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Frequency of De Quervain's Tenosynovitis Due to Mobile Phone Dependence in Female Undergraduate Students

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ABSTRACT

Background: De Quervain's tenosynovitis (DQT) is a common musculoskeletal disorder associated with repetitive wrist and thumb movements, often exacerbated by excessive mobile phone use. This study investigates the prevalence of DQT among female undergraduate students with high screen time.

Objective: To determine the frequency of De Quervain's tenosynovitis due to mobile phone dependence and to assess the correlation between DQT and screen time.

Methods: A descriptive cross-sectional study was conducted among 214 female undergraduate students aged 18-24 years in Rawalpindi and Islamabad. Data were collected using a self-structured questionnaire, the Finkelstein test for DQT diagnosis, and the Patient-Rated Wrist Evaluation (PRWE) tool for pain assessment. Statistical analysis was performed using SPSS version 25.0, with chi-square tests applied to evaluate associations.

Results: The Finkelstein test was positive in 57.5% of participants. Recurrent wrist pain was reported by 94.9%, with 54.7% experiencing aggravating pain. PRWE scores showed that 32.5% had moderate pain, 17.2% severe, and 2.5% very severe pain.

Conclusion: A significant association between mobile phone dependence and DQT was observed, indicating a need for preventive interventions to reduce the risk of musculoskeletal disorders among female students.

INTRODUCTION

De Quervain's tenosynovitis (DQT) is a progressive stenosing tenosynovitis that specifically affects the tendon sheaths of the first dorsal compartment of the wrist, which contains the tendons of the extensor pollicis brevis and abductor pollicis longus muscles. First described by Fritz De Quervain in 1895, this condition has been associated with excessive thumb and wrist usage, leading to inflammation and degeneration of the tendon sheath, which can result in impaired thumb function, swelling, stiffness, and thickening of the ligamentous covering of the tendon structure (1). The pathophysiology of DQT involves myxoid degeneration, where gelatinous substances are replaced with connective tissue and fibrous deposits, increasing vascularity without acute inflammation of the synovial lining. Activities that involve repetitive thumb movements, such as pinching, grasping, pulling, or pushing, have been identified as significant risk factors for developing DQT, with women being more frequently affected due to factors such as hormonal changes and fluid retention (2, 3).

The rise in mobile phone technology has transformed daily life, particularly among young adults who exhibit increased reliance on these devices. This shift has introduced new risks, including musculoskeletal disorders such as DQT, particularly among female students who often engage in prolonged and repetitive hand and wrist movements while using touchscreen devices. Mobile phones, typically weighing around 100g, require continuous thumb musculature engagement, which can contribute to the development of DQT as swollen tendons rub against narrow tunnels within the wrist (4). Research has shown that extensive use of handheld devices correlates with a higher prevalence of musculoskeletal disorders, including DQT, with the Finkelstein test serving as a key diagnostic tool due to its ability to accurately identify the presence of this condition through specific pain-inducing movements (5).

The increasing prevalence of DQT among young adults, particularly female undergraduate students, necessitates a deeper investigation into the potential link between mobile phone dependence and the onset of this condition. The excessive use of smartphones for academic and leisure activities, often involving prolonged screen time and repetitive thumb movements, has been identified as a significant risk factor for the development of DQT. The Patient-Rated Wrist Evaluation (PRWE) tool, which assesses both pain and functional impairment, has proven to be an effective measure for evaluating the impact of DQT on individuals' daily lives, providing insights into the severity of pain and the extent of functional disability experienced by affected individuals (6, 7).

This study aims to explore the frequency of De Quervain's tenosynovitis among female undergraduate students in relation to their dependence on mobile phones, particularly focusing on the correlation between screen time and the severity of symptoms. By assessing the presence of DQT

using the Finkelstein test and evaluating pain and disability through the PRWE tool, this research seeks to contribute to the understanding of how modern technology use, particularly in an academic context, influences the development of musculoskeletal disorders among young women. The findings of this study could inform preventive strategies and interventions aimed at reducing the risk of DQT among vulnerable populations, thereby improving overall musculoskeletal health and well-being (8, 9).

