

Correlation of Hand Dominance, Hand Dimension, and Hand Span with Grip Strength and Pinch Strength in Normal Individuals: A Cross-Sectional Study

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ABSTRACT

Background: Handgrip strength assessment helps evaluate the patient's weakness and his or her progress during the rehabilitation phase and the effectiveness of the treatment. Grip strength is a clinical parameter used to assess nutritional status and physical capability. Hand dominance is an individual's preferential use of one hand, known as the dominant hand, due to it being stronger, faster or better in dexterity. Hand dimension and dominance may be associated with grip strength.

Aim: To identify the correlation between the handgrip strength with hand dominance, hand dimension and hand span in normal individuals. Individual hands differ in size and dimension, dominance, and span.

Methodology: This was a Cross-sectional study with sample size of 600. Duration of the study was 6 months. Age group of 18-64 years, normal BMI, 18.5-24.9kg/m² and both genders were included in the study. Participants were categorized in 2 groups respectively, 18-36 years age group and 37-64 years age group. Hand grip, Pinch grip, Hand span and Hand length and width was measured bilaterally.

Results: Spearman's test was used using MedCalc 18.2.1 Software.

Conclusion: This study concludes that there is positive correlation between Hand Grip strength and Pinch Strength with Hand dimension, Hand span and Dominance.

Keywords:

INTRODUCTION

The hand is one of the most complex and beautiful pieces of natural engineering in the human body. It gives us a powerful grip but also allows us to manipulate small objects with great precision. The hand has one of the strangest arrangements of muscles in the body. The arrangement of the muscles in the hand allows us to do so much. Through habitual use and training even a single

finger can support the entire body weight.

The anatomy of the hand consists of 27 bones: 8 carpal, 5 metacarpal, 14 phalanges, 27 joints, more than 100 ligaments and tendons, 34 muscles, innumerable nerves, blood vessels and soft tissues. ^[1]

Grip strength is a measure of muscular strength or the maximum force/tension generated by one's forearm muscles. It can

be used as a screening tool for the measurement of upper body strength and overall strength. It is most useful when multiple measurements are taken over time to track performance.

There are various types of grips:

- Hammer grip. This grip is formed by full flexion of the fingers into the palm, and flexion of the thumb, to lie outside the palm.
- Baseball batter grip. This is another form of grip that relies on the diagonal shaped palmer gutter in which an object lies.
- Precision grip (tip to tip) The tip-to-tip connection of the fingers is caused by flexion of the fingers, with flexion and opposition of the thumb.
- Key grip. This kind of grip can be used for holding keys.
- Hook grip. The thumb is not involved in this grip. The other fingers are flexed, and usually carrying a weight, e.g. shopping bags.
- Tripod (pen) grip. This is the grip we use when holding a pen.

Hand dominance is an individual's preferential use of one hand, known as the dominant hand, due to it being stronger, faster or better in dexterity. The other hand, comparatively often the weaker, less dexterous or simply less subjectively preferred, is called the non-dominant hand.

Hand dimension is measured following hand length and hand width; hand length is taken from the tip of the middle finger to the distal wrist crease with an inch tape; hand width is taken following hand arch at the maximum palm level using an inch tape. [2]

Hand span is measured from the tip of the thumb to the tip of the little finger with the hand open as broad as possible. [2]

Hand grip strength (HGS) plays an important role in hand function. The handgrip test is used to check the muscular strength of the hand. The flexors strength in palmer, thenar, and hypothenar areas of the hand form the Handgrip Strength (HGS). Also, the extensor mechanism, including the

intrinsic musculature, plays a minor role in producing handgrip strength. Also, each finger plays an important role in handgrip strength. Handgrip strength assessment helps evaluate the patient's weakness and his or her progress during the rehabilitation phase and the effectiveness of the treatment. Grip strength is a clinical parameter used to assess nutritional status and physical capability. (it mainly reflects the ultimate strength derived from the mutual contraction of the intrinsic and extrinsic muscles of the hand, causing the flexion of hand joints). Grip strength measurements are widely used in areas as a functional assessment of overall strength. Also, assessing HGS by using a dynamometer is noninvasive and very simple to implement. [2] Muscle Hypertrophy, range of motion, gender, and types of muscle fiber, muscle coordination, and muscle shortening velocity are the internal factors that affect the muscular strength of the hand. [3] A decrease in HGS can lead to considerable functional limitation which will lead to reduction in daily life activities and affects quality of life. Body height and weight are the main indicators of human growth and correlation with grip. A study was conducted to evaluate HGS and handspan among healthy adults. Another study was conducted to identify the association between HGS and anthropometric measurements. Results found that dominant and non-dominant handgrip is positively associated with height, weight, hand span. Also, hand length is associated with a handgrip. It has also been shown that the maximum handgrip strength can vary to a great extent even if it is compared within people of the same age range and same sex. [3]

This study aims to identify the correlation between the handgrip strength with hand dominance, hand dimension and hand span in normal individuals. There are various studies done using hand grip strength in populations. Individual hands differ in size and dimension, dominance, and span. But association between different hand

dimensions along with hand span with grip strength might have been found but not yet conclusive. Very few studies are done to associate these characteristics of hand to grip. Grip strength is influenced by factors like age, synergistic muscle action, state of nutrition, cooperation of patient, restricted range of motion, pain and sensory loss. Hence, the need arises.

Aim & objectives

Aim

To find the correlation between hand dimension, handspan, and hand dominance with grip strength and pinch strength (lateral and palmar prehension) in normal healthy individuals.

Objectives

1. To find the correlation between hand dimension and grip strength using Jamar Dynamometer and Pinch Gauge.
2. To find the correlation between handspan and grip strength using Jamar Dynamometer and Pinch Gauge.
3. To find the difference between dominant and non-dominant hand with grip strength using Jamar Dynamometer and Pinch Gauge.

METHODOLOGY AND MATERIALS:

This was a Cross-sectional study carried out in Dr. D.Y. Patil College of Physiotherapy Outpatient department. Sample size was 600 and sampling method was purposive with duration of 6 months. Adult Population age group between 18-64 years having normal BMI, 18.5-24.9kg/m² (WHO Asian population), both gender and willing participants were included in the study while individuals going to gym or any fitness center, having history of any trauma to upper extremity e.g. Burns, crush injury, nerve injury, any recent soft tissue injury, Diabetes mellitus, Arthritis, fractures, neurological conditions like stroke, Parkinson's, Multiple Sclerosis, GBS, Spinal Cord Injury, Myasthenia Gravis, Motor Neuron Disease etc.

were excluded. Materials used were Jamar

Dynamometer, Jamar Pinch Gauge Dynamometer, Edinburgh Handedness Questionnaire, Inch tape, Pocket spring return tape, Long 30cms Ruler and Weighing machine. Outcome measures used were cylindrical grip strength and Pinch grip strength: Lateral and Palmar

PROCEDURE

Title was approved by institutional ethical committee. Individuals were screened. Individuals fulfilling the inclusion criteria and willing to participate in the study were included in the study. Signed and informed consent was taken. Participants were categorized in 2 groups respectively, 18-36 years age group and 37-64 years age group. For evaluating BMI, height in meters and weight in kgs were evaluated using pocket spring return tape and weighing scale.

