

RELATIONSHIP RELATIONSHIP BETWEEN THE DURARTION AND POSITION OF SMARTPHONE USAGE WITH INCIDENE OF DE QUERVAIN'S SYNDROME AT STUDENT OF THE JUNIOR HIGH SCHOOL

Grace Yohana, Nia Kurniawati*, Ahmad Syakib
Health Polytechnic of Ministry of Jakarta III
*niakurniawati.physiotherapy@gmail.com

ABSTRACT

In the era of digital, smartphone is one of the most commonly communication device. The largest of smartphone users are held by students. Excessive use and repeatly position use of smartphone can cause health problems,one of them is de quervain's syndrome. This study use analytical observasional with a cross sectional approach with total of respondents is 186 students class of nine. Most of respondents have a positive finkelstein test. The result of data was analyzed of chi square statistical test are significant between duration of smartphone use with incidence of de quervain's syndrome showed p-value 0,008 and also significant results between the position of smartphone use with incidence of de quervain's syndrome sshowed p-value 0,032. There is a relationship between the duration and position of smartphone usage on the incidence of de quervain's syndrome at student of the Junior High School 5 Lahat.

Keywords: *duration of usage, position of usage, smartphone, de quervain's syndrome*

INTRODUCTION

The digital age as it is today, the role of computers, 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 (Mandias and Dengah, 2019). One of the most commonly used types of gadgets is smartphones. In recent years, smartphones have shown remarkable growth with an estimated annual global shipment of 1.42 billion units in 2018. No wonder smartphones are the most familiar type of mobile device in human life (Lee, 2018).

The Indonesian Ministry of Communication and Information said that Indonesia is the country with the fourth largest number of internet users in the world and has an internet penetration rate of 73.7% of the total population or about 202.6 million users. In addition, users of digital services in Indonesia grew by about 37% during the pandemic (Kominfo RI, 2021). According to the data from Weare Social: Hootsuite, the prevalence of internet-connected smartphone use in Indonesia in January 2021 reached 345.3 million users, which means that there was an increase in January 2020 to January 2021 which increased 1.2% from last year (KEMP, 2021).

The majority of smartphone users in Indonesia are among students. According to data (Central Statistical Agency, 2020), the use of smartphones among students increases every year. Where the largest smartphone usage among students is high school students 91.01% followed by junior high school students 73.4% and elementary school 35.97%. The use of smartphones in students has many benefits such as increasing insight by browsing on the internet, facilitating communication with friends, and becoming an entertainment medium (Maknuni, 2020). However, there are a lot of students who depend on smartphones, where junior high school children spend an average of 1 to 5 hours a day using smartphones (Alhady, Salsabila and Azizah, 2018). This should be noted because according to research conducted by Benites-Zapata, Jiménez-Torres and Ayala-Roldán, 2021) suggests that smartphone usage dependence has a high risk of musculoskeletal diseases such as de quervain's syndrome. And another study says using a smartphone for more than 5 hours can cause de quervain's syndrome (Hingarajia et al., 2018).

De quervain's syndrome is a form of tendinitis or inflammation of the tendon membrane accompanied by pain in the base of the thumb extending to the lower arm (Samosir, Permata and Muawanah, 2019). The incidence of De Quervain Syndrome is relatively high, especially for those who have repeated hand-to-hand activities. Research conducted by Nisa et al., De Quervain Syndrome prevalence in smartphone users was 58% at the age of 15-20 years. (Herman, Amrina and Yusuf, 2019). When using a smartphone, the thumb will be overused. Too often using the thumb can cause pain (Nisa, Umer and Hassan, 2016). It causes pain in the stiloideus process area which causes chronic inflammation of the tendon wrapping of the abdominal

muscles of the polysis longus and the extensor of the brevis polysis as high as the distal radius and clasp in both tendons (Susanti and Pangestuningtyas, 2022).

