

ORIGINAL ARTICLE

RELATIONSHIP OF HAND GRIP STRENGTH AND HAND DIMENSIONS IN FEMALE STUDENTS

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ABSTRACT:

Handgrip strength is a quantitative evaluation of generally speaking actual capacity and an assessment of the usefulness of the upper appendages. Hand grasp strength can be evaluated by estimating how much consistent power that the hand can apply on a dynamometer. **Methods:** This study was directed on an example of 68 female college understudies matured somewhere in the range of 18 and 25 years, utilizing a non-likelihood helpful testing method. This study rejects guys and females who are more seasoned and have work related populace. The information was gathered by a survey that included individual data like age, level, weight, BMI, way of life, as well as hand aspects estimated utilizing anthropometric procedures, and hand strength estimated utilizing a dynamometer. The information was dissected utilizing SPSS 21. **Results:** The mean age of female students was 21.6 ± 1.98 years, with a basal age of 19 years and a maximum age of 25 years. The mean level and weight were 157.29 ± 5.06 cm and 52.75 ± 8.46 kg individually. The mean hand grasp strength of female understudies was 12.21 ± 2.875 kg. Out of 68 female understudies, the BMI of 9 (13.2%) was underweight, 48 (70.6%) was typical and 11 (16.2%) was overweight. Out of 68 female understudies, 55 (80.9%) had a functioning way of life that included activity, while 13 (19.1%) had an inactive way of life. The mean of FS1, FS2, FS3, FS4 and FS5 were 10.98 ± 1.82 , 14.32 ± 1.75 , 15.77 ± 1.96 , 16.96 ± 2.00 and 26.63 ± 3.66 individually. The mean of TL, IFL, MFL, RFL AND LFL were 13.10 ± 0.89 , 15.94 ± 3.42 , 17.65 ± 1.27 , 16.71 ± 1.29 and 14.45 ± 0.55 separately. The mean of P1, P2, P3, P4 and P5 were 39.95 ± 2.98 , 44.66 ± 2.59 , 43.89 ± 3.02 , 43.99 ± 3.57 and 54.27 ± 4.22 separately. **Conclusion:** The ongoing review found a vigorous and measurably huge connection between hand aspects (in particular finger range, finger length, and hand edge) and hand hold strength in female understudies at the College of Lahore. Customary actual work and ordinary activity add to expanded hand grasp strength in understudies. **Key Words:** Hand grip strength, hand dimensions, Dynamometer

INTRODUCTION:

The human hand is an intricately designed and advanced anatomical structure. It transmits sensory data on the temperature, shape, and surface characteristics of an object to the brain. The main purpose of the human hand is to manipulate objects in order to achieve a specific objective. Individuals engaged in sports that include handgrip movements may exhibit variations in their grip strength and hand dimensions. (1, 2). Handgrip strength is an essential measure in multiple sports. Engaging in activities that combine language and physical effort requires the improvement of grip strength to boost control and performance, while also decreasing the likelihood of becoming injured. (3, 4). Older persons with diminished handgrip strength (HGS) have a higher likelihood of encountering adverse health consequences, such as chronic diseases, diminished physical capacity, and an elevated risk of dying from any cause. (2, 5). As an individual ages, there is a physiological metamorphosis characterized by a decrease in strength and muscular mass. Muscle deficiency may arise from impaired muscle contractions, metabolic irregularities, or neglect. This insufficiency can subsequently lead to functional disability, falls, and sometimes even death. (6). Grip strength, also referred to as hand grip strength, decreases as individuals get older. Immobile patients with weak quadriceps muscles suffer from various negative health outcomes, such as decreased physical function, higher rates of hospitalization, and early death. The correlation between hand handle strength (HGS) and quadriceps strength, and