Hand dominance was evaluated using the Edinburgh handedness questionnaire.

Hand dimension was measured using inch tape. Hand length was measured from the tip of the middle finger to the midline of the distal wrist crease when the forearm and hand was placed in supination and placed on the table. Hand width was measured across the widest area where the fingers join the palm.

To measure the hand span, the hand was placed palm down on a flat surface. The fingers were outstretched as far as possible. The linear distance was measured between the outside of the thumb to the outside of the little finger using a ruler.

For cylindrical hand grip measurement, the participant was in a sitting position on a chair with back support. Shoulder was in neutral position, forearm 90° flexed in mid prone position and wrist was at the end of the chair's arm and the thumb facing upwards. Hand was in neutral position. Feet were flat on the floor. We ensured the red needle was at zero position. Jamar dynamometer was given in hand. We encouraged squeezing the Jamar dynamometer as long as tightly as possible until the needle stops rising. We used the standard squeezing phrase

“Squeeze...harder, harder.... stop squeezing”, readings were noted. The procedure was repeated for the alternate hand. It was repeated 3 times. Best of 3 were taken.

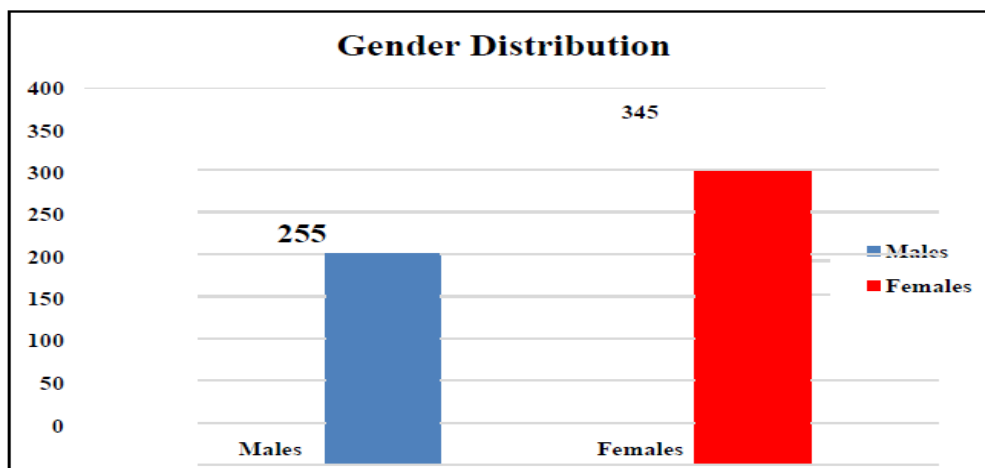
For pinch grip strength measurement, for lateral pinch (key grip), the participant’s start position was sitting on a chair with elbow flexed 90°, palm facing inward, pinch gauge was placed between flexed PIP joint of index finger and thumb. The individual was asked to squeeze, hold and release. For chuck pinch (palmer grip), the individual's

starting position was sitting on a chair with elbow flexed 90°, palm facing downward, pinch gauge was placed between thumb and the index and the middle finger. The individual was asked to squeeze, hold and release.^[11]

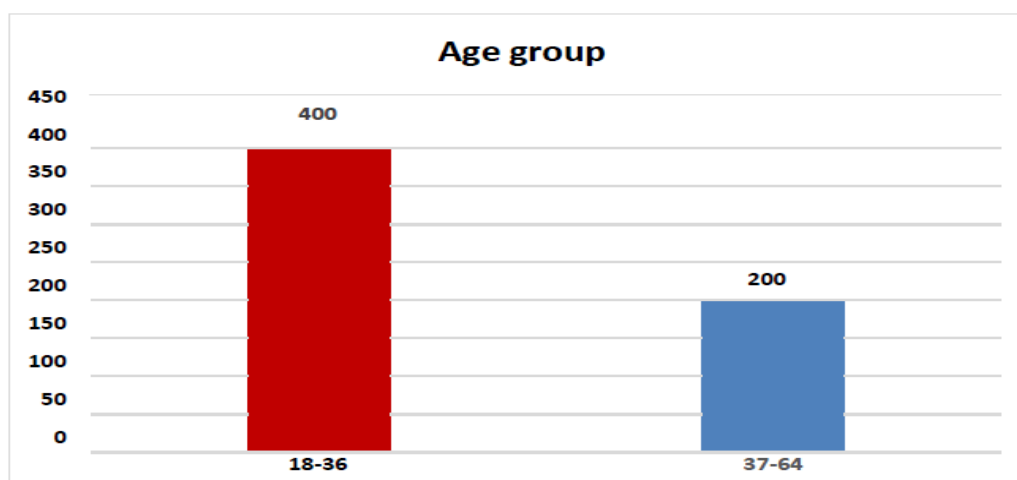
Data was collected and compiled in an excel spreadsheet. Appropriate statistical test: Spearman’s test for correlating hand dominance with grip strength, hand dimension with grip strength and hand span with grip strength were applied and results were analyzed.

RESULTS

GENDER DISTRIBUTION



AGE GROUP DISTRIBUTION



According to the Spearman’s test, using the MedCalc 18.2.1 Software.

AGE GROUP 18-36 (n=400):