Smartphone usage position also affects de quervain's syndrome (Veronica, Primayanti and Adiatmika, 2021). According to a study (Limetal., 2016), which examined the comparison of muscle activity from various conditions during smartphone usage in healthy adults said that the posture and position of using a smartphone with both hands are better than using one hand.

This study aims to analyze whether there is a relationship between the duration and position of smartphone use with the de quervain's syndorme incident in State Junior Highschool 5 Lahat. This study is expected to help and provide education related to prevention and early detection of de quervain's syndrome in junior high school students.

METHOD

The research method that researchers use is observational analytic, because researchers do not intervene with respondents. Additionally, this research approach is done using a cross sectional approach. This study conducted free or independent variable data collection, which is smartphone usage duration and smartphone usage position at the same time as bound or dependent variable data collection, that is, de quervain's syndrome is the focus of this study. This study will assess the relationship of duration and position of use when playing a smartphone with de Quervain's syndorme.

Research data on the duration of smartphone usage are taken from data on the duration of smartphone usage per day using Action Dash and the measurement of the default screen duration of a smartphone, and de quervain's syndrome is measured using a finkelten test.

This study was conducted on State Junior Highschool 5 Lahat students with a total of 186 respondents. Respondents were selected using a purposive random sampling technique where the subject had met the inclusion and exclusion criteria.

The inclusion and exclusion criteria in this study are: Inclusion criteria, students who have and use smartphones, willing to be respondents, students who have complained and have not experienced de quervain's syndrome, co-operative

students, and exclusion criteria for hand and wrist injury in the last 2 weeks, There has been a history of diabetes miletus, rheumatoid arthritis, osteoarthritis, and deformities and changes in the shape of the finger joints.

The data analysis used in this study is chi-square. If viewed in terms of data, this test is used to test categorical variables with categorical variables. In this study, the chi-square test was used to determine the relationship between the duration and position of smartphone use, position of smartphone and the occurrence of de quervain's syndrome. Where the chi-Square value e (0.05) test results, the hypothesis (Ho) fails to be rejected while if the p-value > (0.05) then the hypothesis (Ho) is rejected.

RESULTS AND DISCUSSION

Descriptive statistical tests were obtained from 186 samples the age distribution of the study samples ranging from 13 to 16 years.

The general characteristics of the study sample can be seen in Table 1 which consists of the following variables: age, gender, duration of smartphone use position and finkelstein test of State Junior Highschool 5 Lahat.

Table 1. Definition of Frequency Based on age, gender of smartphone use, duration, position of smartphone use, Finkelstein test check.

	Variable	Frequency	%
Age	11	15	8,1%
	12	135	72,2%
	13	32	17,2%
	14	4	2,2%
Gender	Woman	86	46,2%
	Man	100	53,8%
Duration of smartphone usage	≥5 hours	109	58.6%
	≥5 hours	77	41,4%
Position of smartphone usage	One Hand	95	51,1%
	Two Hands	91	48,9%
Finkelstein test check	Positive	157	84.4%
	Negative	29	15,6%

Based on table 1 the largest number of sample ages, namely age 14 years old, was found to be 72.2% with frequency 135 people and the least number of samples, age

16 years old, and 2.2% with frequency 4 people. It is known that the characteristics of respondents based on the gender of the majority of females as many as 100 were obtained a presentation of 53.8%. In the characteristics of the results of the smartphone usage duration, the result was that the majority of respondents used a smartphone which was 5 5 hours as much as 109 (58.6%) with the average respondent using a smartphone for 6.49 hours.

Based on the characteristics of the hand position when using a smartphone, the result was that students of State Junior Highschool 5 Lahat used more smartphones with one hand, which is as much as 95 students with 51.1% presentation. The characteristic distribution of finkelstein examination results that the majority of respondents tested positive for de quervain's syndrome through finkelstein tests was 157 students with a presentation of 84.4%.

