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Original Article

Prevalence of De-Quervain Tenosynovitis and It's Association with Smart Phone Use Among Medical and Healthcare Students of Mirpurkhas

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ABSTRACT

Background: Smartphone-related thumb activity may contribute to wrist symptoms, but associations with findings suggestive of De Quervain's tenosynovitis remain uncertain. Objective: To determine the frequency of positive provocative wrist-test findings and their association with smartphone-use characteristics among medical and healthcare students in Mirpurkhas. Methods: This cross-sectional study included 250 students recruited through convenience sampling at Bhitai Group of Colleges and Ibn-E-Sina University, Mirpurkhas, during January–June 2023. A self-administered questionnaire assessed phone use and functional difficulty, alongside a provocative wrist assessment. Analyses included frequencies, Wilson confidence intervals, Pearson's chi-square and conditional exact tests, Cramér's V, and Holm adjustment for six functional comparisons. Results: Participants were predominantly female (63.2%) and aged 18–22 years (79.2%). Positive wrist-test findings occurred in 165 participants (66.0%; 95% CI: 59.9–71.6%). Test status was not significantly associated with daily phone-use duration (p = 0.965), message frequency (p = 0.054), device type (p = 0.875), estimated weight (p = 0.370), or typing speed (p = 0.633). Initial associations with selected functional activities did not remain significant after Holm adjustment. Conclusion: Positive provocative wrist-test findings were common, but the assessed smartphone-use characteristics were not significantly associated with test status. These findings do not establish clinically confirmed disease or causation. Keywords: De Quervain tenosynovitis; Smartphone; Students; Wrist pain; Cross-sectional study.

INTRODUCTION

De Quervain's tenosynovitis (DQT) is a painful disorder affecting the abductor pollicis longus and extensor pollicis brevis tendons within the first dorsal compartment of the wrist. It commonly presents radial-sided wrist pain aggravated by thumb movement, grasping, and ulnar deviation, potentially interfering with routine hand activities

(1). Although frequently described as an inflammatory condition, histopathological findings include fibrotic thickening and structural changes in the tendon sheath, indicating that its pathology is more complex than inflammation alone (2). Differences in disease occurrence across demographic and occupational groups suggest that individual characteristics and mechanical exposures may contribute to its development. Research in a young, active population identified differences in incidence according to sex and age, while an occupational study examined associations with repetitive hand movements and demanding wrist postures (3,4).

Smartphone use provides a relevant context for investigating wrist and thumb symptoms because texting and other touchscreen activities involve repeated thumb movements and sustained device handling. These activities require combinations of thumb flexion, extension, abduction, and opposition, with movement patterns influenced by device characteristics and hand size. Research comparing touchscreen and keypad phones has demonstrated differences in thumb kinematics, upper-limb muscle activity, discomfort, and performance, supporting investigation of the mechanical demands associated with different patterns of phone use (5). Studies examining smartphone overuse have also considered hand function, pinch strength, and median nerve characteristics, extending concern beyond subjective discomfort alone (6). Nevertheless, biomechanical plausibility does not establish that smartphone use causes DQT, and associations require interpretation in relation to exposure measurement, clinical assessment, and other repetitive hand activities.

Medical and healthcare students constitute a relevant population for this investigation because smartphones provide access to educational resources, clinical information, and communication applications. A systematic review of healthcare smartphone applications highlighted their role in supporting healthcare-related activities, illustrating the practical importance of these devices within medical learning and practice (7). Their usefulness makes it necessary to examine whether particular usage characteristics, rather than smartphone ownership alone, are associated with wrist and thumb symptoms. In this context, daily use duration, texting frequency, typing behaviour, and device characteristics are relevant exposures for evaluating potential relationships with provocative-test findings and self-reported functional difficulty.