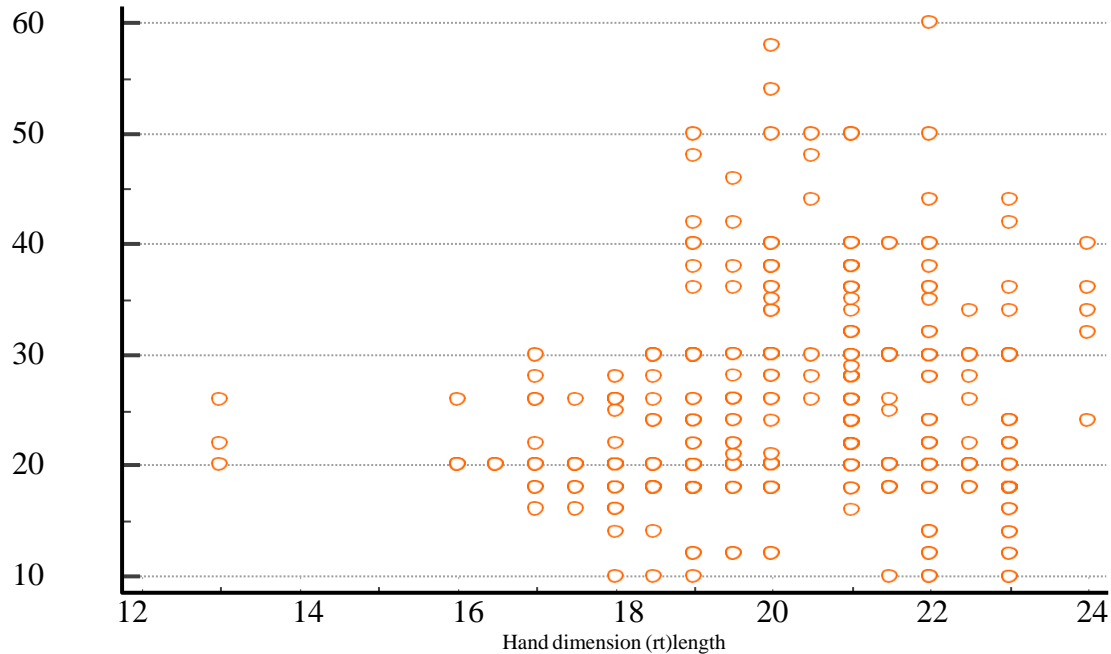
RIGHT:

1. Co-relation of hand grip strength with hand dimension (length):

TABLE NO 1:

r	0.1323
p	0.0081

GRAPH NO 1:



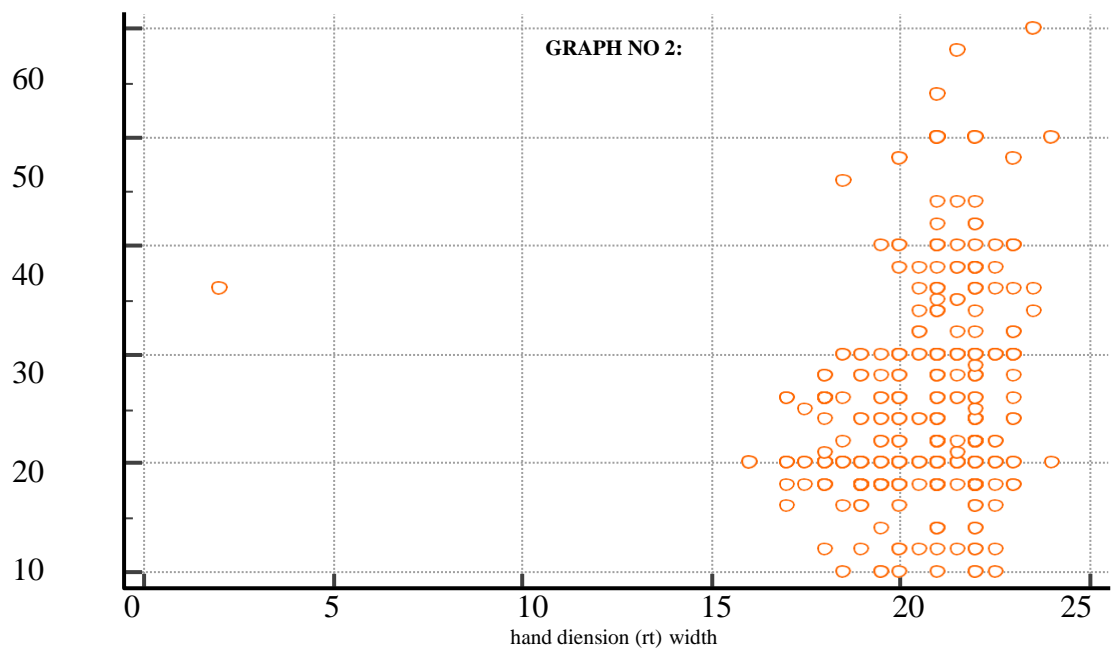
INTERPRETATION: The above table and graph states that there is positive co-relation between right hand grip strength with hand dimension (length) where $r= 0.1323$ and p is less than 0.05 suggesting that there is very weak co- relation which is statistically significant

2. Co-relation of hand grip strength with hand dimension (width):

TABLE NO 2:

r	0.1926
p	0.0001

GRAPH NO 2:

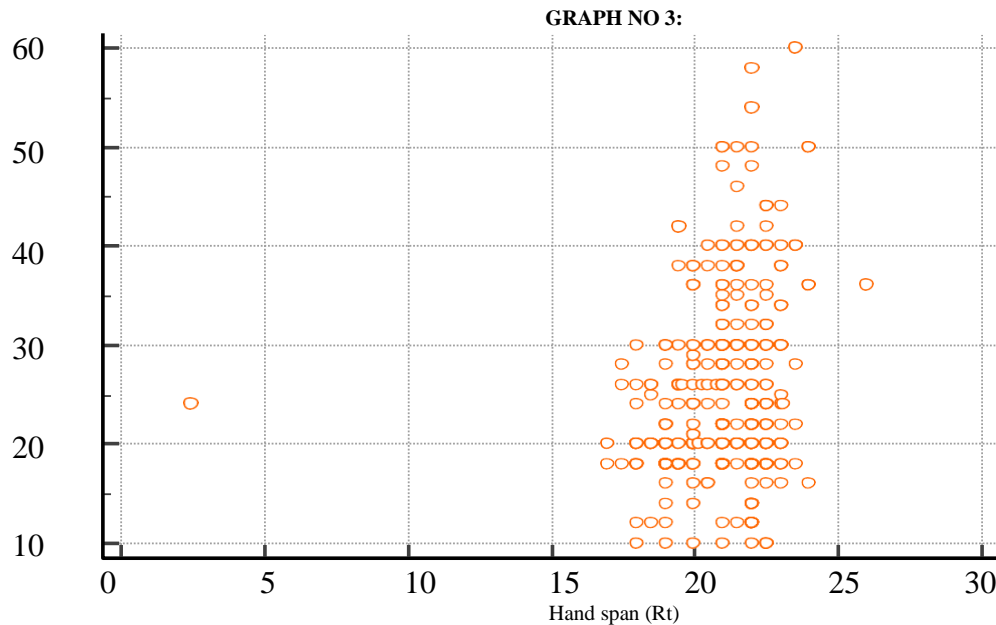


INTERPRETATION: The above table and graph states that there is positive co-relation between hand grip strength with hand dimension (width) where $r= 0.1926$ and p is less than 0.05 suggesting that there is very weak co- relation which is statistically significant