utilitarian profile features, such as postural balance, may be significant in older patients requiring supplementary care. (7, 8). Male individuals demonstrated higher anthropometric dimensions and hand grip strength in comparison to female individuals, with regards to height, weight, and hand grip strength. (9, 10). Handgrip strength (HGS) testing is frequently employed in clinical and professional environments to measure the impact of tasks, track rehabilitation progress, and get useful insights into exterior muscular, neurological, and cardiovascular diseases. (11, 12). A pinch meter is utilized to evaluate finger strength while pinching, although the Jamar dynamometer has been proven to provide the most precise and suitable evaluations of grip strength. Hand grip strength can be evaluated by quantifying the level of stationary force applied by the hand when compressing a dynamometer. The main units used for measuring force are kilograms and pounds. (2, 13). Different cultures exhibit variations in hand measurements. Imran SN conducted a comparative analysis on hand dimensions among different countries. The study sought to examine twenty-four anatomical dimensions of the right hand in a group of fifty female people of Indian origin. Indian girls exhibited statistically significant lower physical dimensions in comparison to girls from The United Kingdom, Japan, Hong Kong, and the United States of America were all involved in the acquisition of comparable measures. Vietnamese Americans and Japanese persons exhibited the lowest degree of similarity to Indians. The variations in the depths and breadths of the fingers were more prominent than the

variations in their lengths. (14, 15). The significance of hand function in occupational performance cannot be overstated. As the demand for self-sufficiency and engagement in scholastic and social activities decreases, manual dexterity decreases. The study's objective is to increase public awareness of hand grip strength, a metric that is crucial for engaging in daily activities and functions as an indicator of overall physical strength.

METHODS:

The study was conducted out between January 2022 and April 2022. The data were collected from a sample of 68 female students at The University of Lahore, after ethical approval from the institution's review council. A sample size of sixty-eight female students was established using the percentage computation, with a 5% margin of error. Information was collected from participants between the ages of 18 and 25, with the exception of those who did not meet the given criteria. Before implementing the measures, the pupils were given information about the procedure and were obligated to sign a consent form. After collecting demographic data, hand dimensions were evaluated based on anthropometric recommendations, and hand grip strength (HGS) was measured using a dynamometer. Participants were instructed to sit comfortably, extend their dominant hand, and place it on a sheet of paper after it had completely stretched in order to ascertain the dimensions of their hands. The deliberate, voluntary movement of bringing the thumb and other digits towards one another optimized the hand's contour. The contours are implemented to ascertain the palms' anthropometric dimensions, as illustrated in Figure 1. Finger range 1 isn't completely fixed because of the assessment of the distance between the tip of the forefinger (I) and the tip of the

thumb (T). The finger range 2 not entirely settled by assessing the distance between the pinnacle of the T finger and the tip of the M digit. The finger length 3 isn't fixed by approximating the distance between the mark of the T finger and the tip of the Ring finger (R). The digit range 4 isn't laid out by assessing the distance between the apex of the thumb (T) and the tip of the little finger (L). The finger lengths were estimated from the wrist, which is the proximal commencing quality of the hand length evaluation, to the digits (refer to Figure 2). The evaluations include the following: the separation from the wrist-thumb joint to the tip of the thumb (thumb length [TL]), the separation from the wrist joint to the tip of the pointer (pointer length [IFL]), the separation from the wrist joint to the tip of the center finger (center finger length [MFL]), the separation from the wrist joint to the tip of the ring finger (ring finger length [RFL]), and the separation from the wrist joint to the tip of the little finger (little finger length [LFL]). Starting at the W joint (WTIW, P1), the bearing extends to the farthest points of the I and M digits, as well as the W joint (WIMW, P3). It is suitable for accessing the digits of the M and R fingers, as well as the W joint (WMRLW, P4), and extends from the W joint. Additionally, it encompasses the metacarpophalangeal joint (WMRLW, P4) and the distal phalanges of each farthest region. At some point, it reaches the W joint, I, M, R, and L digits, as well as the W joint (WTIMRLW, P5), as illustrated in Figure 3. The information that was collected was analyzed using SPSS 21. The quantitative factors' mean and standard deviation are not consistent. The extent and subjective recurrence are not fixed. Pearson's relationship coefficient was employed to ascertain the correlation between hand hold strength and hand aspects.