The study used a bivariate analysis with a chi-square test used to determine whether there was a relationship between the duration and position of smartphone use with the occurrence of de quervain's syndrome. Based on chi-square test data that tested the relationship of smartphone usage duration with de quervain's syndrome, a p-value of 0.008 which means $p < 0,05$ then there is a significant relationship between the duration of smartphone use of de quervain's syndrome in state junior high school 5 Lahat and the Odd ratio (OR) of 3.243 times de quervain's syndrome.

Based on the statistical results of the chi-square test of the relationship between the position and use of the smartphone against the de quervain's synthorme event, it is found that the p-value is 0.032 which means $p < 0,05$ then there is a significant relationship between the smartphone usage position of de quervain's syndrome in junior high school 5 Lahat and the Odd ratio (OR) of 2,689 times that of de quervain's syndrome.

This study was conducted at State Junior Highschool 5 Lahat. The 9th class population of Lahat Junior High School students is 347. In this study, 186 students were selected based on specific criteria and used purposive random sampling techniques. This study aims to determine the relationship between duration and position of smartphone use to the occurrence of de quervain's syndrome. The study was conducted both directly and online; it was conducted directly by a Finkelstein

test whether there was wrist pain while online aimed to determine the duration and position of the hand when using a smartphone with a questionnaire via google form.

In this study, the characteristics of respondents by age were 13-16 years old, where the majority of respondents were 14 years old. The ages of 13-16 include early adolescence (Pitchforth et al., 2019). Based on the results of the 2021 Hootsuite survey, 79.5% of smartphone active users in Indonesia come from adolescence starting from the ages of 14 to 19 (Paridawati, Daulay and Amalia, 2021).

According to the gender sample, female sex is greater than male, with 53.8% female and 46.2% male. According to a study conducted by Hasanah on Indonesian teenagers (13-17 years old) who experienced smartphone addiction, most smartphone users at that age were dominated by women by 70.3% compared to men 29.7% (Hasanah, Hijrianti and Iswinarti, 2020). This data is also supported by Choliz's research which shows that women have a more addictive tendency towards smartphones than men (Mawarpury et al., 2020). The characteristics of respondents based on the smartphone usage position, the majority of respondents used one hand, which was 95 students at 51.1%.

This is in line with the research conducted by Bandar Hetamish on teenagers shows that most smartphone usage positions with one hand as many as 111 people with dominant right hand (Hetaimish, Bossei and Turkstani, 2020) In addition, the results of a study conducted by Mousa which compares the use positions of unilateral and bilateral smartphones in the community with results that the majority of unilateral or one-handed smartphone usage is 74% (Hetaimish, Bossei and Turkstani, 2020).

Based on the research results, there was a relationship between the duration of smartphone use and de quervain's syndrome with a p-value of 0.008 with an Odd ratio (OR) of 3.243. This result is also in line with a study conducted by Haikal that there is a relationship between the duration of smartphone use and de quervain's syndrome and the data analysis shows that p is 0.000 ($p < 0.05$), the majority of respondents use smartphones more than 5 hours by 75,8% experience pain in Extensor Pollicis Brevis (EPB) and Abductor Pollicis Longus (APL) muscle movements (Haikal, Hutahaeen and Nuryanto, 2020). Similar to the study conducted by Majkkk, the study subjects of mobile game players who repeated activities over

the long term for 2 2.25 hours had 3.16 times higher for Finkelstein test positive results (Metal., 2019). Musculoskeletal disorders are increasing in line with the duration of smartphone use (Morgan et al., 2020). Therefore long and frequent duration of use, as well as repeated static movements can increase the prevalence of musculoskeletal disorders such as de quervain's syndrome (Eitivipart, Viriyarajanakul and Redhead, 2018).