MATERIAL AND METHODS

This descriptive cross-sectional study was conducted over a six-month period at various universities in Islamabad and Rawalpindi, focusing on the frequency of De Quervain's tenosynovitis (DQT) due to mobile phone dependence among female undergraduate students. The study was designed to assess the association between screen time and the presence of DQT, utilizing established diagnostic and evaluation tools. A sample size of 214 participants was determined using Raosoft Software, with participants selected through convenient non-probability sampling. Female students aged 18-24 years were recruited for the study, and individuals with psychological or neurological impairments, fractures, or other relevant conditions were excluded to maintain the study's focus on the effects of mobile phone use on musculoskeletal health (1).

Data collection involved a self-structured questionnaire, which was designed to gather information on demographics, mobile phone usage patterns, and symptoms related to DQT. The Finkelstein test was performed on all participants to assess the presence of DQT, characterized by pain, swelling, and clicking in the wrist and thumb during specific movements. A positive Finkelstein test result was indicative of DQT. Pain severity and functional disability were further evaluated using the Patient-Rated Wrist Evaluation (PRWE) tool, a validated measure that assesses pain and functional impairment associated with wrist conditions. The PRWE tool includes two sections, pain and function, each scored out of 100, with higher scores indicating greater pain and disability (2).

All participants provided informed consent prior to their inclusion in the study, and the research was conducted in accordance with the principles outlined in the Declaration of Helsinki. Ethical approval was obtained from the institutional review board of the Margalla Institute of Health and Sciences, ensuring that the study met all ethical standards for research involving human subjects. The confidentiality and anonymity of all participants were maintained throughout the study.

Data were analyzed using SPSS version 25.0. Descriptive statistics, including means, standard deviations, and frequencies, were calculated to summarize the demographic characteristics of the participants and the prevalence of DQT. The chi-square test was employed to assess the association between screen time and the presence of DQT, with a significance level set at $p < 0.05$. The results were presented in tables and figures to illustrate the frequency and severity of DQT among the participants, providing a comprehensive overview of the study findings (3).

RESULTS

The study included a total of 214 female undergraduate students from various universities in Rawalpindi and Islamabad. The majority of participants (91.6%) were right-handed, as depicted in the pie chart, with only 8.4% being left-handed (Figure 1). The data on the type of wrist pain experienced by the participants revealed that a significant proportion, 94.9%, experienced recurrent wrist pain, while only 5.1% reported continuous pain. This suggests that recurrent pain is a common issue among the study population, potentially linked to their mobile phone usage patterns.

Table: Demographic Variables, Wrist Pain Types, Aggravating Pain, and Finkelstein Test Results

Variable	Mean/ Frequency	Standard Deviation/ Percentage
Age (years)	20.72	±1.75
Height (inches)	2.62	±0.25
Weight (lbs)	52.89	±9.82
Type of Pain		
Recurrent	203	94.9%
Continuous	11	5.1%
Aggravating Pain		
Yes	117	54.7%
No	97	45.3%
Finkelstein Test Result		
Positive	123	57.5%
Negative	91	42.5%

The demographic analysis revealed that the mean age of the participants was 20.72 years with a standard deviation of ±1.75 years, indicating a relatively young population. The mean height was 2.62 inches (±0.25), and the mean weight was 52.89 lbs (±9.82), highlighting the typical physical attributes of the studied population.

Regarding the type of wrist pain experienced, a significant majority (94.9%) of the participants reported recurrent pain, while a small fraction (5.1%) experienced continuous pain. This suggests that recurrent pain is a prevalent issue among the female undergraduate population.

The study further explored the presence of aggravating pain during specific activities. It was found that 54.7% of the

participants experienced aggravating pain, indicating an increase in discomfort during activities involving the wrist. Conversely, 45.3% did not report such aggravation.

