

A Study to Compare the Effectiveness of Grip Strength Exercise versus Tendon Gliding Exercise for the Smart Phone Users in Young Male Adults

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Abstract: *The use of smartphones has become a necessity for everyone in their daily life. Smartphones have been recently used for communication, gaming, socializing, and internet browsing, especially by the younger population. Hand grip strength (HGS) is crucial to the human body for controlling objects. It is used to assess skeletal muscle functions and, over the years, it has also received notable attention from industrial engineers and ergonomics researchers. Data will be collected from outpatient department of various hospitals in and around Chennai only. For the study, 30 subjects were selected. Patients were evaluated using an assessment form, patients were informed about the procedure, merits and demerits study. Consent form is obtained from each patients for voluntary participation. Subjects were selected in the study on the basis of inclusion criteria (Age between 18 to 30 years, Only young male, Subject with fair hand strength are included, Willing to participate in the study). Patients taken in two groups; Hand Grip Strength Exercise taken as group A and Tendon Gliding Exercise taken as group B. The results of correlation analysis showed that there is a strong positive relationship between grip strength and smart phone usage, indicating that higher (or lower) the hand grip strength, higher (or lower) the smart phone usage. The intra-group analysis showed that both the treatments are effective in terms of mean increase in the grip strength. However, the intergroup analysis showed that Treatment A is effective than Treatment B in terms of mean increase in hand grip strength.*

Keywords: Smartphones, Hand Grip, Tendon Gliding, Dynamometer

1. Introduction

The use of smartphones has become a necessity for everyone in their daily life. Smartphones have been recently used for communication, gaming, socializing, and internet browsing, especially by the younger population. In the last few years, there has been a constant increase in the number of people using smartphones. In 2020, the number of smartphone users globally had projected to 3.5 billion, which is more by 9.3 % than in 2019 ^[1]. Despite the structure and the design of smartphones that allow both hands, the use of singlehanded is more preferred by young people.

The use of single-hand mainly relies on the thumb movement to reach for the keys for pressing, whereas, the rest of the hand is used for grasping. It was reported that the average duration of smartphone usage among university students was > 3.5 hours/day, which was also accompanied by pain at the base of the thumb ^[6]. Complications and adverse effects of smartphones' excessive usage may include dry eyes, computer vision problems, neck and shoulder problems, De Quervain's tenosynovitis, and weakness of the thumb and wrist. These complications would limit the hand's functionality over time and may lead to psychological problems such as low quality of life

Also, it has been suggested by many surveys that younger adults are the ones who represent the majority of smartphone users globally. This increase in smartphone usage led to the addiction behaviour to these devices, especially by 50 % of teens, as survey reports suggested. A study compared hand-grip and pinch-grip strength between high-frequency

smartphone users and low frequency smartphone users among children. Grip strength was chosen as the primary endpoint because strength is an integral part of hand function, although other aspects may be equally relevant.

Hand grip strength (HGS) is crucial to the human body for controlling objects. It is used to assess skeletal muscle functions and, over the years, it has also received notable attention from industrial engineers and ergonomics researchers. Osteras et al. concluded that further studies should focus on optimal grip strength exercises. In another RCT, significant improvement in grip strength and activity performance was attained with a home-based hand exercise programme for hand OA. On the other hand, a study involving a multidisciplinary group-based treatment for patients with hand OA showed no effect on grip strength and other outcomes, potentially due to a nondirective approach (patients should select and also develop their own treatment goals and treatment plans)

The application of gliding exercises may influence "stretching the adhesion in the carpal tunnel, broadening the longitudinal area of contact between the median nerve at the transverse carpal ligament, reducing tenosynovial edema, improving venous return from the nerve bundles, and reducing pressure inside the canal."¹². Nerve and tendon gliding exercises may be used for neural mobilization of the median nerve and to improve the condition of the upper limb muscle tendons in CTS. Many studies have correlated grip strength to various other physical variables including nutritional status, rotator cuff weakness, fatigue, and overall physical function ⁽⁴⁻⁶⁾. A stronger HGS indicates a firmer

grasp or grip. Research has also focused on the mechanisms of HGS in relation to industrial safety and tool design. Kong et al. showed HGS to be related to the distance between an individual's fingers, the length of the fingers, and their interaction. There are highly significant relationships between maximal HGS of the dominant hand and general anthropometric variables in all age groups. The adolescent growth curve peaks at 15 years of age for both males and females in Taiwan. Shih et al. also indicated that grip strength was related to the heights of hand elbows. LunaHeredia et al. found that grip strength in healthy people correlated positively with stature. Hence the purpose of the present study is to highlight the relationship between grip strength and duration of smart phone usage among young male adults and also to determine the effectiveness of grip strength exercises using theraputty versus tendon gliding exercises in improving grip strength among smart phone users

2. Methodology

Data will be collected from outpatient department of various hospitals in and around Chennai only. For the study, 30 subjects were selected. Patients were evaluated using an assessment form, patients were informed about the procedure, merits and demerits study. Consent form is obtained from each patients for voluntary participation. Subjects were selected in the study on the basis of inclusion criteria (Age between 18 to 30 years, Only young male, Subject with fair hand strength are included, Willing to participate in the study). Patients taken in two groups; Hand Grip Strength Exercise taken as group A and Tendon Gliding Exercise taken as group B. The study was conducted for 2 weeks.