Previous observational studies have investigated these relationships in several populations. Research on SMS texting examined the frequency of DQT and its association with messaging behaviour, while a cross-sectional study in Karachi explored DQT occurrence in relation to texting habits (8,9). Among medical students, Baabdullah et al. investigated the association between smartphone addiction and thumb or wrist pain, addressing symptoms in a population closely related to the present study (10). Benites-Zapata et al. similarly reported an association between problematic smartphone use and DQT symptomatology among young adults (11). Research on mobile gaming also identified associations between positive provocative-test findings and gaming frequency, duration, and wrist position (12). Collectively, these studies justify further investigation, but their findings should not be treated as interchangeable because texting exposure, problematic smartphone use, gaming behaviour, pain, and clinically assessed tendon disorders represent different constructs.

Outcome definition is particularly important when interpreting this literature. Self-reported thumb or wrist pain does not necessarily represent the same outcome as clinically diagnosed DQT, and the interpretation of provocative-test findings depends on the examination procedure used. Published descriptions distinguish Finkelstein's test from Eichhoff's maneuver, emphasizing the need for consistent technique and accurate terminology when reporting findings (13,14). Differences in assessment procedures, participant characteristics, and exposure definitions may therefore limit direct comparison of reported frequencies across studies. Furthermore, cross-sectional associations cannot determine whether greater smartphone use preceded symptoms or whether participants changed their phone-use behaviour after developing discomfort.

The literature reviewed provides evidence from general populations, young adults, medical students, and gaming populations, but does not establish the frequency of DQT-related provocative-test findings or their relationship with smartphone-use characteristics among medical and healthcare students in Mirpurkhas. Evidence specific to this population would help characterize the local burden of wrist and thumb problems and inform subsequent research on student hand health. Accordingly, this cross-sectional study aimed to estimate the proportion of medical and healthcare students in selected institutions in Mirpurkhas with positive provocative-test findings suggestive of DQT and to examine their associations with reported smartphone-use characteristics. Associations between test findings and self-reported difficulty performing routine hand activities were also explored.

MATERIAL AND METHODS

A cross-sectional study was conducted among medical and healthcare students at Bhitai Group of Colleges and Ibn-E-Sina University in Mirpurkhas, Sindh, Pakistan, during January–June 2023. The design enabled assessment of the frequency of provocative wrist-test positivity and its association with reported smartphone-use characteristics at a single assessment. The overall study period was six months, with questionnaire administration and wrist assessment undertaken during an approximately two-week data-collection period.

Participants were recruited using non-probability convenience sampling, and the study included 250 students. Eligibility criteria comprised current enrolment in medical or healthcare education, age between 18 and 29 years, smartphone use, and willingness to participate. Both male and female students were eligible. Non-medical students, individuals outside the specified age range, and those with reported carpal tunnel syndrome, hand or wrist tendinitis, or trigger finger were excluded. Permission to approach students was obtained from the participating institutions. Eligible students received an explanation of the study purpose and procedures, instructions for completing the questionnaire, and an opportunity to ask questions. Participation was voluntary, and written informed consent was obtained before data collection.

Data were collected using a demographic form, a self-administered questionnaire, and a provocative wrist assessment. Demographic information included age, sex, educational level, and dominant hand. The questionnaire comprised sections addressing concomitant health conditions, mobile-phone use, and wrist or thumb symptoms and functional difficulty. Participants reported diabetes, hypertension, and participation in weight training. These characteristics were considered potential correlates of wrist-test findings.

Mobile-phone exposure variables included device type, perceived device size relative to the participant's hand, estimated device weight, texting hand, self-rated typing speed, daily use duration, and the number of messages sent per day, including messages sent through social-media applications. Device type was recorded as standard, QWERTY-keyboard, or touchscreen. Relative device size was classified as smaller than, equal to, or larger than the hand, and estimated weight was recorded as less than 100 g, 100–200 g, or more than 200 g. Texting hand was recorded as right, left, or both hands. The questionnaire assessed daily phone use over the preceding six months using the categories 1–2, 2–4, 4–6, 6–8, and more than 8 hours. Message frequency was recorded as fewer than 50, 50–100, 100–200, or more than 200 messages per day. Participants could identify multiple purposes of phone use, including texting, gaming, calling, reading, and internet use.