3. Co-relation of hand grip strength with hand span:

TABLE NO 3:

r	0.232
p	<0.0001



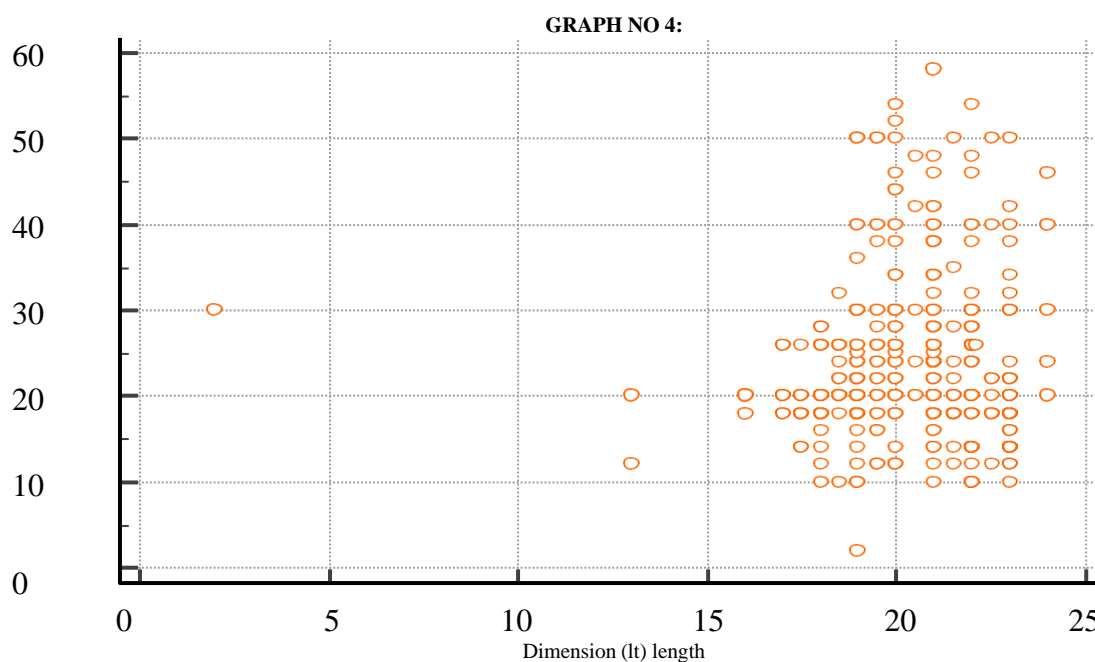
INTERPRETATION: The above table and graph states that there is positive co-relation between right hand grip strength with hand span where $r= 0.2320$ and p is less than 0.05 suggesting that there is weak co-relation which is statistically significant

LEFT

4. Co-relation of hand grip strength with hand dimension (length):

TABLE NO 4:

r	0.09567
p	0.0559

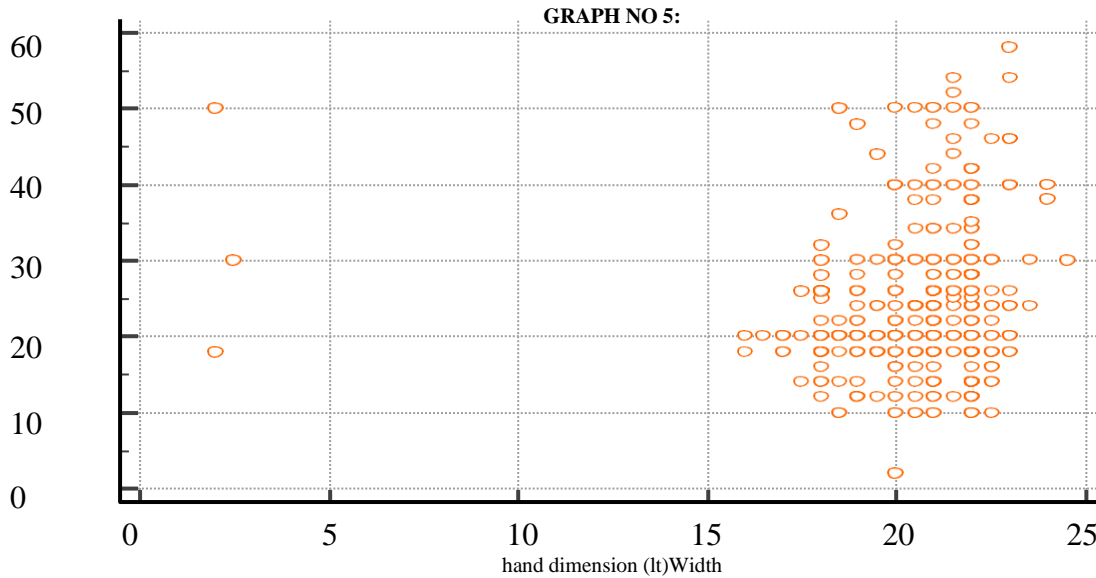


INTERPRETATION: The above table and graph states that there is positive co-relation between left hand grip strength with hand dimension (length) where $r= 0.09567$ and p is less than 0.05 suggesting that there is weak co-relation which is statistically significant

5. Co-relation of hand grip strength with hand dimension (width)

TABLE NO 5:

r	0.1036
p	0.0383

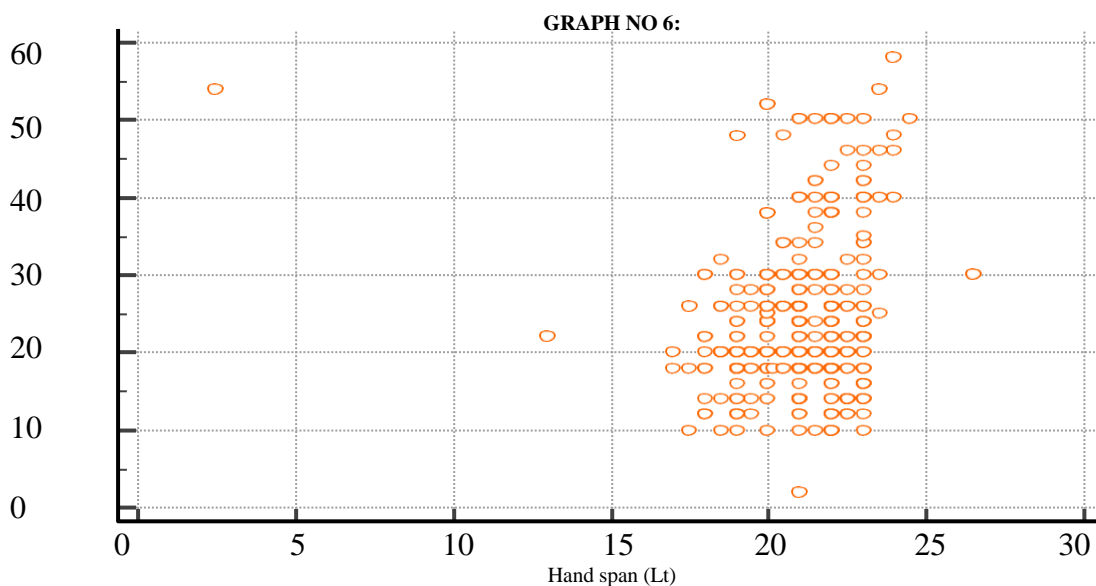


INTERPRETATION: The above table and graph states that there is positive co-relation between left hand grip strength with hand dimension (width) where $r= 0.1036$ and p is less than 0.05 suggesting that there is very weak co-relation which is statistically significant

