



Research Article

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## ***Prevalence and Awareness Evaluation of De Quervain's Tenosynovitis among Students in the Kingdom of Saudi Arabia***

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### **ABSTRACT**

**Introduction:** De Quervain's tenosynovitis is characterized by inflammation and thickening of the tendons of the extensor pollicis brevis and abductor pollicis longus muscles and the synovial sheath, leading to a common cause of wrist pain that typically occurs in adults. This condition has been given several other names such as texting tenosynovitis, BlackBerry thumb, washerwoman's sprain, gamer's thumb, teen texting tendonitis, WhatsAppitis, and radial styloid tenosynovitis, all of which involve repeated thumb pinching and wrist movement. **Objectives:** The purpose of this study was to determine the prevalence of de Quervain's tenosynovitis among students using smartphones in Saudi Arabia. Many studies have been conducted on this disease in other countries, but not many have been performed in Saudi Arabia. Our aim was to obtain more information about the disease prevalence among students in Saudi Arabia. Our secondary objective was to determine the correlation of the condition with different demographics and risk factors in our study population, such as age, sex, and time spent texting. **Methods:** This was an observational cross-sectional study based on web-survey questionnaires for students developed by the authors with high confidence to review the prevalence of De Quervain's tenosynovitis in Saudi Arabia. The sample size was 338 estimated using the Qualtrics calculator with a confidence level of 95% and a margin of error of 5%. The sample was collected from March 2020 to May 2020. The inclusion criteria were as follows: aged 15–40 years and private or public students who agreed to participate in this study. Those who were younger than 15 or older than 40 years, were not students, or those who had a previous pathology that was diagnosed in either wrist were excluded. The correlation with risk factors was calculated using means and percentages using SPSS software. **Results:** A total of 338 participants responded to the survey. More than half of them had a positive result in the Finkelstein test (233 [68.9%]) and more than half of them (192 [56.8%]) were females. The age of participants ranged from 15 to 40 years, and more than half of them aged 21–25 years (184 [54.4%]). Regarding the field of study, over half of the participants were students in the medical field (170 [50.3%]). There was a positive correlation between the duration of phone use and the development of the condition ( $p = 0.003$ ). **Conclusion:** Our study was conducted to demonstrate the association between the use of smartphones and de Quervain's tenosynovitis in students throughout Saudi Arabia, including medical and non-medical students, raising public awareness regarding the risk factors that can lead to this condition since 68.9% had a positive result in the Finkelstein test. There was a positive correlation between the duration of phone use and the presence of de Quervain's syndrome; although more studies need to be conducted to confirm the causal association, we recommend limiting phone usage among students. Furthermore, the Finkelstein test should be performed under supervision to avoid any chances of false-negative results.

**Key words:** De Quervain's disease, De Quervain's syndrome, De Quervain's tenosynovitis

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## INTRODUCTION

De Quervain's disease is the inflammation of the extensor pollicis brevis and abductor pollicis longus tendons and the thickening of their synovial sheath, leading to a common cause of wrist pain that typically occurs in adults. [1]

De Quervain's tenosynovitis was first described by Fritz de Quervain in 1895 as a pain in the wrist caused by stenosing tenosynovitis of the extensor pollicis brevis and abductor pollicis longus tendons. [2] Since its discovery, this condition has been given several other names such as texting tenosynovitis, BlackBerry thumb, washerwoman's sprain, gamer's thumb, teen texting tendonitis, WhatsAppitis, and radial styloid tenosynovitis, all of which involve repeated thumb pinching and wrist movements. [3] Occupations and hobbies that require repetitive abduction of the thumb under the stress of grasping motions and adduction of the thumb with ulnar deviation of the wrist, e.g., typewriting, golfing, and piano playing, can cause chronic trauma to the tendons and their sheaths and result in this condition. [4] The cause is almost always related to overuse injury. Predisposing movements include forceful grasping and repetitive use of the thumb. Other risk factors include being aged between 30 and 50 years, rheumatoid arthritis, and female sex [5, 6]. Females are six to ten times more likely to be affected by this disease than males. [7] In addition to pain along the radial aspect of the wrist at the base of the thumb, swelling in the anatomic snuffbox can also be noted in some cases. [8] The diagnosis of de Quervain's tenosynovitis is made based on the history and physical examination findings. [9] The pain is exacerbated by tucking the thumb under the other fingers during ulnar deviation of the wrist. This is referred to as a positive Finkelstein's sign. [10] Radiological studies are not usually required to diagnose de Quervain's tenosynovitis but they can be used to rule out other pathologies. [11]