Symptom questions addressed wrist or thumb pain during the preceding six months and whether pain was related to a previous injury. Additional items assessed perceived reduction in grip strength, snapping during hand movement, numbness or tingling after prolonged phone use, and symptoms involving the shoulders, hands, neck, and upper back. Difficulty performing routine activities was assessed using three response categories: very difficult, mildly difficult, and not difficult. Activities included twisting a key, unbuttoning a shirt, opening a door, pinching, unscrewing a jar lid, gripping objects, and typing on a keyboard. These responses represented self-reported functional difficulty rather than objectively measured strength or performance.

The wrist assessment evaluated pain provoked at the radial side of the wrist during ulnar deviation. The examination instructions included in the study questionnaire specified placing the thumb inside a closed fist while a second person stabilized the forearm and passively deviated the wrist. The procedure was repeated on both hands, and radial-sided wrist pain was recorded as a positive finding. Participants with positive findings compared pain between their dominant and non-dominant hands or reported equal pain in both hands. Provocative-test findings were treated as the study outcome suggestive of DQT; interpretation of this assessment requires distinction between the Finkelstein and Eichhoff maneuvers described in the clinical literature (13,14).

Data were coded and analysed using SPSS. Categorical variables were summarized as frequencies and percentages. The analysis described participant characteristics, mobile-phone exposures, and the proportion with positive wrist-test findings. Associations were evaluated between test status and sex, reported diabetes and hypertension, device characteristics, daily phone-use duration, message frequency, and typing speed. Associations between test status and reported difficulty performing routine hand activities were also examined. The reported analyses consisted of unadjusted comparisons, with statistical significance defined as $p < 0.05$.

Ethical approval was obtained from the institutional review board of Bhitai Institute of Physical Therapy and Rehabilitation Sciences, Mirpurkhas. Institutional permission and participant consent preceded data collection. Participant confidentiality was maintained, and research data were coded for analysis.

RESULTS

A total of 250 medical and healthcare students were included. Most participants were aged 18–22 years (198; 79.2%), female (158; 63.2%), right-hand dominant (234; 93.6%), and undergraduates (242; 96.8%) (Table 1). The provocative wrist test was positive in 165 participants, corresponding to a test-positive proportion of 66.0% (95% CI: 59.9–71.6%) (Table 2).

Touchscreen devices were used by 239 participants (95.6%), and 184 (73.6%) estimated their device weight at 100–200 g. The largest daily-use category was 4–6 hours (69; 27.6%), while 60 participants (24.0%) reported more than eight hours of daily use. Fewer than 50 messages per day were reported by 102 participants (40.8%), and 43 (17.2%) reported more than 200 messages daily. Typing speed was rated as moderate by 180 participants (72.0%) (Table 3).

The tables below use complete, internally consistent distributions. Percentages and association tests were recalculated from the reported counts. The female total of 158 is supported by the abstract and sex cross-tabulation; message-frequency counts follow the complete cross-tabulation. Conflicting phone-size, texting-hand, hypertension, and pain-laterality counts are excluded pending reconciliation. Continuous summaries and adjusted regression estimates cannot be reconstructed from these aggregate data.

Table 1. Participant characteristics (N = 250)

Characteristic	Category	n (%)
Age, years	18–22	198 (79.2)
	23–27	52 (20.8)
Sex	Male	92 (36.8)
	Female	158 (63.2)
Dominant hand	Right	234 (93.6)
	Left	16 (6.4)
Educational level	Undergraduate	242 (96.8)
	Graduate	8 (3.2)
Diabetes	Yes	2 (0.8)
	No	248 (99.2)

Table 2. Provocative wrist-test findings (N = 250)

Test result	n (%)	Proportion, 95% CI (%)
Positive	165 (66.0)	59.9–71.6
Negative	85 (34.0)	28.4–40.1

CI: confidence interval. Confidence intervals were calculated using the Wilson method.

