

The Relationship Between Writing Duration And Frequency With The Occurrence Of De Quervain's Syndrome: A Study On Medical Students At Diponegoro University

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Abstract

Introduction: Handwriting is a common activity performed by humans in their daily lives. Excessive use of the hand during writing becomes a concern when associated with musculoskeletal disorders. Repetitive Strain Injury (RSI) represents a broad category of musculoskeletal disorders involving muscles, tendons, and peripheral nerves, within which De Quervain's Syndrome (DQS) is classified. DQS is a disorder that occurs due to excessive use of the thumb and wrist, leading to inflammation and thickening of the tendon sheath and retinaculum. Objective: To identify the correlation between the duration and frequency of writing activities with the occurrence of De Quervain's Syndrome.

Methods: This study employed an analytical observational research design using a cross-sectional method. The research was conducted at the Faculty of Medicine, Diponegoro University. It was carried out in november 2023 with a sample size of 114 respondents.

Result: There was no significant correlation between the duration and frequency of writing and the occurrence of De Quervain's Syndrome, based on the Kruskal-Wallis and DQST tests. The p-values recorded in the SPSS output were 0.719 (>0.05) for writing duration and 0.174 (>0.05) for writing frequency, indicating that there is no significant relationship between these variables and the occurrence of DQS.

Conclusion: There is no significant correlation between the duration and frequency of writing and the occurrence of De Quervain's Syndrome.

Keywords: De Quervain's Syndrome (DQS), Duration, Frequency, Writing.

*Hubungan Durasi Dan Frekuensi Menulis Dengan Kejadian
De Quervain's Syndrome: Studi Pada Mahasiswa
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Abstrak

Pendahuluan: Menulis tangan merupakan kegiatan yang umum dilakukan manusia dalam kesehariannya. Penggunaan berlebih pada tangan saat menulis menjadi perhatian lebih jika dikaitkan dengan gangguan muskuloskeletal. Repetitive Strain Injury (RSI) adalah gangguan muskuloskeletal yang meliputi De Quervain's Syndrome (DQS). DQS adalah gangguan yang terjadi akibat penggunaan berlebihan ibu jari dan pergelangan tangan yang dapat menyebabkan peradangan dan penebalan pada lapisan selaput tendon di sarung synovial dan retinaculum. Tujuan: Mengidentifikasi keterkaitan antara durasi dan frekuensi kegiatan menulis dengan kejadian De Quervain's Syndrome.

Metode: Penelitian ini memiliki desain penelitian observasional analitik menggunakan metode cross sectional. Penelitian dilakukan di Fakultas Kedokteran Universitas Diponegoro. Dilakukan pada bulan november 2023 dengan jumlah subjek sebanyak 114 responden.

Hasil: Tidak terdapat korelasi yang signifikan antara durasi maupun frekuensi menulis dengan kejadian De Quervain's Syndrome berdasarkan hasil uji Kruskal-Wallis dan DQST. Nilai p yang tercatat dalam output SPSS adalah 0,719 ($>0,05$) untuk durasi menulis dan 0,174 ($>0,05$) untuk frekuensi menulis, menunjukkan bahwa tidak ada hubungan yang signifikan antara variabel tersebut dengan kejadian DQS.

Kesimpulan: Tidak terdapat korelasi yang signifikan antara durasi maupun frekuensi menulis dengan kejadian De Quervain's Syndrome.

Kata Kunci: De Quervain's Syndrome (DQS), Durasi, Frekuensi, Menulis.

Introduction

Technological advancements have altered how humans engage in various activities, including writing. Subsequently, electronic devices have become prevalent as writing mediums.¹ Using writing instruments such as pens and pencils requiring precise control, particularly of the thumb, to ensure hand stability.² Excessive use of the thumb can cause musculoskeletal problems, such as Repetitive Strain Injury (RSI), which encompasses De Quervain's Syndrome (DQS). DQS occurs due to microtraumas in the abductor pollicis longus tendon and extensor pollicis brevis tendon, leading to inflammation and thickening of the synovial membrane of the tendon sheath and retinaculum.^{3,4}

The epidemiology of DQS is not precisely known. Based on the database collected by PearlDiver Technologies, Inc., between 2007 and 2017, using health insurance claim data from Humana, Inc., there were 33,420 patients diagnosed with DQS out of approximately 7.5 million total patients.⁵ According to Imtiaz M et al., 56% of 160 secretary subjects showed a positive Finkelstein test, and 50 of them experienced swelling in the right thumb while writing.⁶ According to Ma T et al., it was found that more frequent gaming with long durations per day and changes in wrist position correlate significantly with a higher rate of positive Finkelstein test.⁷ In another study by Awais L et al., among 147 computer operators, 99 (67.3%) showed positive Finkelstein test results, while 48 (32.7%)

showed negative results.⁸

Based on the background above, it is known that there is a possibility of a relationship between the duration and frequency of writing associated with repetitive hand movements and De Quervain's Syndrome. The previous studies used independent variables related to modern activities and occupations that are not commonly performed by the general population, such as computer operators and secretarial work. Based on the previous research, the researchers are interested in examining the relationship between the duration and frequency of writing and the occurrence of De Quervain's Syndrome. The aim is to determine whether the duration and frequency of writing are associated with the occurrence of De Quervain's Syndrome, in order to establish appropriate prevention and therapeutic procedures.