Various non-operative and operative treatments have been advocated for this condition. [12] Options include anti-inflammatory medication, corticosteroid injections, ultrasound therapy, and occupational therapy, such as splinting and physical therapy. Surgical release of the involved tendons is the operative approach in some cases [13, 14]

De Quervain's tenosynovitis is notably associated with smartphone usage, text messaging, gaming, and other activities. [15, 16] A recent cross-sectional study showed a significant correlation between heavy smartphone usage and hand pain among medical students at King Abdulaziz University (KAU) in Jeddah. [17] The same study highlighted that females were more likely to have a positive Finkelstein's sign than males, with 52 females (28.4%) and 22 males (10.8%) affected.

Another study, emphasizing the relationship between the frequency of texting and Finkelstein's sign, revealed that 67% of people who used their mobile phones for texting were positive for the sign. [18] In addition to acquiring de Quervain's tenosynovitis due to phone use, studies have been conducted to investigate the association between smartphone use addiction and other musculoskeletal pain [19]. A study showed that the most frequently reported pain related to smartphone addiction was in the neck (60.8%), followed by the lower back (46.8%) and shoulders (40.0%). [20] It is well known that overuse of the wrist can cause de Quervain's tenosynovitis, but other risk factors, such as age and sex, play a role in causing this condition. Furthermore, a case report published in 2019 suggested that a phone relatively larger than the size of the hand is more likely to lead to this condition. [21] A cross-sectional survey conducted in Karachi, Pakistan assessed the relationship between the frequency of using cell phones and de Quervain's tenosynovitis. It revealed that the more the participants used their phones, the more likely they were to have a positive Finkelstein's sign. [2] A study examined the role of age in de Quervain's tenosynovitis and concluded that the disease is more frequent among females in their thirties to sixties. [22] A 2016 study assessed the relationship between de Quervain's tenosynovitis and the dominant hand, as opposed to the non-dominant hand, using the Disabilities of Arm, Shoulder, and Hand scores. It showed that there was no significance of hand dominance in the development of the condition. [23]

Despite studies examining the prevalence of de Quervain's syndrome among students using smartphones in Saudi Arabia, previous studies have focused on small sample sizes. In addition, previous studies excluded non-medical students from the inclusion criteria. Consequently, and due to scant information relating to de Quervain's tenosynovitis in Saudi Arabia, the issues mentioned above need to be examined in greater detail. Our study was designed to demonstrate the association between the use of smartphones and de Quervain's syndrome in students throughout Saudi Arabia, including medical and non-medical students, and its prevalence in males and females. As highlighted before, age is one of the risk factors that can lead to de Quervain's tenosynovitis, and we intended to examine this variable more closely in our population. We also aimed to compare the degree of pain experienced in the dominant and non-dominant hands in those with positive Finkelstein's sign. Moreover, this study aimed to

determine the duration of phone use in such patients to identify whether it is related to the development of de Quervain's tenosynovitis. There is a paucity of information regarding the relationship between phone size, hand size, and disease development, and our study aimed to address this. Lastly, we aimed to raise public awareness regarding the risk factors that can lead to this condition.

## METHODS:

This was an observational cross-sectional study based on a web-survey and personal questionnaires for students that was developed with high confidence by the authors to review the prevalence of de Quervain's tenosynovitis in Saudi Arabia. The sample size was 338 estimated using the Qualtrics calculator with a confidence level of 95% and a margin of error of 5%; in total, data from 338 students were collected from March 2020 to May 2020. The inclusion criteria were as follows: aged 15–40 years and private or public students who agreed to participate in this study. Those who were younger than 15 years or older than 40 years, or who were not students and those who had a previous pathology that was diagnosed in either wrist were excluded. The questionnaire included some features such as age, sex, and field of study. The participants were asked about the duration of phone use, type of cell phone that they used, and the experience of any pain in the wrist or thumb in the past 6 months. They were also asked to perform the Finkelstein test. The data were collected using Google forms and prepared for analysis using Microsoft Excel. Statistical analysis was performed using the SPSS software for statistical analysis to produce descriptive statistics; examine the correlation between sex and the results of the Finkelstein test; examine the correlation between Finkelstein's test and duration of phone use and phone size relative to hand size; compare the knowledge of the term "de Quervain's tenosynovitis" between medical students and non-medical students; compare the degree of pain between the dominant and non-dominant in those with a positive Finkelstein's sign; and measure the typing speed among those with a positive sign. The study was approved by the institutional review board of KAU in Jeddah, Saudi Arabia. (Reference No 156-20).