6. Co-relation of hand grip strength with hand span:

TABLE NO 6:

r	0.1426
p	0.0043



INTERPRETATION: The above table and graph states that there is positive co-relation

between left hand grip strength with hand span where $r= 0.1426$ and p is less than 0.05 suggesting that there is very weak co-relation which is statistically significant

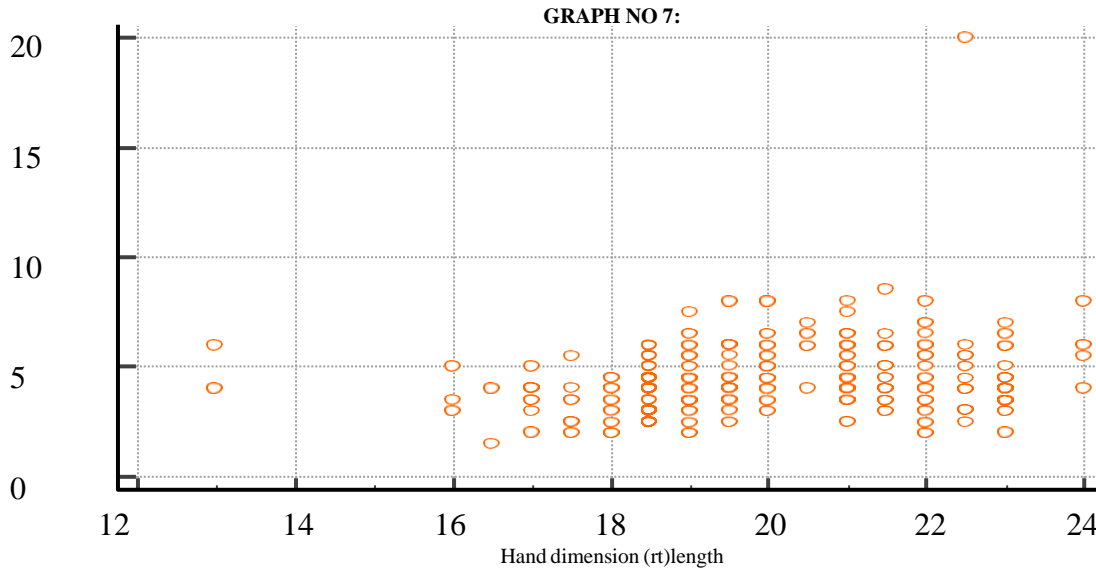
RIGHT:

7. Co-relation of pinch grip strength with hand dimension (length):

TABLE NO 7:

r	0.2000
p	0.0001

**PINCH GRIP STRENGTH:
LATERAL PINCH:**

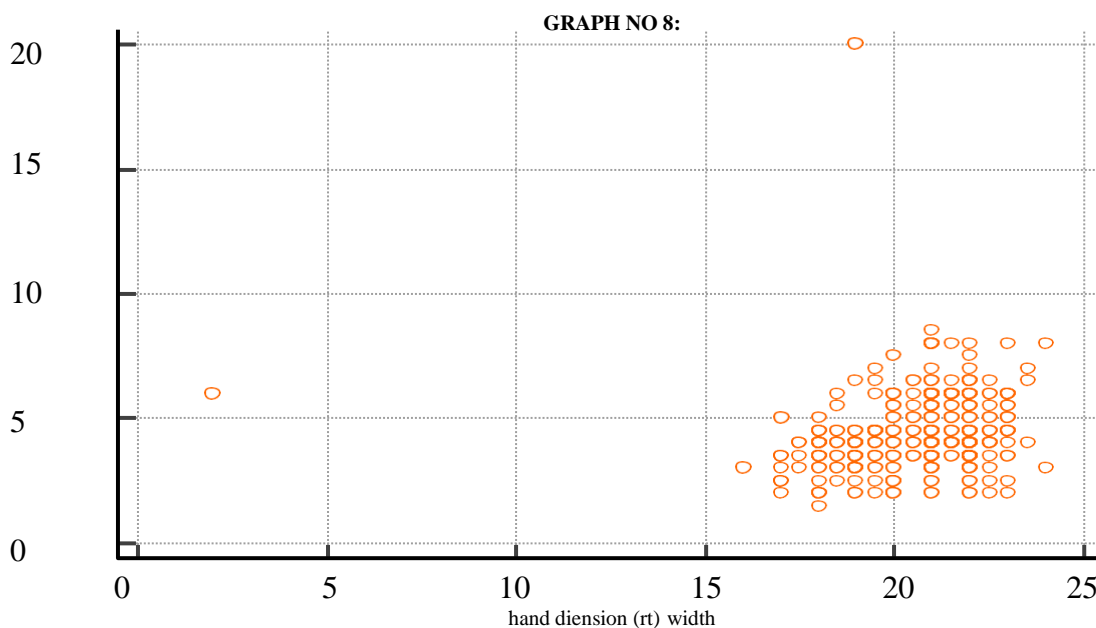


INTERPRETATION: The above table and graph states that there is positive co-relation between right lateral pinch grip strength and hand dimension (length) where $r= 0.2000$ and p is less than 0.05 suggesting that there is weak co-relation which is statistically significant