RESULTS:

With a standard deviation of 1.98 years, the average age of female enrollees was 21.6 years. The mean height and weight were 157.29 ± 5.06 cm and 52.75 ± 8.463 kg, respectively. The average hand grip strength of female students was 12.21 ± 2.875 kg (Table 1). Among the 68 female university students, 9 (13.2%) had a BMI indicating underweight, 48 (70.6%) had a BMI indicating normal weight, and 11 (16.2%) had a BMI indicating overweight. Among the 68 female students, 55 of them (80.9%) engaged in regular physical activity, including exercise, whereas the remaining 13 (19.1%) had a sedentary lifestyle, as shown in Table 2. An evident and significant association was detected between hand dimensions (finger spread, finger length, and hand perimeter) and hand grip strength, as shown by a strong correlation ($r < 0.9$). as per p values shown in (Table 3).

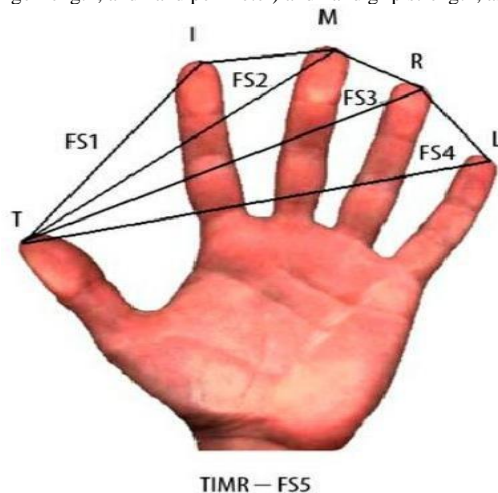


Figure 1: Finger Span Measurements

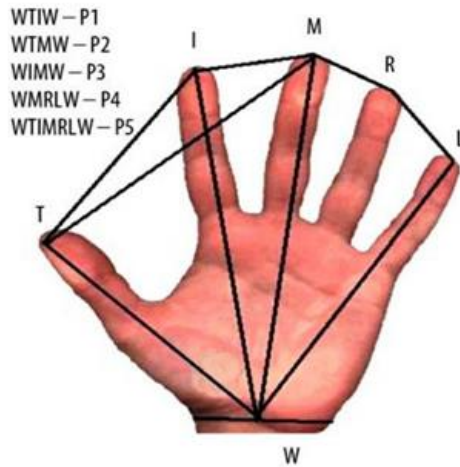


Figure 2: Finger length measurements

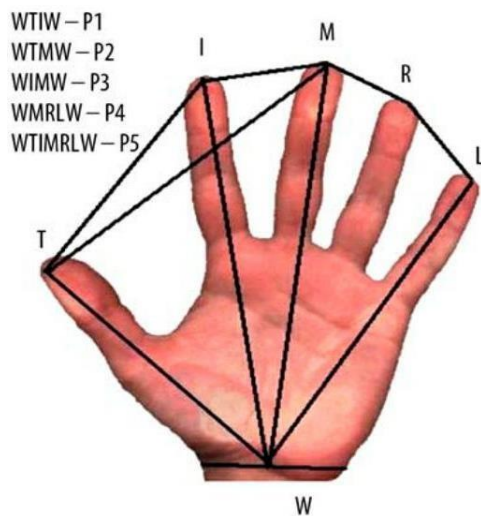


Figure 3: Finger perimeters Measurements

Table 1: Descriptives of Age, weight, Height and Handgrip Strength

Variable	Mean± Std deviation
Age	21.6±1.98
Weight	52.7±8.46
Height	157.2±5.06
Hand Grip Strength	12.2±2.87

Table 2: Descriptives of BMI, Lifestyle and Exercise Routine

Variable	Frequency (%)
BMI	
Underweight	9(13.2%)
Normal	48(70.6%)
Overweight	11(16.2%)
Lifestyle	
Active	55(80.9%)
Sedentary	13(19.1%)
Exercise Daily	
Yes	55(80.9%)
No	13(19.1%)
How many times do you exercise daily?	
Once a week	16(23.5%)
Twice a week	35(51.5%)
Three times a week	17(25.0%)