Table 3. Mobile-phone characteristics and use according to provocative wrist-test status

Variable	Category	Total, n (%)	Positive, n (% within category)	Negative, n (% within category)
Device type	Standard	9 (3.6)	6 (66.7)	3 (33.3)
	QWERTY keyboard	2 (0.8)	2 (100.0)	0 (0.0)
	Touchscreen	239 (95.6)	157 (65.7)	82 (34.3)
Estimated device weight, g	<100	28 (11.2)	16 (57.1)	12 (42.9)
	100–200	184 (73.6)	126 (68.5)	58 (31.5)
	>200	38 (15.2)	23 (60.5)	15 (39.5)
Daily phone use, hours	1–2	18 (7.2)	11 (61.1)	7 (38.9)
	2–4	41 (16.4)	28 (68.3)	13 (31.7)
	4–6	69 (27.6)	44 (63.8)	25 (36.2)
	6–8	62 (24.8)	41 (66.1)	21 (33.9)
	>8	60 (24.0)	41 (68.3)	19 (31.7)
Messages sent daily	<50	102 (40.8)	58 (56.9)	44 (43.1)
	50–100	49 (19.6)	34 (69.4)	15 (30.6)
	100–200	56 (22.4)	39 (69.6)	17 (30.4)
	>200	43 (17.2)	34 (79.1)	9 (20.9)
Typing speed	Slow	16 (6.4)	10 (62.5)	6 (37.5)

Variable	Category	Total, n (%)	Positive, n (% within category)	Negative, n (% within category)
	Moderate	180 (72.0)	122 (67.8)	58 (32.2)
	Fast	54 (21.6)	33 (61.1)	21 (38.9)

Total percentages use N = 250; test-status percentages use the total within each category.

Table 4. Associations of participant and mobile-phone characteristics with provocative wrist-test status

Variable	Pearson χ^2	df	p-value	Cramér's V
Sex	0.227	1	0.634	0.030
Diabetes	0.230	1	1.000[a]	0.030
Device type	1.042	2	0.875[b]	0.065
Estimated device weight	1.990	2	0.370	0.089
Daily phone-use duration	0.587	4	0.965	0.048
Daily message frequency	7.650	3	0.054	0.175
Typing speed	0.916	2	0.633	0.061

df: degrees of freedom. Unmarked p-values use Pearson's chi-square test without continuity correction. [a]Two-sided Fisher's exact test. [b]Fisher–Freeman–Halton conditional test with Monte Carlo estimation using 200,000 resamples and random seed 20260914. Cramér's V was calculated from Pearson's χ^2. Statistical significance threshold: $p < 0.05$.

Table 5. Self-reported functional difficulty according to provocative wrist-test status

Activity	Difficulty	Positive, n (%), n = 165	Negative, n (%), n = 85
Twisting a key	Very difficult	3 (1.8)	1 (1.2)
	Mildly difficult	19 (11.5)	2 (2.4)
	Not difficult	143 (86.7)	82 (96.5)
Unbuttoning a shirt	Very difficult	0 (0.0)	2 (2.4)
	Mildly difficult	12 (7.3)	1 (1.2)
	Not difficult	153 (92.7)	82 (96.5)
Opening a door	Very difficult	1 (0.6)	0 (0.0)
	Mildly difficult	14 (8.5)	3 (3.5)
	Not difficult	150 (90.9)	82 (96.5)
Pinching	Very difficult	4 (2.4)	0 (0.0)
	Mildly difficult	24 (14.5)	8 (9.4)
	Not difficult	137 (83.0)	77 (90.6)
Unscrewing a jar lid	Very difficult	9 (5.5)	1 (1.2)
	Mildly difficult	35 (21.2)	10 (11.8)
	Not difficult	121 (73.3)	74 (87.1)
Gripping objects	Very difficult	6 (3.6)	0 (0.0)
	Mildly difficult	36 (21.8)	15 (17.6)
	Not difficult	123 (74.5)	70 (82.4)

Percentages use the corresponding test-status group denominator.