In this study, a relationship was found between the smartphone usage position of de quervain's syndrome, where the smartphone usage position increased the positive outcome of the finkelstein examination. At the one-hand position allows excessive movement and contraction of the muscles of the abdominal polycystic longus and the extensor carpi radialis muscles higher and easier to experience fatigue (Choi et al., 2020). This is because most of the activities performed with one hand involve many movements in wrist, pinching, grasping (grasping), the use of this one can be considered as a risk factor for de quervain's syndrome development (Reada et al., 2020). Repeated movements can cause retinal strain injury (RSI) to increase the number of movements that are repeated continuously without a pause can cause muscle overuse resulting in retinal friction and synovium thickening (Osailan, 2021). The thickening of the tendon causes swelling and constriction of the canal fibrous. In the part that experiences the swelling becomes stenosis which eventually leads to suppression of the tendon. The nekana can cause pain in the radial side of the thumb (Mostowy et al., 2020).

Most of the 9th graders of State Junior Highschool 5 Lahat experienced thumb pain at the time of the Finkelstein examination, this became something to watch out for in an era where everyone uses their smartphones on hariday activities. To reduce the incidence of de quervain's syndrome, there needs to be preventive measures taken by physiotherapy such as education on smartphone usage activities, especially in the duration and position of smartphone usage.

The limitation faced by researchers in conducting this study is to only examine the duration and position of the hand when using a smartphone. There are other factors that cannot be predicted such as sleep activity, body position when using a smartphone that can affect the results of the variables studied. In the data collection process, information provided by respondents through questionnaires

conducted online with google forms sometimes does not show respondents' opinions due to differences in each respondent's thinking, assumptions, understanding and interpretation.

CONCLUSION

Based on the results of the analysis of the research data, it can be concluded that there is a significant relationship between the duration of smartphone use and the occurrence of de quervain's syndrome in 9th graders of State Junior Highschool 5 Lahat. With a p-value of (0.008 ± 0.05) and an Odd Ratio (OR) of 3.243 at the risk of de quervain's syndrome. And there is a significant relationship between smartphone usage position and de quervain's syndrome with a p-value of 0.032 (00.05) and an odd ratio of 2.689 is likely to occur in de quervain's syndrome.

DECLARATIONS

Funding: The authors received no financial support for the research, authorship, and/or publication of this article

Conflict of interest: The authors have declared that no competing interests exist.

Ethical approval: The study proposal was approved by the Research Ethics Board of Universitas Negeri Semarang (13/04/2022)

REFERENCES

- Alhady, N.C., Salsabila, A.F. and Azizah, N.N. (2018) 'Penggunaan Smartphone pada Konstruksi Belajar Siswa MTs Negeri 7 Model Jakarta', *Al-Izzah: Jurnal Hasil-Hasil Penelitian*, 13(2), p. 240. doi:10.31332/ai.v13i2.975.
- Badan Pusat Statistik (2020) *Penggunaan Internet di Kalangan Siswa Sekolah Semakin Meningkat, Databoks*. Available at: <https://databoks.katadata.co.id/datapublish/2021/05/03/tren-siswa-sekolah-menggunakan-internet-semakin-meningkat#>.
- Benites-Zapata, V.A., Jiménez-Torres, V.E. and Ayala-Roldán, M.P. (2021) 'Problematic smartphone use is associated with de Quervain's tenosynovitis symptomatology among young adults', *Musculoskeletal Science and Practice*, 53(January). doi:10.1016/j.msksp.2021.102356.
- Choi, Y. *et al.* (2020) 'Effects of smartphone size and hand size on grip posture in one-handed hard key operations', *Applied Sciences (Switzerland)*, 10(23), pp. 1–10. doi:10.3390/app10238374.