8. Co-relation of pinch grip strength with hand dimension (width):

TABLE NO 8:

r	0.1642
p	0.001

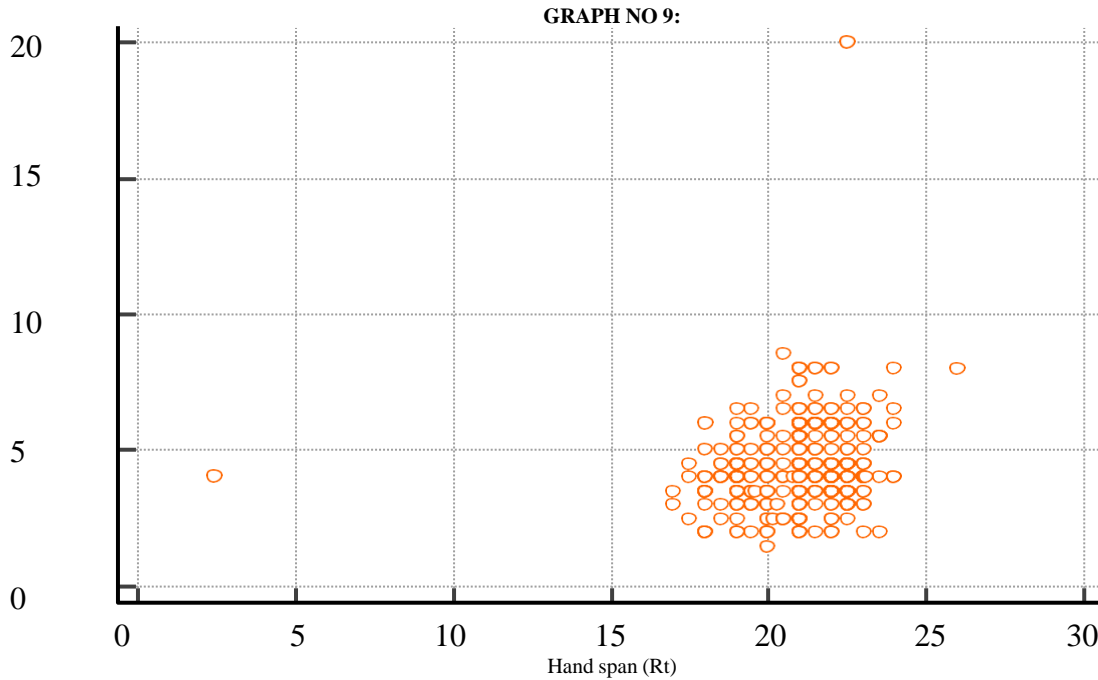


INTERPRETATION: The above table and graph states that there is positive co-relation between right lateral pinch grip strength with hand dimension (width) where $r= 0.1642$ and p is less than 0.05 suggesting that there is very weak co-relation which is statistically significant

9. Co-relation of pinch grip strength with hand span:

TABLE NO 9:

r	0.1749
p	0.0004

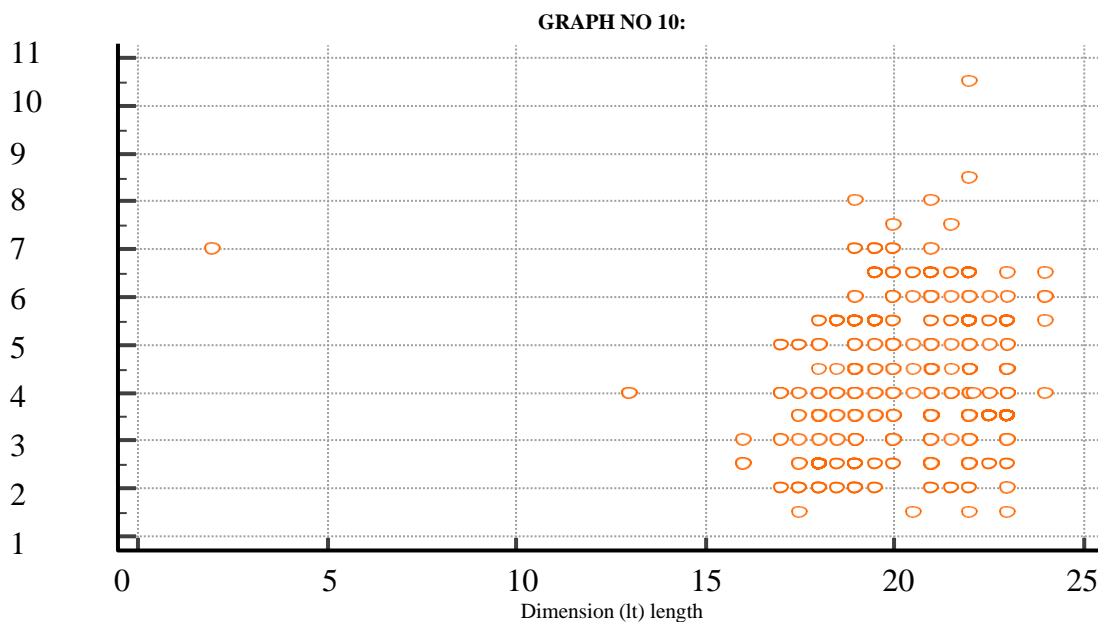


INTERPRETATION: The above table and graph states that there is positive co-relation between right pinch grip strength with hand span where $r= 0.1749$ and p is less than 0.05 suggesting that there is very weak co-relation which is statistically significant

LEFT:
10. Co-relation of pinch grip strength with hand dimension (length):

TABLE NO 10:

r	0.1227
p	0.0141

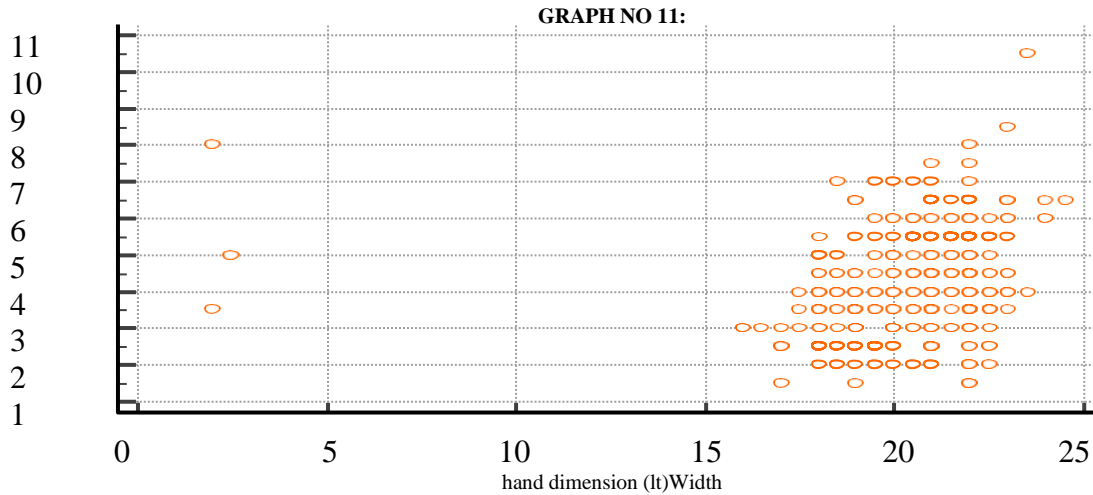


INTERPRETATION: The above table and graph states that there is positive co-relation between left lateral pinch grip strength with hand dimension (length) where $r=0.1227$ and p is less than 0.05 suggesting that there is very weak co-relation which is statistically significant