Table 6. Associations between functional difficulty and provocative wrist-test status

Activity	p-value	Holm-adjusted p-value	Cramér's V
Twisting a key	0.029	0.145	0.159
Unbuttoning a shirt	0.020	0.118	0.179
Opening a door	0.222	0.427	0.104
Pinching	0.206	0.427	0.120
Unscrewing a jar lid	0.035	0.145	0.164
Gripping objects	0.142	0.427	0.127

P-values use the Fisher–Freeman–Halton conditional test with Monte Carlo estimation using 200,000 resamples and random seed 20260914. Holm adjustment covers the six functional comparisons. Cramér's V was calculated from Pearson's χ^2. Statistical significance threshold: $p < 0.05$.

No statistically significant associations were detected between test status and sex, diabetes, device type, estimated device weight, daily phone-use duration, or typing speed. Daily phone-use duration showed little association with test status ($\chi^2 = 0.587$, df = 4, $p = 0.965$; Cramér's V = 0.048). Test positivity ranged from 56.9% among participants sending fewer than 50 messages daily to 79.1% among those sending more than 200. However, the overall association across message-frequency categories did not reach the specified significance threshold ($\chi^2 = 7.650$, df = 3, $p = 0.054$; Cramér's V = 0.175) (Tables 3 and 4).

Most participants in both test-status groups reported no difficulty with the assessed activities. Among test-positive participants, 21.2% reported mild difficulty unscrewing a jar lid and 21.8% reported mild difficulty gripping objects, compared with 11.8% and 17.6%, respectively, among test-negative participants (Table 5). Unadjusted comparisons identified differences in difficulty distributions for twisting a key ($p = 0.029$), unbuttoning a shirt ($p = 0.020$), and unscrewing a jar lid ($p = 0.035$). After Holm adjustment across the six functional comparisons, none met the significance threshold; corresponding adjusted p-values were 0.145, 0.118, and 0.145. Functional association effect sizes ranged from Cramér's $V = 0.104$ to 0.179 (Table 6).

DISCUSSION

This study identified a high proportion of positive provocative wrist-test findings among medical and healthcare students in Mirpurkhas but did not demonstrate statistically significant associations with the assessed smartphone-use characteristics. Although test positivity varied across message-frequency categories, the overall association did not reach the specified significance threshold. Associations with selected functional activities were observed before adjustment for multiple comparisons, but none remained statistically significant after adjustment. These findings distinguish the frequency of positive examination findings from evidence that smartphone-use patterns explain their occurrence.

The observed test-positive proportion should be interpreted in relation to the outcome assessed. Previous studies have examined DQT in connection with SMS texting, smartphone-related pain, and problematic smartphone use, but these outcomes and exposures are not equivalent (8–11). Baabdullah et al. investigated thumb and wrist pain in relation to smartphone addiction, whereas Benites-Zapata et al. examined DQT symptomatology among young adults (10,11). Differences between reported frequencies may therefore reflect symptom definitions, examination procedures, recruitment methods, and participant characteristics rather than differences in underlying disease burden. In the present study, the findings more directly describe pain elicited during a provocative maneuver than independently confirmed clinical DQT.

This distinction is particularly relevant because the questionnaire described placing the thumb inside a fist before ulnar deviation, whereas another methodological description referred to an examiner-held thumb maneuver. Published descriptions distinguish Finkelstein's test from Eichhoff's maneuver, making consistent technique and terminology essential when interpreting examination findings (13,14). Uncertainty about the procedure limits comparison with studies using other diagnostic approaches. Consequently, the high proportion of positive findings should not be interpreted as evidence that an equivalent proportion of students had clinically established tendon disease or substantial functional impairment.

The absence of a statistically significant association with daily phone-use duration differs from the associations described in some studies of texting and problematic smartphone use (8,9,11). One possible explanation is that total daily use is an imprecise indicator of repetitive thumb loading. Time spent reading or viewing content may involve different mechanical demands from active texting or gaming. Research comparing touchscreen and keypad phones has demonstrated that thumb movement and muscle activity vary with device characteristics and hand size, supporting the importance of how a device is used rather than duration alone (5). The broad, self-reported exposure categories in the present study may therefore have obscured differences in mechanically demanding activities.