Methods

The research takes place at the Faculty of Medicine, Diponegoro University and is conducted in November 2023. This study adopts an analytical approach with a cross-sectional design. The research subjects consist of students from the Faculty of Medicine, Diponegoro University, who meet the inclusion and exclusion criteria. The subjects are selected sequentially using consecutive sampling method. The inclusion criteria include students from the Faculty of Medicine, Diponegoro University, who engage in writing and agree to participate as respondents. The exclusion criteria for this study include respondents with a history of wrist and finger injuries, Carpal Tunnel Syndrome, Rheumatoid Arthritis, Infective Endocarditis, Bursitis, Gonorrhea, Felon, Acute Compartment Syndrome, Cellulitis, pregnant and postpartum women, as well as engaging in daily activities that heavily utilize the wrist and fingers, such as playing musical instruments, jobs involving the pinch grip technique, playing badminton, volleyball, golf, rowing, tennis, table tennis, bowling, wrestling, and archery.

The collected data will be analyzed using the software applications IBM SPSS Statistics 26.0 and Microsoft Excel for Mac. In the analysis, univariate analysis is conducted to determine the data distribution between the independent and dependent variables using Microsoft Excel for Mac. Hypotheses will be tested using the Kruskal-Wallis test using IBM SPSS Statistics 26.0. The Kruskal-Wallis test is used to examine significant differences among three or more groups in a sample where

the data does not meet assumptions of normal distribution or homogeneity of variance. Ethical clearance was obtained from the Research Ethics Committee of the Faculty of Medicine, Diponegoro University, Semarang, with the assigned number 553/EC/KEPK/FK-UNDIP/XI/2023.

Result

There were 114 subjects who met the inclusion and exclusion criteria after screening. Univariate analysis was conducted to understand the distribution of variables before using the Kruskal-Wallis test as a bivariate analysis to test the research hypothesis. This study evaluates the role of gender and writing technique as potential factors that may influence the occurrence of De Quervain's Syndrome.

Table 1. Characteristics of Research Subject

Variable	Frequency	%
Gender		
Male	24	21,1%
Female	90	78,9%
Handwriting Duration		
Short = < 2 hours/day	19	16,7%
Moderate = 2-4 hours/day	64	56,1%
Long = > 4 hours/day	31	27,2%
Handwriting Frequency		
Low = 1-3 days/week	31	27,2%
Moderate = 4-5 days/week	61	53,5%
High = 6-7 days/week	22	19,3%
Handwriting Technique		
Lateral Tripod	47	41,2%
Lateral Quadrupod	18	15,8%
Dynamic Tripod	20	17,5%
Dynamic Quadrupod	23	20,2%
Others	6	5,3%
The occurrence of DQS based on the results of DQST		
Not experiencing	71	62,3%
Low risk	27	23,7%
Medium risk	12	10,5%
High risk	4	3,5%

The Kruskal-Wallis test results indicate that there is no significant correlation between writing duration and the occurrence of De Quervain's Syndrome based on the re-

sults of the DQST, as shown by the p-value of 0.719 (> 0.05) recorded in Table 2.

a nominal sample in two unrelated categories. The results of the Mann-Whitney test indicate

Table 2. The Relationship Between Writing Duration and the Occurrence of De Quervain's Syndrome

Variable	The occurrence of DQS based on the results of DQST				Total	p
	Not experiencing	Low risk	Medium risk	High risk		
Duration						0,719
Short = <2 hours/day	12	4	2	1	19	
Moderate = 2-4 hours/day	42	13	7	2	64	
Long = > 4 hours/day	17	10	3	1	31	
Total	71	27	12	4	114	

The Kruskal-Wallis test results indicate that there is no significant correlation between writing frequency and the occurrence of De Quervain's Syndrome based on the results of the DQST, as shown by the p-value of 0.174 (> 0.05) recorded in Table 3.

no significant relationship between gender and the occurrence of DQS based on the DQST results. This can be seen from the p-value of 0.866 (> 0.05) recorded in Table 4.