## RESULTS:

A total of 338 participants responded to the survey. The age of the participants ranged from 15–40 years, and more than half of the respondents were aged 21–25 years (184 [54.4%]), 15–20 (100 [29.6%]), 26–30 (14 [4.14%]), 31–35 (17 [5.03%]), and 36–40 (23 [6.81%]). Regarding the field of study, nearly half of the students were in the medical field including nursery, medicine, and pharmacy (170 [50.3%]).

Regarding the correlation between sex and results of the Finkelstein test, our results showed that more than half of all male (65.75%) and female (71.35%) participants had a positive Finkelstein's sign. The difference between male and female participants was not significant ( $p = 0.270$ ; Table 1)

**Table 1:** Correlation between sex and Finkelstein test.

Sex	Finkelstein test		Total
	Negative	Positive	
Female	55	137	192
Male	50	96	146
Total	105	233	338

Regarding the correlation between a positive Finkelstein's sign and phone size relative to hand size, our results showed that 64 (69.6%) of those who used smaller phones than their hand size, 151 (69.3%) of those who used a phone of a similar size to their hands, and 18 (64.3%) of those who used a bigger phone than their hand had a positive Finkelstein's sign. The difference among the groups was not significant ( $p = 0.856$ ; Table 2).

**Table 2:** Correlation between positive Finkelstein test and size of phone compared to the hand

Phone Size compared to the participant's hand	Finkelstein test		Total
	Negative	Positive	
Smaller	28	64	92
Equal	67	151	218
Bigger	10	18	28
Total	105	233	338

Regarding the correlation between the positive Finkelstein's sign and duration of phone use, our results showed that 38 (57%) of those who used their phone for  $\leq 6$  hours, 118 (67%) of those who used their phone for 6–8 hours, and 77 (81%) of those who used their phone for  $> 8$  hours had a positive Finkelstein's sign. The difference between the groups was significant ( $p = 0.003$ ; Table 3).

**Table 3:** Correlation between positive Finkelstein test and *duration* of phone use

Duration of Phone Use	Finkelstein test		Total
	Negative	Positive	
Smaller	29	38	67
Equal	58	118	176
Bigger	18	77	95
Total	105	233	338

When comparing the degree of pain between the dominant hand and non-dominant hand in those who had a positive Finkelstein's sign, of 233 participants who had a positive Finkelstein's sign, 112 (48%) reported that the pain was more intense in the dominant hand, 76 (32.6%) reported the pain was equal in both hands, and 45 (19.3%) reported more intense pain in the non-dominant hand; there was no significant difference between the groups (Table 4).

**Table 4:** Comparing the degree of pain between dominant and non-dominant hands in those who tested positive

comparing pain between hands	Finkelstein test		Total
	Negative	Positive	
Equal in both hands	29	38	67
More in the dominant hand	58	118	176
More in the Nondominant hand	18	77	95
Total	105	233	338

Among 338 participants who responded to our survey, 168 (49.7%) were not in the medical field, and the majority (90.5%) of them were not aware of the term "de Quervain's tenosynovitis". Of the remaining 170 (50.3%) who were students in the medical field, the majority (70%) did not have knowledge of the term (Table 5).

**Table 5:** Knowledge assessment of the term De Quervain tenosynovitis between medical students' field and non-medical field students

Specialty	Knowledge of the term		Total
	No	Yes	
Medical field	119	51	170
non-medical field	152	16	168
Total	271	67	338

