



## Prevalence of De-Quervains Tenosynovitis in Smart Phone Users in School Going Students Using Finkelstein Test-An Observational Study

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### Abstract

**Aim:** The aim is to study the prevalence of De Quervains tenosynovitis in smart phone users among school going students using Finkelstein test.

**Background:** Excessive use and Smart phone addiction rate among children are constantly increasing day by day, where smart phones become inseparable items from children. Students are using smart phone for Studying, Typing, Playing games and Online lectures, etc. there is excessive overuse of thumb in this activities which can lead to de quervains tenosynovitis.

**Methodology:** A Observational study was conducted among 171 school going students using smart phone for at least 2hrs a day since 1yr in age group 12-16 years in using Convenient sampling method. Finkelstein test is used to, diagnose de quervains tenosynovitis.

**Result:** Among 171 students 91(53.22%) students are positive for De quervains tenosynovitis and 80(46.78%) students are negative.

**Conclusion:** This study concluded that there is high prevalence of de quervains tenosynovitis in smart phone users in school going students.

**Keywords:** De-Quervains Tenosynovitis, Finkelstein test, Smart phone users, School going students

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### Introduction

De Quervain tenosynovitis is the most common over-use injury involving the wrist and often occurs in individuals who regularly use a forceful grasp coupled with ulnar deviation of the wrist. It is a thickening of the sheath encompassing the tendons of the extensor pollicis brevis (EPB) and the abductor pollicis longus (APL) tendon. The EPB and APL tendon provides motion at the first metacarpophalangeal (MCP) and first carpometacarpal (CMC) joint, respectively. These tendons transverse the first dorsal extensor compartment of the forearm and lie superficial to the radial styloid. The EPB tendon inserts onto the base of the proximal phalanx of the thumb, and the APL inserts at the first metacarpal base <sup>[1]</sup>.

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. A chronic overuse syndrome of the wrist and hand and a common cumulative movement disorder De Quervain's tendinitis is defined as a painful symptom of the wrist <sup>[2]</sup>. 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 <sup>[3]</sup>.

The digital era as it is today, the role of mobile, gadgets and the internet in life is essential for working, learning, social media or games. In general, individuals can spend at least three hours a day on internet-related activities. Especially related activities are directly related to computers and the internet. One of the most commonly used types of gadgets is smartphones. In recent years smartphones have shown remarkable growth. No wonder smartphones are the most familiar type of mobile device in human life <sup>[4]</sup>.

It is seen that smartphone usage is more common in young population due to its numerous attractive and interesting applications. Apart from that the tremendous increase of mobile phone in current era primarily involves the dexterousness of thumb functions [5]. Children are incomplete in physical development, so overuse of smart phones will cause negative effects on their physical development. However, excessive use and mobile phone addiction rate are constantly increasing, and predict problems in the young population's physical development, such as the emergence of De Quervain tenosynovitis in children. Mobile phone overuse among children is likely to be continuous throughout the lifetime in our society, where smartphones become increasingly inseparable items from children. There is therefore a big effort to be made by parents and society to prevent this excess in order to fight against physical, but also personal and social loss [6]. The causes of De Quervain tenosynovitis in students is overuse of the thumb as in: in writing, short messaging service SMS, typing, computer users, unnecessary grasping and pinching of objects over a prolonged time [7].

Harry Finkelstein, an American surgeon (1865-1939), described the Finkelstein's test or Finkelstein's sign in 1930. It is a provocative test for diagnosis of De Quervain's disease that can easily be performed in sitting or standing. Finkelstein's test produces severe tenderness and usually pain on the radial aspect of the wrist when the thumb is flexed into the palm and the wrist is ulnar deviated. De Quervain's disease is commonly associated with the repetitive motions that place stress on the wrist. The test is considered positive when the patient complains of pain at dorsolateral aspect of wrist joint [8].

**Materials & Methods**

**Materials:** Pen, Paper, Consent form, Evaluation Sheet

**Methodology**

- a) Study Design – Observational study
- b) Method of Sampling-Convenience Sampling
- c) Sample Size-171
- d) Place of Study- Schools in Jalgaon
- e) Study Duration- 6 months

**Selection Criteria**

- a) Inclusion criteria- 12-16 years old male and female, using smartphones for playing games, online lectures, studying etc. for at least 2hrs a day since 1yr.
- b) Exclusion criteria- Recent injury, any previous fracture of upperlimb.

**Outcome Measure:** Finkelstein test



**Procedure**

A Observational study will be conducted among school going students using smart phone for at least 2hrs a day since 1yr in age group 12-16 years in Jalgaon. Ethical clearance was obtained from the institutional ethical committee of Dr Ulhas Patil College of physiotherapy, Jalgaon. As per the inclusive and exclusive criteria, 171 School Going Students both males and females of 12 to 16 years of age, using smart phones for at least 2hr a day since 1 year were included. Finkelstein test is used to, diagnose de quervains tenosynovitis. Finkelstein test is performed when the thumb is flexed into the palm and the wrist is ulnar deviated. The test is considered positive when the patient complains of pain at dorsolateral aspect of wrist joint.

**Result**

Demographic characteristics of participants:

**Table 1:** The Age Wise Distribution

Sr. No	Age	No of Subjects	Percentage
1	12	39	22.80%
2.	13	25	14.61%
3.	14	33	19.29%
4.	15	43	25.14%
5.	16	31	18.12%

**Comment-**The table and Graph 1 shows age wise distribution of subjects in which 12 age group includes 39 (22.80%) subjects 13 includes 25 (14.61%) subjects 14 include 33 (19.29%) subjects 15 include 43(25.14%) subjects and 16 include 31(18.12%) subjects.