Message frequency showed the largest association effect size among the assessed smartphone-use variables, although the overall comparison remained nonsignificant. The higher test-positive proportion in the highest messaging category is compatible with the hypothesis that repeated thumb activity may be more relevant than total phone-use duration. However, this descriptive pattern does not establish a dose–response relationship, particularly because the analysis was unadjusted and the exposure categories were broad. The findings should therefore be considered alongside earlier texting studies without presenting them as confirmation of an association (8,9). Prospective assessment using recorded device activity and clearly defined clinical outcomes would help distinguish cumulative exposure from changes in behaviour following symptom onset.

A mechanical explanation for thumb and wrist symptoms remains plausible. The abductor pollicis longus and extensor pollicis brevis tendons pass through the first dorsal compartment, where restricted tendon movement and sheath thickening may contribute to pain during thumb and wrist activity (1,2). Repeated thumb movements, sustained gripping, and particular wrist positions could influence local loading, although these mechanisms were

not measured in this study. Occupational research has investigated repetitive movements and demanding wrist postures as correlates of DQT, while experimental phone-use research has demonstrated differences in movement and muscle activity across devices (4,5). These findings provide biological context but do not establish that smartphone use caused the examination findings observed here.

Device type and estimated weight were not significantly associated with test status. Interpretation of the device-type comparison is limited by the predominance of touchscreen phones and the very small numbers using other devices. Similarly, estimated weight categories cannot capture all aspects of device handling, including grip force, support from the other hand, or the relationship between device dimensions and hand size. The present findings therefore do not establish equivalence between device categories or identify a protective device weight. The role of device–hand interaction remains relevant to future investigation because biomechanical differences during phone use have been demonstrated under controlled conditions (5).

The functional findings also require cautious interpretation. Most participants reported no difficulty with the assessed activities, despite the relatively high frequency of positive provocative tests. This suggests that test positivity did not uniformly coincide with self-reported activity limitation. Initial associations involving twisting a key, unbuttoning a shirt, and unscrewing a jar lid did not persist after adjustment across the six functional comparisons. Sparse responses in some difficulty categories further limit interpretation. Although previous research has examined hand function and pinch strength in relation to smartphone overuse, the present questionnaire measured perceived difficulty rather than objective strength or performance (6). It cannot establish clinically important functional impairment or the severity of DQT.

Sex was not significantly associated with test status, despite women comprising most of the sample. This differs from the sex-related incidence differences reported by Wolf et al., but the studies assessed different populations and outcomes (3). A cross-sectional provocative-test finding among students is not directly comparable with diagnosed incident disease measured over person-time. Similarly, the low frequency of diabetes in this sample does not exclude its relevance in other populations or establish smartphone use as the principal explanation for symptoms. Other repetitive hand activities and individual susceptibility remain potential contributors (4).

The findings have implications for student health because smartphones serve educational and communication functions that make simple avoidance an impractical interpretation of the evidence (7). A high frequency of provoked wrist pain supports attention to symptom assessment, but does not justify attributing symptoms automatically to smartphone use or imposing a specific daily-use threshold. Clinical interpretation should distinguish examination findings from persistent pain and activity limitation, with consideration of alternative explanations. Although gaming research has explored duration and wrist position, those findings cannot be transferred directly to this study, which did not report corresponding exposure analyses (12).

Strengths include the assessment of students from two institutional settings, the inclusion of several phone-use characteristics, and the consideration of both examination findings and routine hand activities. Reporting the test-positive proportion with a confidence interval improves the presentation of statistical precision, while appropriate treatment of sparse contingency tables and adjustment of exploratory functional comparisons reduce reliance on isolated p-values. Nevertheless, these analytical improvements do not remove limitations arising from participant selection or measurement.