## DISCUSSION:

Our study showed that among the 388 participants, 68.9% had a positive result in the Finkelstein test. This percentage is higher than that reported in a study conducted in Pakistan, where 42% of adolescents reported pain in the thumb/wrist due to smartphone use. [17] Participants in this study aged 15–40 years, with more than half aged 21–25 years (184 [54.4%]). A previous study found that the syndrome occurs more frequently among females between the ages of 20 and 40 years and is significantly more common among females than among males. [24] Our results showed that among the 192 (56.8%) female participants, more than half (71.35%) had a positive Finkelstein's sign, and among the 146 (43.2%) male participants, more than half (65.75%) had a positive Finkelstein's sign. In our analysis, we did not observe any significant differences between male and female participants likely because we did not target the general population and were more focused on students. Regarding the size of the phone, there was no significant difference in the proportion of participants with a positive Finkelstein's sign among those with a smaller phone than their hand (69.6%), equally sized phone and hand (69.3%), and those with phones bigger than their hands (64.3%). No other study revealed a significant difference, but one study found that 72% of people who had a positive Finkelstein's sign used cellphones lighter than 100 g,

and surprisingly fewer positive signs were found among those who used cellphones heavier than 100g, which might be due to the use of two hands to hold the phone. [15]

We found that 57% of those who used their phone for  $\leq 6$  hours, 67% of those who used their phone for 6–8 hours (67%), and 81% of those who used their phone for  $> 8$  hours had a positive Finkelstein's sign. We compared our data with those of similar studies. They found that overuse of the thumb by mobile texting for hours is considered a risk factor for de Quervain tenosynovitis (4, 32–34), and the results are quite similar to those published by Ali et al. who found that 50% of those who sent 50 text messages per day and 33% of those who sent 100 text messages per day had a positive Finkelstein's sign. [3]

Among the 233 participants who had a positive Finkelstein's sign, 48% reported that the pain was more intense in the dominant hand. Because most activities are usually performed using the dominant hand that involve many wrist movements, pinching, and grasping, the use of the dominant hand while using a smartphone might be considered a risk factor for developing de Quervain's tenosynovitis. A previous study reported that 62.5% of the responders used both hands for texting. However, of those who had a positive Finkelstein's sign, only 23.8% had pain in both hands and 56.8% had pain only in the dominant hand. This indicates that even in people who use their phones with both hands, the dominant hand takes most of the strain and is more at risk for de Quervain's tenosynovitis. [15]

In our survey, 168 students (49.7%) were not in the medical field, and the majority (90.5%) were not aware of the term "de Quervain's tenosynovitis". The remaining 170 (50.3%) were students in the medical field, and the majority (70%) of them also did not know the term.

Therefore, we found a lack of knowledge in both medical and non-medical settings. We advocate raising awareness and knowledge, especially among medical students and staff, to educate the community. Regarding the field of study, nearly half of our participants were in the medical field (170 [50.3%]). Of the 338 participants, more than half had a positive Finkelstein's sign (233 [68.9%]). An Indian meta-analysis study found that the percentage of smartphone addicts ranged from 39% to 44%, and reported that smartphone usage is increasing because it is becoming a fundamental way to spend free time. People who are addicted to smartphones will probably have physical and psychosocial problems, as well as internet addiction. [25] In a study from China, 43.4% of participants experienced thumb/wrist pain due to the use of different electronic devices. [17]

### **Limitations:**

Our study provides an insight into the prevalence of de Quervain's tenosynovitis and its relationship with the overuse of smartphones, based on several factors, such as duration of use, and size. However, there were some limitations. First, our questionnaire was an online form and the authors were not able to supervise the Finkelstein test, which may have resulted in false negatives and positives. We also did not ask about other risk factors, such as going to the gym or having a newborn, as these are other risk factors of the disease and are prevalent among the study population. Students are usually at a young age, so any relationship with age cannot be applied to the general population. In addition, our study had a relatively small sample size. Moreover, we could not differentiate between the touch screen and button phones and did not identify whether they were using their index finger or thumb while texting.

### **CONCLUSION:**

Our study was conducted to demonstrate the association between the use of smartphones and de Quervain's tenosynovitis in students throughout Saudi Arabia, including medical and non-medical students, raising public awareness regarding the risk factors that can lead to this condition since 68.9% of participants had a positive Finkelstein's sign. There was a positive correlation between the duration of phone use and the presence of de Quervain's tenosynovitis; although more studies need to be conducted to confirm a causal association, we recommend trying to limit phone usage among students. Furthermore, the Finkelstein test should be conducted under supervision to avoid false-negative results.

### **Conflicts of Interest:**

The authors have no conflicts of interest to declare.

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This study did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

**Ethical Approval:**

This research was approved by the Institutional Review Board at King Abdulaziz University “KAU” in Jeddah, Saudi Arabia, KSA (reference: IRB-156-20).

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