- Eitivipart, A.C., Viriyarajanukul, S. and Redhead, L. (2018) ‘Musculoskeletal disorder and pain associated with smartphone use: A systematic review of biomechanical evidence’, *Hong Kong Physiotherapy Journal*, 38(2), pp. 77–90. doi:10.1142/S1013702518300010.
- Haikal, S.M.S., Hutahaean, Y.O. and Nuryanto, M.K. (2020) ‘Hubungan Durasi Rata-Rata Penggunaan Smartphone dengan Kejadian Tenosynovitis De Quervaina’, *Husada Mahakam: Jurnal Kesehatan*, 10(1), p. 37. doi:10.35963/hmjk.v10i1.204
- Hasanah, U., Hijrianti, U.R. and Iswinarti, I. (2020) ‘Pengaruh Smartphone Addiction Terhadap Perilaku Agresif Pada Remaja’, *Proyeksi*, 15(2), p. 182. doi:10.30659/jp.15.2.182-191
- Hepilita, Y. and Gantas, A.A. (2018) ‘Hubungan Durasi Penggunaan Media Sosial dengan Gangguan Pola Tidur pada Anak Usia 12 sampai 14 Tahun di SMP Negeri 1 Langke Rembong’, *Jurnal Wawasan Kesehatan*, 3(2), pp. 78–87
- Herman, L.F., Amrina, I. and Yusuf, J. (2019) ‘Gambaran Nyeri Syndrom De Quervain pada Remaja Akhir di Fakultas Ilmu Kesehatan Universitas Muhammadiyah Pekajangan Pekalongan’, *Jurnal University Reseach Colloquium*, (Proceeding of The 10th University Research Colloquium 2019: Bidang MIPA dan Kesehatan), pp. 1017–1021. Available at: <http://repository.urecol.org/index.php/proceeding/article/view/758>.
- Hetaimish, B., Bossei, A. and Turkstani, G. (2020) ‘Prevalence of De-Quervain’s Tenosynovitis among Medical Professionals’, *World Family Medicine Journal/Middle East Journal of Family Medicine*, 18(1), pp. 125–131. doi:10.5742/mewfm.2020.93738.
- Hingarajia, D. *et al.* (2018) ‘Prevalence Of De Quervain’s Tenosynovitis And Its Effect On Pinch Strength In Mobile Users’, *International Journal of Recent Scientific Research*, 9(03), pp. 25032–25035. doi:10.24327/IJRSR.
- Jarmi, A. and Rahayuningsih, S.I. (2017) ‘Hubungan penggunaan gadget dengan kualitas tidur pada remaja’, *Jurnal Keperawatan*, pp. 1–7.
- KEMP, S. (2021) *DIGITAL 2021: INDONESIA, We Are Social: Hootsuite*. Available at: <https://datareportal.com/reports/digital-2021-indonesia> (Accessed: 25 January 2022).
- Kominfo RI (2021) *Dorong Efisiensi Infrastruktur TIK, Menkominfo: Pemerintah Siapkan Kebijakan yang Ramah*, Kemkominfo. Available at: https://kominfo.go.id/content/detail/37899/siaran-pers-no-390hmkominfo112021-tentang-dorong-efisiensi-infrastruktur-tik-menkominfo-pemerintah-siapkan-kebijakan-yang-ramah/0/siaran_pers (Accessed: 15 January 2021).