Several limitations affect interpretation. Convenience sampling restricts generalizability, and the predominance of younger, female, undergraduate participants may not reflect all medical and healthcare students in Mirpurkhas. The cross-sectional design cannot establish temporal order, and students may have modified their phone use after developing symptoms. Self-reported exposure over six months is susceptible to recall error, while broad categories and overlapping category boundaries reduce measurement precision. The restriction to phone users also prevents comparison with a non-user group. Diagnostic uncertainty, the absence of a documented independent clinical reference assessment, and the lack of reported questionnaire validation further limit interpretation. Analyses were unadjusted, and the effects of other repetitive activities, previous symptoms, and institutional differences could not be separated. Inconsistent counts for some variables prevented their inclusion in the reconciled analyses. Finally, the confidence interval describes uncertainty around the observed test-positive proportion and does not account for selection or measurement bias. These limitations support interpreting the study as evidence of

frequent provocative wrist-test findings in the sampled students, with inconclusive evidence concerning their relationship to smartphone-use characteristics.

CONCLUSION

Positive provocative wrist-test findings suggestive of DQT were common among the sampled medical and healthcare students in Mirpurkhas, but the assessed smartphone-use characteristics were not significantly associated with test status. Associations with selected functional activities did not remain significant after adjustment for multiple comparisons. The findings indicate that frequent positive examination findings should be distinguished from confirmed clinical disease and do not establish smartphone use as their cause.

REFERENCES

1. Moore JS. De Quervain's tenosynovitis: stenosing tenosynovitis of the first dorsal compartment. J Occup Environ Med. 1997:990–1002.
2. Clarke M, Lyall H, Grant J, Matthewson M. The histopathology of de Quervain's disease. J Hand Surg Br. 1998;23(6):732–4.
3. Wolf JM, Sturdivant RX, Owens BD. Incidence of de Quervain's tenosynovitis in a young, active population. J Hand Surg Am. 2009;34(1):112–5.
4. Le Manac'h AP, Roquelaure Y, Ha C, Bodin J, Meyer G, Bigot F, et al. Risk factors for de Quervain's disease in a French working population. Scand J Work Environ Health. 2011:394–401.
5. Gustafsson E, Coenen P, Campbell A, Straker L. Texting with touchscreen and keypad phones—a comparison of thumb kinematics, upper limb muscle activity, exertion, discomfort, and performance. Appl Ergon. 2018;70:232–9. doi: 10.1016/j.apergo.2018.03.003.
6. İnal EE, Demirci K, Çetintürk A, Akgönül M, Savaş S. Effects of smartphone overuse on hand function, pinch strength, and the median nerve. Muscle Nerve. 2015;52(2):183–8.
7. Mosa ASM, Yoo I, Sheets L. A systematic review of healthcare applications for smartphones. BMC Med Inform Decis Mak. 2012;12:67. doi: 10.1186/1472-6947-12-67.
8. Ali M, Asim M, Danish SH, Ahmad F, Iqbal A, Hasan SD. Frequency of De Quervain's tenosynovitis and its association with SMS texting. Muscles Ligaments Tendons J. 2014;4(1):74.
9. Ahmed N, Iftikhar HY, Javed R, Warda T, Samad S. Occurrence of De Quervain's tenosynovitis and its association with short message service texting habit: a cross-sectional study in the general population of Karachi, Pakistan. Int Arch BioMed Clin Res. 2019;5(1):7–11.
10. Baabdullah A, Bokhary D, Kabli Y, Saggaf O, Daiwali M, Hamdi A. The association between smartphone addiction and thumb/wrist pain: a cross-sectional study. Medicine (Baltimore). 2020;99(10).
11. Benites-Zapata VA, Jiménez-Torres VE, Ayala-Roldán MP. Problematic smartphone use is associated with de Quervain's tenosynovitis symptomatology among young adults. Musculoskelet Sci Pract. 2021;53:102356.
12. Ma T, Song L, Ning S, Wang H, Zhang G, Wu Z. Relationship between the incidence of de Quervain's disease among teenagers and mobile gaming. Int Orthop. 2019;43(11):2587–92. doi: 10.1007/s00264-019-04389-9.
13. Dawson C, Mudgal CS. Staged description of the Finkelstein test. J Hand Surg Am. 2010;35(9):1513–5.
14. Wu F, Rajpura A, Sandher D. Finkelstein's test is superior to Eichhoff's test in the investigation of de Quervain's disease. J Hand Microsurg. 2018;10(2):116–8.