11. Co-relation of pinch grip strength with hand dimension (width):

TABLE NO 11:

r	0.1589
p	0.0014

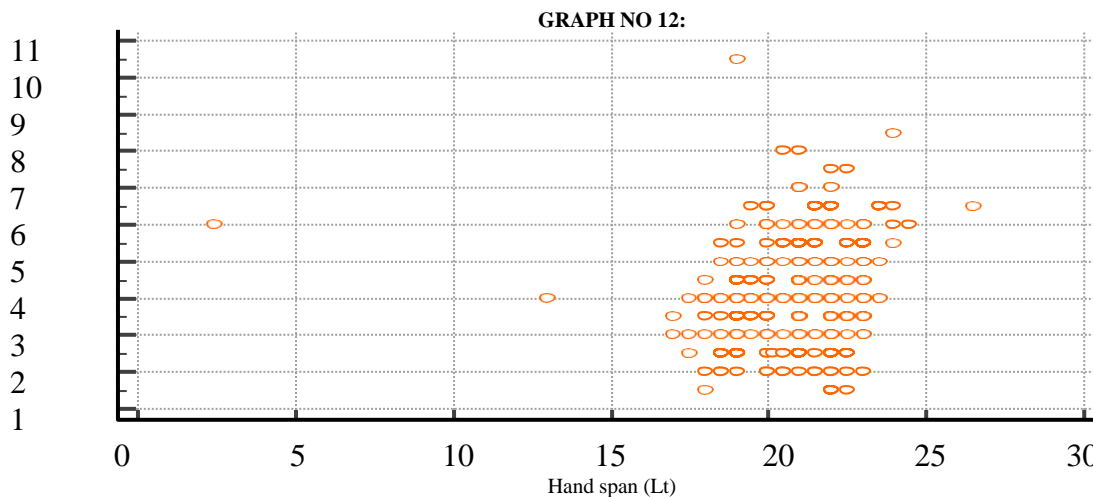


INTERPRETATION: The above table and graph states that there is positive co-relation between left lateral grip strength with hand dimension (width) where $r=0.1589$ and p is less than 0.05 suggesting that there is very weak co-relation which is statistically significant

12. Co-relation of pinch grip strength with hand span:

TABLE NO 12:

r	0.1407
p	0.0048



INTERPRETATION: The above table and graph states that there is positive co-relation between left lateral pinch grip strength with hand span where $r=0.1407$ and p is less than 0.05 suggesting that there is very weak

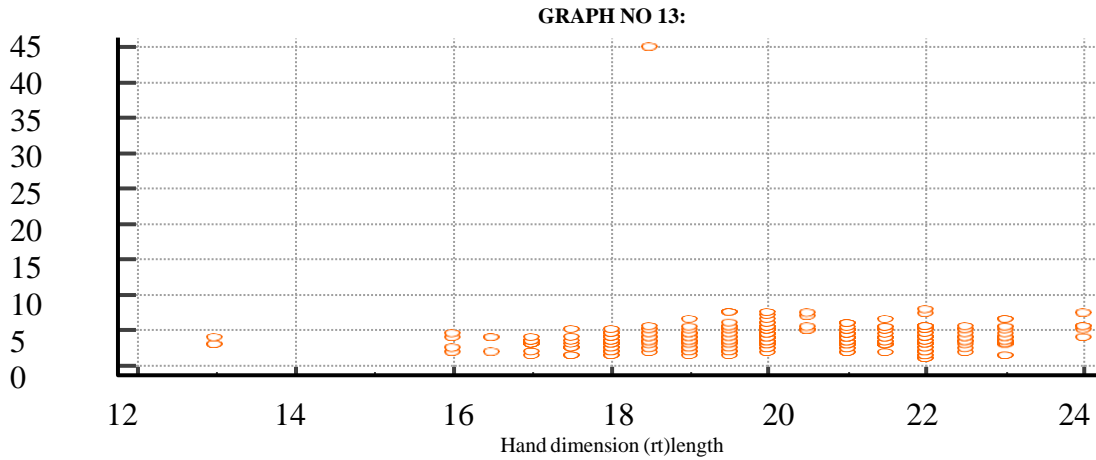
co-relation which is statistically significant

**PALMER PINCH:
RIGHT:**

13. Co-relation of pinch grip strength with hand dimension (length):

TABLE NO 13:

r	0.03369
p	0.5016

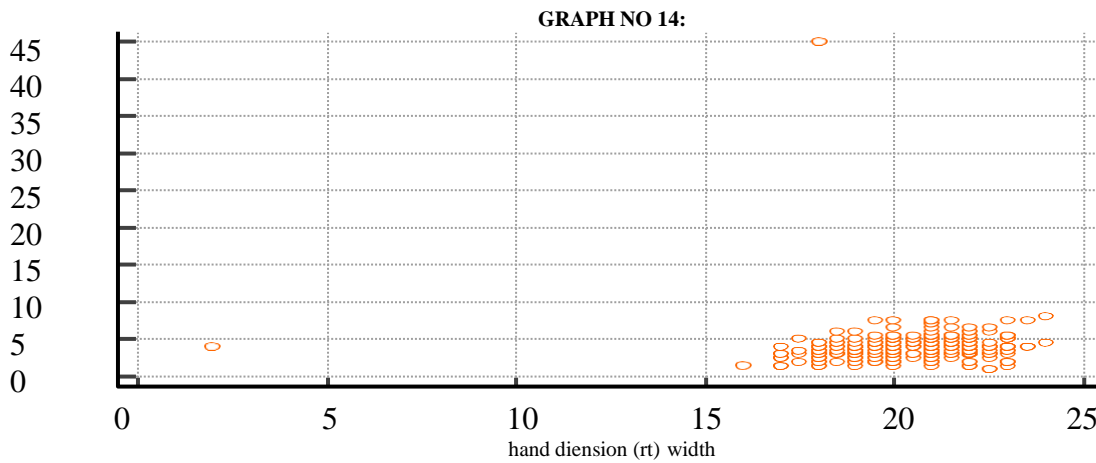


INTERPRETATION: The above table and graph states that there is positive co-relation between right pinch grip strength and hand dimension (length) where $r=0.3369$ and p is less than 0.05 suggesting that there is weak co-relation which is statistically significant

