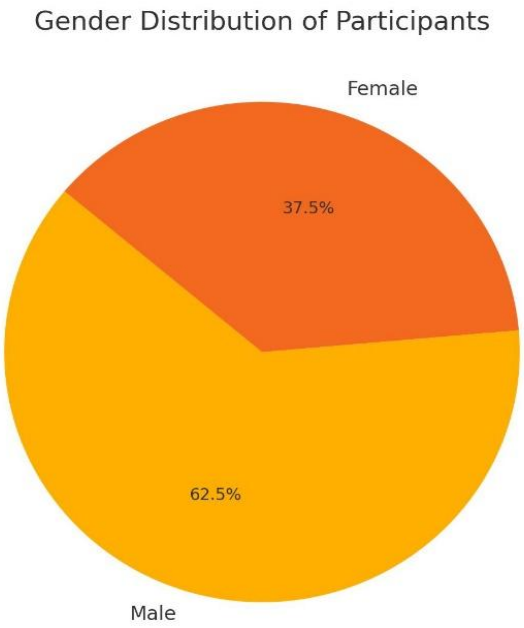

Figure 1 Gender Distribution of Participants

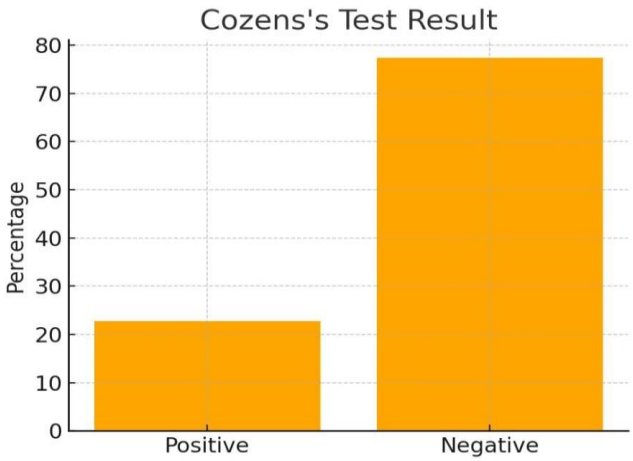

Figure 2 Cozen's Test Results

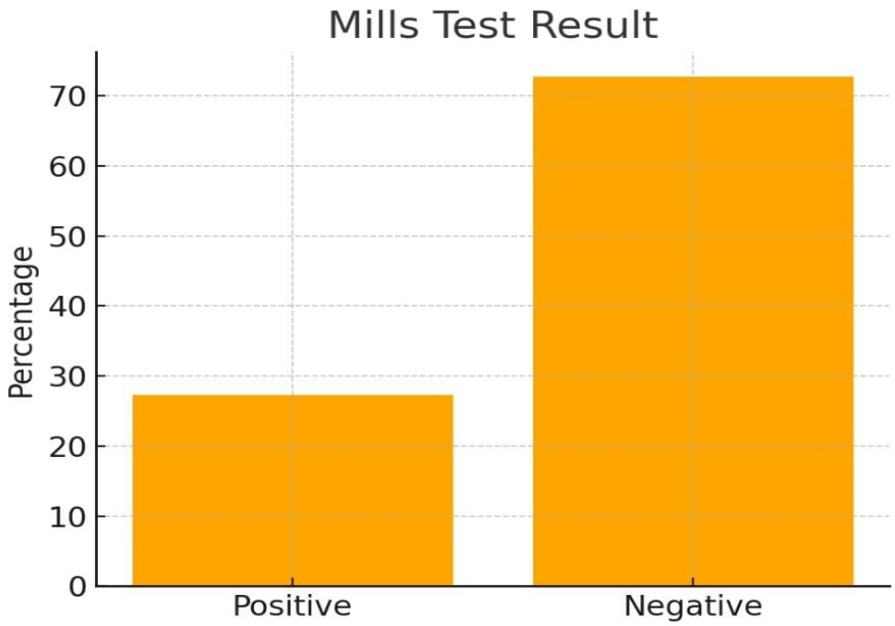

Figure 3 Mills Test Results

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DISCUSSION

The present study explored the prevalence of lateral epicondylitis (LE) among office workers about digital device usage, postural habits, and activity-based triggers. Among the 88 participants, 22.7% tested positive on Cozen's and 27.3% on Mill's test, indicating a noticeable presence of LE symptoms, particularly in the dominant (right) hand. These findings align with previous studies that have linked repetitive upper-limb movements in occupational settings, especially typing and gripping, to the development of LE.

Gender distribution in the sample showed a male dominance (62.5%), which may reflect workforce trends in certain office environments. Age distribution was diverse but concentrated in a younger to middle-aged demographic, suggesting that LE symptoms can emerge even in early stages of occupational exposure.

A significant association was found between average daily device use and elbow pain ($\chi^2 = 8.551$, $p = 0.036$), with symptoms more prevalent among those using devices for more than 2–5 hours or over 8 hours per day. This supports the hypothesis that prolonged repetitive activity can contribute to microtrauma at the lateral epicondyle. Conversely, no statistically significant association was observed between pain and the type of device used or frequency of breaks, although those taking breaks still reported higher discomfort. This may suggest that breaks alone are insufficient if not combined with posture correction and ergonomic adjustments.

One of the most striking findings was the strong correlation between pain and task-specific activities ($\chi^2 = 88.000$, $p < 0.001$), with typing, gripping, and lifting identified as the main aggravating factors. These results underscore the functional nature of LE, where tendon strain increases with specific repetitive tasks rather than general device use.

PRTEE pain and function scores provided further insight into the clinical burden of LE among participants. Most individuals reported **minimal to mild pain (71.6% and 27.3%, respectively)**, and **functional limitations were largely mild to moderate.** Only 1.1% reported severe symptoms. This suggests that although LE was present, its functional impact in the sample was generally low, possibly due to early-stage symptoms or individual adaptation strategies.

CONCLUSION

This study concludes that **lateral epicondylitis is a relevant musculoskeletal concern** among office workers, particularly those with prolonged digital device use and repetitive upper-limb tasks such as typing and gripping. While most affected individuals reported mild pain and minimal functional impairment, the presence of statistically significant associations with device usage duration and task-specific triggers highlights the need for ergonomic interventions and preventive strategies in workplace settings.

Educating office workers on proper posture, encouraging frequent micro-breaks with stretching, and redesigning workstations for optimal biomechanics may reduce the onset or severity of LE. Future longitudinal studies are recommended to assess progression and long-term effects of these risk factors in occupational environments.

AUTHOR CONTRIBUTION

Author	Contribution
Suad Abdullah*	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Khadija Usman	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
Okasha Anjum	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published

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