

## Pinch and Grip Strength in Adults with De Quervain Tenosynovitis: Malaysian Population

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**Abstract:** This study was designed to determine the measurement pinch and grip strength in patients with de Quervain for Malaysian population. Thirty one patients with De Quervain participated in this study. The range aged between twenty to sixty years old. Each participants completed three trials for both pinch and grip strength unilaterally. The measurements of grip strength were taken in sitting and standing position. Intraclass correlation coefficients (ICC) were calculated for test retest reliability. A repeated measure of paired t-test was used to determine the significant different between pre test and post test. The pinch and grip strength tools was found to be reliable ( $r=0.79$  to  $0.99$ ) and there is significant difference ( $p<0.001$ ). The results of this study indicate that pinch gauge and jamar hand dynamometer was reliable tool to use by Malaysia clinician for de Quervain diseases.

**Key words:** Pinch and grip strength • Reliability • Validity • De Quervain

### INTRODUCTION

De Quervein's tenosynovitis described as the narrowing of the wrist compartment due to the inflammation of the tendon and the synovial fluid. The tendons commonly get affected were Abductor Pollicis longus (APL) and the Extensor pollicis Brevis (EPB). This condition produces more pain over the radial aspects of the distal forearm and wrist [1, 7]. This condition usually diagnosed by using a clinical test "Finkelstein's sign". There are lot of non surgical and rehabilitation interventions are present now a day like hand therapy [6]. Due to the pain, patient had limitations in doing their daily activity. These limitations can also reduce the strength in the pinch and grip [2].

Previous studies are suggested that there is decreased strength in the pinch strength on the symptomatic side of de Quervein's. They also suggested using the pinch gauge as the evaluation tool for the patient with De Quervein's tenosynovitis. Early studies has established that PS evaluation was used by pinch gauge with good test- retest reliability ( $r= 0.812$  to  $0.883$ ) and high interrater reliability ( $r = 0.979$  to  $0.999$ ) in normal healthy persons. Additionally, higher interrater

reliability was also found in subjects with cumulative trauma disorders (ICC ranging from  $0.93$  to  $0.97$ ) [3, 6]. However, there was no test retest reliability analysis were conducted in subjects with de Quervein's." disease.

The grip strength and the pinch strength is also have the direct relation, hence the pinch strength decreases there is also changes in the grip strength [8]. Reliable and accurate prediction of the normal hand grip strength value is more important in determining the results of treatment in patients with hand related [4] like de Quervain's disease. The Jamar dynamometer has been cited in numerous journals at the standard instrument for the measurement of grip strength. It has also proven to be more accurate than previous dynamometer [4, 6]. Previous studies mention that Malaysian population local validity and reliability are important for the reference and serve as the objectives values for purpose of rehabilitation [4]. Although there was no study conducted on the Pinch and Grip Strength for adults with De Quervain Tenosynovitis in Malaysian population. Hence, the current study was aim to investigate the Pinch and Grip Strength in adults with De Quervain Tenosynovitis for Malaysian population.

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## MATERIALS AND METHODS

**Participants:** A convenience sample of 31 patients was recruited from occupational therapy department with unilateral de Quervain's disease (9 men and 22 women) ages 20 to 65 years with free of any pathological condition affecting the hands. The other inclusion criteria are positive Finkelstein's test; the participants are adult worker and attend occupational the rapist not more than 2 years. All the participants completed the informed consent form approved by Research Ethics Committee Faculty of Health Sciences, Universiti Teknologi MARA, Puncak Alam.

**Instrument:** The Jamar hand dynamometer and pinch gauge was used to measure the strength for establishing reliability. For this study, 3 successive trials were recorded for hand with de Quervain. The pain assessment was conducted by Visual Analog Scale (VAS) from 0 to 10. The 0 mean no pain and 10 means unbearable pain [9]. The subjects were asked to show the level of pain in the visual analog scale before and after the test.