**Table 2:** The Gender wise distribution

Sr. no	Gender	No of Subjects	Percentage
1.	Male	99	57.89%
2.	Female	72	42.11%
3.	Total	171	100%

**Comment:** Total 171 subjects are present in the study out of which 57% (99) subjects are male and 43% (72) subjects are female.

**Table 3:** No of hours smart phone used

No of Hours Smart Phone Used	No of Subjects	No of Positive Subjects	Percentage
2-3 hrs	89	39	43.82%
3-4 hrs	82	52	63.41%

**Comment-** Total 171 subjects were included in the study out of which 89 subjects were using smart phone for 2-3 hours and 82 subjects were using for 3-4 hours out of which 39 students were positive for 2-3 hours and 52 subjects were positive for 3-4 hours of smart phone use.

**Table 4:** Prevalence of De Quervains Tenosynovitis

Test	Result	Frequency	Percentage
Finkelstein test	Positive	91	53.22%
	Negative	80	46.78%

**Comment -**Among 171 students 91(53.22%) students are positive for De quervains tenosynovitis and 80(46.78%) students are negative.

## Discussion

The aim of the study is to find the prevalence of De Quervain's Tenosynovitis in smart phone users among school going students aged 12-16yrs in this study Finkelstein test is used to screen and diagnose them as de quervain's disease.

Total 171 subjects were included in the study out of which 99(57.89%) participants were male and 72(42.11%) were female. Among 171 subjects 89 subjects were using smart phone for 2-3 hours and 82 subjects were using for 3-4 hours out of which 39 (43.82%) students were positive for 2-3 hours and 52(63.41%) subjects were positive for 3-4 hours of smart phone use. In a study of Bashar Reada *et al* the correlation between the positive Finkelstein's sign and duration of phone use showed that 38(57%) of those who used their phone for <6hours, 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 sign. A study done by Vicente Alexandre in (2020) in Peru found an association between having occasional or frequent problematic smartphone use with a higher prevalence of DQT Symptomatology, assessed by Finkelstein test and found association between the number of hours per day of smartphone use and prevalence of de quervain's tenosynovitis [10].

Sohail Iqbal *et al* conducted a study on Frequency of De Quervain's tenosynovitis in mobile users among Undergraduate Students of Allied Health science Peshawar (2022). Finkelstein test was performed to diagnose De Quervain's syndrome. Out of 384 participants 315 (82%) were male and 69 (18%) were females, Finkelstein test was positive in 223 (58.1%) participants and negative in 161(41.9%) participants. Thus it shows that mobile phone users are at greater risk of developing De Quervain's syndrome due to repetitive movement of thumb while mobile texting, playing games without taking rest in between activities. Thus it concludes that the more the use of smart phone the more the prevalence of de quervain's occurs.

Tendon sheaths which have a tubular structure surrounding muscle tendons, consist of two layers: an internal synovial membrane and an external fibrous layer. These sheaths reduce friction, facilitate tendon movement, and help maintain tendon alignment against the bone. Repetitive damage and regeneration of the retinaculum lead to the formation of degenerated scar tissue. The resulting oversized, fibrotic retinaculum exerts pressure on the tendon, causing pain during wrist and thumb movements, particularly during flexion and extension, thus due to the repetitive activity of thumb while using smartphone causes friction over the tendon sheath results in the narrowing of the synovial membrane and causes pain during wrist and thumb movement.

The use of computers and mobile phones among younger peer group for the access and exposure to different types of information and communication has intensely increased over recent years causing such problems. Due to the overuse of the thumb musculature pain arises that spread over the surface of the radial aspect of the wrist and severity decreases by ulnar deviation of the hand and thus it shows that De Quervain's tenosynovitis is due to the overuse of thumb musculature.

Bashar Reade *et al* conducted a study on Prevalence and Awareness Evaluation of De Quervain's Tenosynovitis among Students in the Kingdom of Saudi Arabia A total of 338 participants responded to the survey. The age of participants ranged from 15 to 40 years. More than half of them had a positive result in the Finkelstein test (233

[68.9%]) and (192 [56.8%]) were females among them 137(71.35%) were positive for Finkelstein test in the present study there is no significant difference between males and females participants because only students were focused.

A study was carried out in 2019 by Titania Ma *et al*. Conducted a study on 500 students aged 16-20years. The statistical analysis shows that more frequent play, prolonged mobile gaming time per day, and changes in wrist position were significantly correlated with the positive rate of Finkelstein test. According to the study, 226(49.0%) of students had De Quervain's tenosynovitis, mobile gaming should be limited to 2.25 hours per day in order to prevent De Quervain's disease. DQT therefore had a high frequency among young adult online gamers. Similarly in our study there is high prevalence of de quervain's tenosynovitis in smart phone users in school going students Total 171 Participants were included in the study out of which 91(53.22%) are positive for De quervain's tenosynovitis and 80(46.78%) are negative.

## Conclusion

This study concluded that there is high prevalence of de quervain's tenosynovitis in smart phone users in school going students. Among 171 students 91(53.22%) are positive for De quervain's tenosynovitis and 80(46.78%) are negative. It also concludes that there is a positive association between the duration of phone use and the presence of de Quervain's tenosynovitis.

## Future Scope

1. Research can be done to study any significant variations between males and females.
2. Further studies can be conducted to minimize the risk of developing de quervain's tenosynovitis.
3. Findings could influence public health policies and awareness campaigns aimed at parents and educators emphasizing the need for monitoring children's technology use and its potential health impacts.

## Clinical Implication

1. Raising awareness about the risks associated with excess use of smart phone and teaching proper techniques.
2. Encouraging users to take frequent breaks and perform wrist and thumb stretches to prevent overuse.

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