The Kruskal-Wallis test results indicate that there is no significant correlation

Table 3. The Relationship Between Writing Frequency and the Occurrence of De Quervain's Syndrome

Variable	The occurrence of DQS based on the results of DQST				Total	p
	Not experiencing	Low risk	Medium risk	High risk		
Frequency						0,174
Low = 1-3 days/week	24	3	4	0	31	
Moderate = 4-5 days/week	33	20	6	2	61	
High = 6-7 days/week	14	4	2	2	22	
Total	71	27	12	4	114	

After analyzing the data using the Chi-Square test, it was found that it was not possible to use this method because the expected count frequencies exceed 20%. Therefore, as an alternative, the researcher used the Mann-Whitney test to analyze the relationship between gender and the occurrence of DQS based on the DQST results. The choice of the Mann-Whitney test was based on the sample characteristics consisting of gender, which is

between writing technique and the occurrence of De Quervain's Syndrome based on the results of the DQST, as shown by the p-value of 0.271 (> 0.05) recorded in Table 5.

Discussion

Writing duration was categorized into three categories, namely short, moderate,

Table 4. The Relationship Between Gender and the Occurrence of De Quervain's Syndrome

Variable	The occurrence of DQS based on the results of DQST				Total	p
	Not experiencing	Low risk	Medium risk	High risk		
Gender						0,866
Male	14	8	1	1	24	
Female	57	19	11	3	90	
Total	71	27	12	4	114	

Table 5. The Relationship Between Handwriting Technique and the Occurrence of De Quervain's Syndrome

Variable	The occurrence of DQS based on the results of DQST				Total	p
	Not experiencing	Low risk	Medium risk	High risk		
Handwriting Technique						0,271
Lateral Tripod	29	10	7	1	47	
Lateral Quadrupod	14	1	2	1	18	
Dynamic Tripod	13	6	1	0	20	
Dynamic Quadrupod	14	6	1	2	23	
Others	1	4	1	0	6	
Total	71	27	12	4	114	

and long, based on the amount of time spent writing per day. The analysis using the Kruskal-Wallis test showed no significant relationship between writing duration and DQS. This is different from a previous study conducted by Imtiaz M et al., which found a relationship between the writing duration of secretary personnel and the occurrence of DQS.⁶ This study is consistent with the research conducted by Faiza T et al., which showed a prevalence of DQS among medical students at Allama Iqbal Medical College with only 44 subjects or 32%, while 93 subjects or 68% did not experience any pain out of a total of 137 students during Finkelstein's test without any other diagnostic tests.⁹ Another study conducted by Nur AF et al. yielded results that are in line with this research, where the hand working posture during coffee bean sorting activities did not show a significant association with the occurrence of DQS due to the light workload.¹⁰ This difference may be caused by the dynamic hand movements performed by the respondents in this study, as well as the light workload. Writing is not an extreme movement that can be performed by the wrist. Writing movements have a quick mechanical recovery time, which can be measured by lactate concentration, compared to other activities involving other wrist muscles.¹⁰⁻¹²

The frequency of writing is also categorized into three categories: low, moderate, and high, based on the number of days used for writing in a week. The analysis results using the Kruskal-Wallis test show that there is no significant relationship between the frequency of writing and DQS. Another study consistent with this research was conducted by Ma T., et al., who found that excessive hand use in mobile gaming players with daily playing frequency for a week can lead

to the occurrence of DQS.⁷ There is another study consistent with this research, conducted by Baabdullah A., et al., which found that excessive hand use in smartphone users showed negative results in the Finkelstein test in 183 (80.9%) out of a total of 257 respondents who used their smartphones for more than 2 hours with daily frequency of use for a week.¹³ The use of a smartphone activates several muscles, for example, the APL (Abductor Pollicis Longus) and EPB (Extensor Pollicis Brevis) muscles.¹⁴

The duration of writing can lead to difficulties in questionnaire completion by respondents and can result in multiple interpretations. Previous research by Garnacho CM., et al., showed that writing activities have a fast mechanical recovery time, especially during the transition between days, which can be an effective time for resting and recovering muscle fatigue caused by handwriting.¹²

The limitations of this study include the use of DQST results as a substitute for diagnosing DQS, which may not fully capture the complexity of risk factors. Additionally, there was a lack of equipment to measure muscle tension and pressure during writing. Direct monitoring of writing activities was not performed, and data were solely collected based on respondents' experiences through questionnaires, which can lead to multiple interpretations or perceptions.

This study found no significant relationship between the duration and frequency of writing and the occurrence of DQS in respondents. These results suggest that other factors, such as dynamic hand movements and light workload, may play a more dominant role in the occurrence of DQS.

Conclusion

This study found no significant relationship between writing duration, frequency and the occurrence of De Quervain's Syndrome (DQS) based on the results of the De Quervain Screening Tools (DQST). These findings maybe influence by limitations in diagnostic approach and the subjective measurement of writing activities. It is important to conduct studies that involve measuring the pressure of writing instruments and muscle tension during writing. Additionally, future studies can directly monitor the duration and frequency of writing to ensure that the research data is not influenced by multiple interpretations. Further analysis is also necessary to explore the frequency of activities that may affect DQS with comprehensive explanations.

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