## RESULT

All the thirty one participants have unilateral de Quervain's disease. The mean ages of participants that involve in this study are 43.4 years old. The mean of duration participants having de Quervain is 7.6 month. The demographic data of the participants and the results of pain were given in Table 1.

For GS measurement, two types of position were measured. First used standard position by American Society of Hand Therapy and the other one was by standing position where the elbow was fully extended. From this two types of measurement, the results show GS stronger when measurement was done while standing position. Internal consistency for the hand grip, tip, palmar and lateral pinch strength shows high reliability that range from 0.84 to 0.998. The reliability of

GS measurement on asymptomatic hand which is 0.998 is higher than other measurement. The Cronbach's alpha for symptomatic GS was 0.995, for asymptomatic PS was 0.959 and symptomatic PS was 0.920. This is proved that internal consistency for the item of PS and GS was high reliable.

Table 2 shows that paired t-test was chosen to identify the mean difference between asymptomatic and symptomatic hand with the score or PS and GS test. The p value for all item was  $p < 0.001$ . Based on the result above, it can be conclude that the mean difference between total score of every item of PS and GS are statistically significant ( $p < 0.05$ , 95% CI does not cross zero).

## DISCUSSION

Overall, 9 men and 22 women aged 20 to 65 years participated in this study. The mean age is 43.39 ( $\pm 11.35$ ). The result showed that the de Quervain disease affects more on women 2.5% compare to men 1%. Previous study also shown de Quervain disease affects 0.5% men and 1.3% of women [5]. The knowledge of normative values is of paramount importance as they serve as the reference point to distinguish between normality and abnormality. Together with proper, valid, accurate and reliable evaluation of hand grip strength measurement, the effectiveness of hand problems can be monitored and compared [4]. Most study of was done on western and it cannot be used in Malaysian population and our study was done to find the reliability of pinch and grip strength among patients with de Quervain in Malaysia. This also proves that pinch gauge and Jamar hand dynamometer was reliable and valid device in testing of pinch and grip strength among de Quervain patients.

Result for internal consistency of each types of strength test was shown alpha coefficient. An alpha coefficient of 0.998 was found for asymptomatic GS., 0.995 for symptomatic GS., 0.959 was found for symptomatic

Table 1: Characteristics of the Thirty one Participants with de Quervain's Disease

Age (years)*	43.4 $\pm$ 11.4
Number of male/female	9: 22
Number of symptomatic dominant hand	4 (12.9%) Right: 4 Left: 0
Number of left handed in this study	4 (12.9%)
Duration of symptoms (months)*	7.6 $\pm$ 4.2
Pain at rest *	1.9 $\pm$ 1.29
Pain after Finkelstein test *	6.3 $\pm$ 1.6

Table 2: Grip and pinch strength for asymptomatic and symptomatic hand

Variables	Asymptomatic Mean (SD)	Symptomatic Mean (SD)	Mean of score difference (95% CI)	t-stat (df)	p-value
Hand grip	22.58 (6.89)	11.65 (4.74)	10.94 (9.25, 12.55)	13.80 (30)	.000
Tip pinch	3.92 (1.40)	2.42 (.87)	1.5 (1.01, 1.99)	6.23 (30)	.000
Palmar pinch	4.69 (.55)	3.03 (1.00)	1.66 (1.13, 2.19)	6.39 (30)	.000
Lateral pinch	5.31 (1.82))	3.45 (1.34)	1.85 (1.37, 2.34)	7.8 (30)	.000

pinch strength and 0.92 for symptomatic pinch strength. Thus, the internal consistency for all strength test were high reliable. However, Fournier, *et al.*, 2006 [6] was done a study on thumb strength using biaxial dynamometer and the result also show the reliability of pinch strength measurement is higher than thumb strength measurement.

**CONCLUSION**

The overall results of this study found that pinch gauge and jamar hand dynamometer was reliable tool to use in de Quervain’s disease in Malaysia. This result suggested that pinch and grip strength can be used to assess strength problem for Quervain’s disease in Malaysia context. However, further research need to develop new tool for strength problem on the effectiveness of treatment for this population.

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