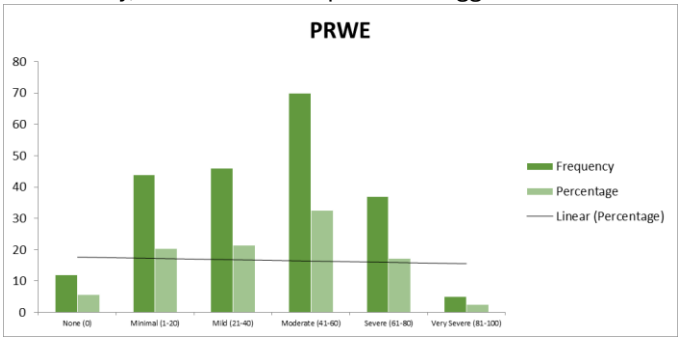

Figure 1 Wrist/thumb pain categorization

The Finkelstein test, used to diagnose De Quervain's tenosynovitis, was positive in 57.5% of the participants, signifying a substantial prevalence of DQT in the studied population. The remaining 42.5% had negative results, indicating no presence of the condition in those individuals. The severity of pain and functional impairment was further evaluated using the Patient-Rated Wrist Evaluation (PRWE) tool, which categorized participants based on their pain levels. The results showed that 32.5% of participants reported moderate pain, making it the most common level of discomfort, followed by mild pain in 21.4% and minimal pain in 20.4% of the participants. Severe and very severe pain were less commonly reported, affecting 17.2% and 2.5% of the participants, respectively. Only 5.6% of the participants were pain-free.

The study assessed 214 female undergraduate students to evaluate the frequency of De Quervain's tenosynovitis (DQT) and its association with mobile phone use. The demographic data, type of wrist pain, aggravating pain, and Finkelstein test results were compiled and analyzed.

Overall, the results underscore the significant association between mobile phone use, the prevalence of De Quervain's tenosynovitis, and the type and severity of wrist pain experienced by female undergraduate students. These findings suggest a need for targeted interventions to reduce the risk of musculoskeletal disorders in this demographic.

DISCUSSION

The findings of this study provide significant insights into the prevalence of De Quervain's tenosynovitis (DQT) among female undergraduate students, particularly in relation to mobile phone dependence. The high frequency of DQT, as indicated by the positive Finkelstein test results in 57.5% of the participants, aligns with previous research that has highlighted the increasing occurrence of musculoskeletal disorders linked to the extensive use of handheld devices. Similar studies, such as the one conducted by Benites-Zapata et al., demonstrated that problematic smartphone use is strongly associated with symptoms of DQT, reinforcing the connection between repetitive wrist and thumb movements and the development of this condition (2). The recurrent and aggravating pain reported by a significant portion of the study population further underscores the physical strain that continuous mobile phone usage can impose on the musculoskeletal system.

This study's findings also resonate with those of Sharan et al., who identified a high prevalence of musculoskeletal disorders among young adults engaged in prolonged mobile phone use. The study's demographic focus on female undergraduate students is particularly relevant, as women are generally more susceptible to DQT due to factors such as hormonal changes and fluid retention, which may exacerbate the effects of repetitive strain (3). The results also highlight the severity of pain experienced by the participants, with 32.5% reporting moderate pain and a notable percentage experiencing severe or very severe pain. This level of discomfort could have significant implications for the quality of life and academic performance of these students, as persistent pain can hinder daily activities and overall well-being.

The study's strengths include its focus on a specific population that is particularly vulnerable to DQT due to lifestyle factors, such as prolonged screen time and academic demands. The use of validated tools like the Finkelstein test and the Patient-Rated Wrist Evaluation (PRWE) tool adds robustness to the findings, providing reliable measures of the prevalence and severity of DQT among the participants. However, the study also had some limitations. The cross-sectional design, while effective for identifying associations, does not allow for the determination of causality. Additionally, the non-probability sampling method may limit the generalizability of the findings to the broader population. The study also focused exclusively on female undergraduate students, which, while relevant to the research objectives, means that the findings cannot be extrapolated to other groups, such as male students or older adults, who may also be affected by mobile phone-induced DQT.

Given these limitations, future research should consider longitudinal designs to explore the causal relationship between mobile phone use and the development of DQT over time. Studies with larger, more diverse samples could also provide a more comprehensive understanding of how various demographic factors influence the risk of DQT. Additionally, interventions aimed at reducing screen time and promoting ergonomic practices among students could be evaluated to determine their effectiveness in preventing DQT and alleviating its symptoms.

CONCLUSION

In conclusion, this study contributes to the growing body of evidence linking mobile phone dependence with the prevalence of De Quervain's tenosynovitis, particularly among female undergraduate students. The significant association between screen time and the severity of wrist pain underscores the need for targeted interventions to mitigate the risks associated with excessive mobile phone use. Addressing these issues through education and preventive strategies could significantly reduce the burden of musculoskeletal disorders in this vulnerable population, ultimately improving their quality of life and academic success (4).

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