Variables

Primary measures of the Hand Grip is Jamar Hand Dynamometeras pre and post test.

Procedure

Group A:

Exercise with theraputty:

Build a ball with the theraputty seen in fig.1 and hold it for a 5 to 11 sec and relax and repeat it for 3 to 5 times in a single set



Figure 1

Subsequently build a roll with the theraputty with one hand and the fingers all have a gap in between them and roll seen in fig 2 for a 5 to 10 times



Figure 2

PINCER GRIP: squeeze the roll with the thumb and the index finger and hold it for 10 to 15 seconds and relax seen in fig 3



Figure 4

All fingers touch each other wrap the roll around the all fingers to form it to a ring and hold as seen in fig 4 & 5

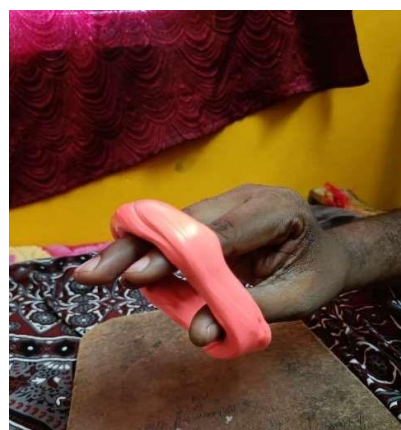


Figure 4



Figure 5

Open the hand against the resistance of the theraputtu as seen in fig.6&7



Figure 6



Figure 7

Group B:

Keep the hand in a neutral position and slowly adduct the thumb and hold it for 5 to 8 seconds and then relax do it for 3 repetition as seen in fig no 8



Figure 8

Keep the hand in a neutral position and flex the thumb and then flex the fingers as similar as fist hold it and relax as seen in fig.9.



Figure 9

Keep the hand in a neutral position and make a fist without using thumb and then hold and relax as seen in fig.10



Figure 10

Keep the hand in a position where anterior part facing downwards and posterior part facing upwards and make all fingers like a web hold it and relax and repeat it for 3 to 5 times as seen in fig.11



Figure 11

Make hand in a neutral position and then using other hand just extend the thumb and hold it and relax and repeat it for 3 to 5 times as seen in fig.12



Figure 12

Just extend the wrist and then open the fingers till u fell stretch and hold it for 5 to 10 seconds and repeat for 3 to 5 times as seen in fig.13



Figure 13

Just flex all the fingers except the thumb finger and keep the thumb finger in neutral position as seen in fig.14



Figure 14

Keep hand in neutral and flex the distal interphalangeal joint of the thumb and fingers and then hold and then relax as seen in fig.15



Figure 15

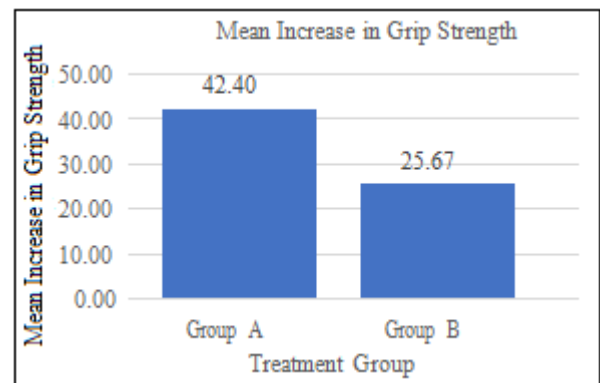
Make a 'O' sign using the thumb and the 4th finger and hold and relax as seen in fig.16



Figure 16

Statistical Analysis

The present study included 30 subjects, in which 15 subjects were on Group A (Hand Grip Strength Exercise) and 15 subjects were on Group B (Tendon Gliding Exercise).[Table 1] represents demographic data of the study participants. Within group comparison of pre-test and post-test scores in both groups demonstrated increase in hand grip [Graph 1] with P-value = 0.000 < 0.05.



Graph 1

3. Conclusion

The results of correlation analysis showed that there is a strong positive relationship between grip strength and smart phone usage, indicating that higher (or lower) the hand grip strength, higher (or lower) the smart phone usage. The intra-group analysis showed that both the treatments are effective in terms of mean increase in the grip strength. However, the intergroup analysis showed that Treatment A is effective than Treatment B in terms of mean increase in hand grip strength.

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27	19	M	B	80
28	18	M	B	80
29	19	M	B	70
30	20	M	B	80

Table 1

S.NO	Age	Sex	Group	JAMAR HAND DYNAMOMETER
				Grip Strength
1	20	M	A	80
2	21	M	A	80
3	21	M	A	100
4	21	M	A	60
5	21	M	A	60
6	21	M	A	80
7	21	M	A	80
8	21	M	A	80
9	21	M	A	80
10	21	M	A	60
11	20	M	A	80
12	21	M	A	80
13	18	M	A	60
14	19	M	A	80
15	19	M	A	60
16	19	M	B	60
17	20	M	B	80
18	19	M	B	70
19	19	M	B	80
20	19	M	B	80
21	25	M	B	90
22	19	M	B	70
23	18	M	B	60
24	19	M	B	80
25	20	M	B	70
26	19	M	B	60