Table-3: Correlation between hand dimensions and Hand grip strength

Variable	Mean± Std deviation	P and r value
FS1	10.9±1.82	r.595 p.000
FS2	14.3±1.6	r.721 p.000
FS3	15.7±1.96	r.406 p.001
FS4	16.9±2.0	r.729 p.000
FS5	26.6±3.6	r.386 p.001
TL	13.1±.89	r.275 p.023
IFL	15.9±3.42	r.774 p.000
MFL	17.6±1.27	r.853 p.000
RFL	16.7±1.2	r.860 p.000
LFL	14.4±.954	r.829 p.000
P1	39.9±2.98	r.595 p.000
P2	44.6±2.5	r.721 p.000
P3	43.8±3.02	r.406 p.001
P4	43.9±3.56	r.729 p.000
P5	54.2±4.2	r.386 p.001

DISCUSSION:

The objective of this investigation was to establish a correlation between the physical attributes of the hands and the grasp strength of female students. The results exhibited a favorable connection between them, as evidenced by the p-values in the Pearson test. Kano E et al. conducted a comparative study. (16, 17) The results indicate a strong and positive relationship between overall body measures and handgrip strength, with a correlation coefficient ranging from 0.35 to 0.42. Out of all these actions, the body's level has the strongest correlation with handgrip strength. The ongoing investigation yielded consistent results, demonstrating a robust correlation between the size of the hand and the strength of the grasp in female college students. Students who reside in Lahore. In accordance with Jürimäe et al. (16, 17), The primary anthropometric indicator is body height, which accounts for up to 76.1% of handgrip strength in prepubertal children. The correlation between grasp strength and hand size was investigated in the current study of female university students in Lahore. Handgrip strength has been found to have a positive relationship with overall body measurements such as body weight, height, and BMI, as well as specific hand measurements such as hand perimeters, finger lengths, and finger spans. Emiko Kono and her colleagues did a study on the hand grip strength and physical measurements of the 2021 Italian women's national basketball teams. We conducted anthropometric measurements of body and hand proportions, as well as an assessment of maximal handgrip strength, on a sample of 109 female Italian basketball national players, spanning the Under14 to Senior levels. There was a discernible increase in arm length and handgrip strength, with statistically significant differences primarily observed between the elite (U20, seniors) and sub-elite (U14, U15) groups ($p < 0.05$). Handgrip strength exhibited a moderate positive correlation with height and BMI ($r = 0.5$; $p < 0.001$), while it exhibited a strong positive correlation with arm length ($r = 0.5$; $p < 0.001$). The data indicates that arm length is considered when selecting female basketball players by evaluating handgrip strength. Therefore, the measurement of arm length could be a valuable criterion for identifying young female candidates (ages 16 and 17) who exhibit potential, in addition to height. The aforementioned study included a sample of 68 female university students, with an average age of 21.61 years and a standard deviation of 1.98 years. The results obtained from these people were nearly indistinguishable. Hand grip strength is significantly correlated with hand dimensions, including digit span, finger length, and hand perimeter. There is a robust positive correlation between grasp strength and hand size. The grasp strength decreases in tandem with the reduction in hand size.

CONCLUSION:

The current study determined a robust and statistically significant link between hand dimensions (namely finger spread, finger length, and hand perimeter) and hand grip strength in female students from the University of Lahore. Regular physical activity and everyday exercise contribute to increased hand grip strength in students.

Author Contributions:

Conception and design: Areeba Hassan

Collection and assembly of data: Anna Zaheer

Analysis and interpretation of the data: Liza Fayyaz

Drafting of the article: Anna Zafar

Critical revision of article for intellectual content: Areeba Hassan

Statistical expertise: Anna Zaheer

Final approval and guarantor of the article: Liza Fayyaz

Conflict of Interest: None declared

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