- Lee, S. (2018) 'Quantifying the Benefits of Smartphone Adoption: Digital Device Substitution and Digital Consumption Expansion', *SSRN Electronic Journal* [Preprint]. doi:10.2139/ssrn.3014995.
- Lim, Y. *et al.* (2016) 'The comparison of muscle activity according to various conditions during smartphone use in healthy adults', *Physical Therapy Rehabilitation Science*, 5(1), pp. 15–21.
- Ma, T. *et al.* (2019) 'Relationship between the incidence of de Quervain's disease among teenagers and mobile gaming', *International Orthopaedics*, 43(11), pp. 2587–2592. doi:10.1007/s00264-019-04389-9.
- Maknuni, J. (2020) 'Pengaruh Media Belajar Smartphone Terhadap Belajar Siswa Di Era Pandemi Covid-19 (The Influence of Smartphone Learning Media on Student Learning in The Era Pandemi Covid-19)', *Indonesian Education Administration and Leadership Journal (IDEAL)*, 02(02), pp. 94–106. Available at: <https://online-journal.unja.ac.id/IDEAL/article/view/10465>.
- Mandias, R.J. and Dengah, H.M. (2019) 'Hubungan Intensitas Penggunaan Internet Dengan Carpal Tunnel Syndrome', *Klabat Journal of Nursing*, 1(2), p. 27. doi:10.37771/kjn.v1i2.415.
- Mawarpury, M.- *et al.* (2020) 'Kecenderungan Adiksi Smartphone Ditinjau Dari Jenis Kelamin Dan Usia', *Psikoislamedia : Jurnal Psikologi*, 5(1), p. 24. doi:10.22373/psikoislamedia.v5i1.6252.
- Morgan, S.D. *et al.* (2020) 'A Review of De Quervain's Stenosing Tenovaginitis in the Context of Smartphone Use', *The journal of hand surgery Asian-Pacific volume*, 25(2), pp. 133–136. doi:10.1142/S2424835520300029.
- Mostowy, M. *et al.* (2020) 'Impact of Smartphone Screen Size on De Quervain Tenosynovitis Epidemiology', *Issues of Rehabilitation, Orthopaedics, Neurophysiology and Sport Promotion - IRONS*, (31), pp. 7–16. doi:10.19271/irons-000111-2020-31.
- Nisa, Z. un, Umer, B. and Hassan, T. ul (2016) 'Prevalence of De Quervain's Syndrome Among Young Mobile Phone Users', *Jrcrs*, 4(1), pp. 22–24. Available at: <http://www.scopemed.org/?jid=130>.
- Osailan, A. (2021) 'The relationship between smartphone usage duration (using smartphone's ability to monitor screen time) with hand-grip and pinch-grip strength among young people: an observational study', *BMC Musculoskeletal Disorders*, 22(1), pp. 1–8. doi:10.1186/s12891-021-04054-6.
- Paridawati, I., Daulay, M.I. and Amalia, R. (2021) 'Persepsi orang tua terhadap penggunaan smartphone pada anak usia dini di desa indrasakti kecamatan tapung kabupaten kampar', *Journal Of Teacher Education*, 2(2), pp. 28–34.

- Pitchforth, J. *et al.* (2019) 'Mental health and well-being trends among children and young people in the UK, 1995-2014: Analysis of repeated cross-sectional national health surveys', *Psychological Medicine*, 49(8), pp. 1275–1285. doi:10.1017/S0033291718001757.
- Reada, B. *et al.* (2020) 'Prevalence and Awareness Evaluation of De Quervain's Tenosynovitis among Students in the Kingdom of Saudi Arabia', *International Journal of Pharmaceutical Research & Allied Sciences*, 9(4), pp. 151–157. Available at: www.ijpras.com.
- Samosir, N.R., Permata, A. and Muawanah, S. (2019) 'Pencegahan Terjadinya Resiko De Quervain Syndrom Pada Pengguna Gadget', *Jurnal Pengabdian Masyarakat Multidisiplin*, 2(2), pp. 138–145. doi:10.36341/jpm.v2i2.723.
- Susanti, N. and Pangestuningtyas, A. (2022) 'Penyuluhan Dan Pelatihan Fisioterapi Pada Kondisi De'quervain Syndrome Dengan Terapi Latihan Di Komunitas Keluarga Desa Leses Sawangan Kecamatan Gringsing', *Abdimas*, 3(1), Pp. 34–40.
- Veronica, E., Primayanti, I.D.A.I.D. And Adiatmika, I.P.G. (2021) 'Hubungan Antara Intensitas Penggunaan Smartphone Dengan Risiko Kemunculan Sindrom De Quervain Pada Mahasiswi Program Studi Sarjana Kedokteran Dan Profesi Dokter Fakultas Kedokteran Universitas Udayana', *Jurnal Medika Udayana*, 10(4), Pp. 1–4.