14. Co-relation of pinch grip strength with hand dimension (width):

TABLE NO 14:

r	0.2799
p	0.5767

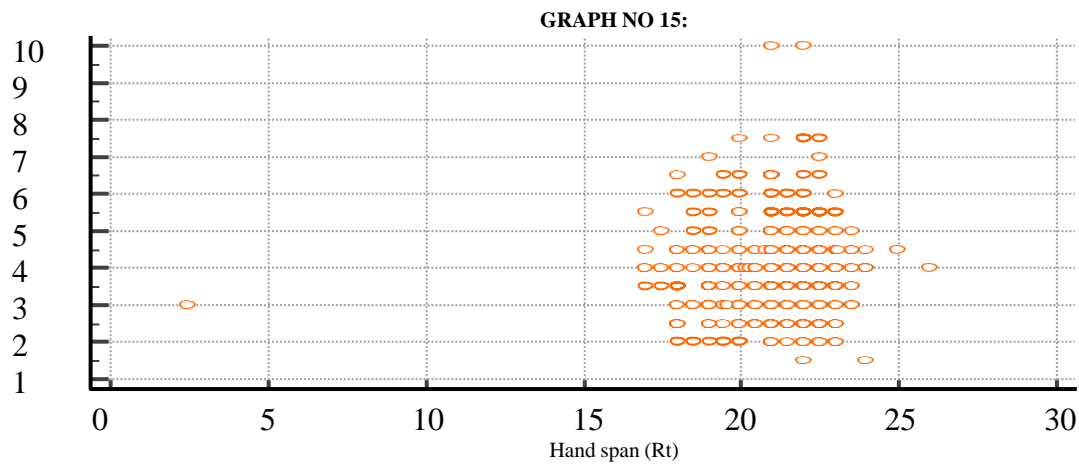


INTERPRETATION: The above table and graph states that there is positive co-relation between right pinch grip strength palmer with hand dimension (width) where $r=0.2799$ and p is less than 0.05 suggesting that there is very weak co-relation which is statistically significant

15. Co-relation of pinch grip strength with hand span:

TABLE NO 15:

r	0.02771
p	0.4977



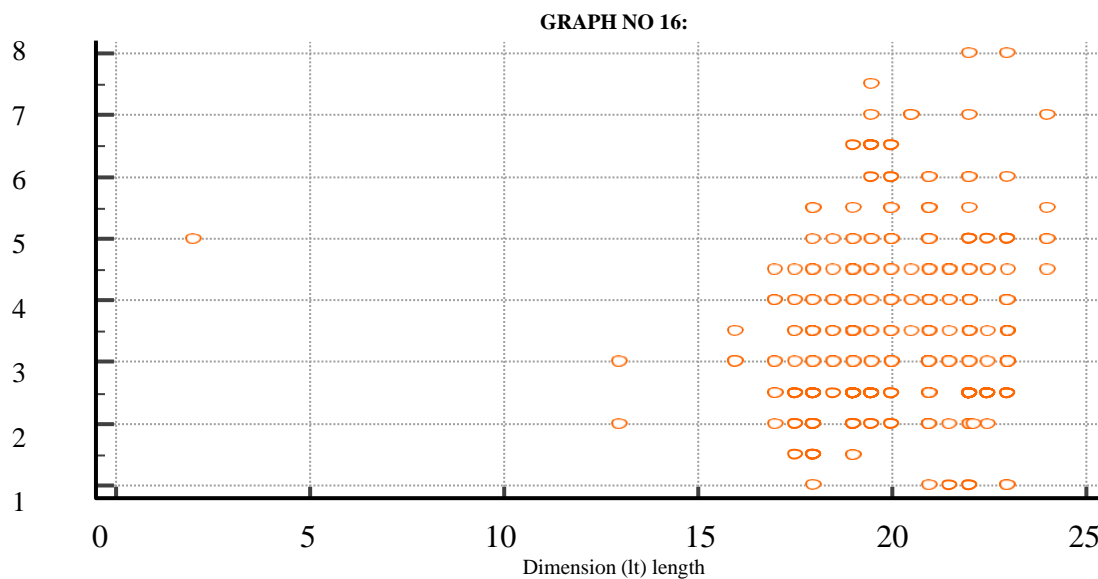
INTERPRETATION: The above table and graph states that there is positive co-relation between right pinch grip strength with hand span where $r = 0.02771$ and p is less than 0.05 suggesting that there is very weak co-relation which is statistically significant

16. Co-relation of pinch grip strength with hand dimension (length):

TABLE NO 16:

r	0.06807
p	0.1743

LEFT:

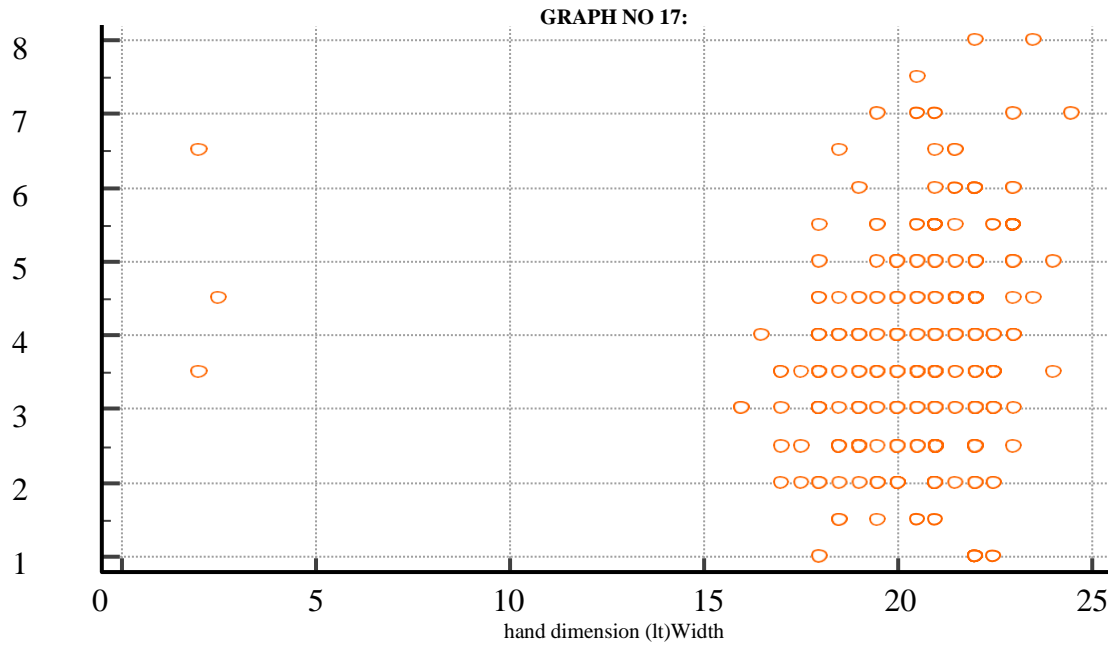


INTERPRETATION: The above table and graph states that there is positive co-relation between left palmer pinch grip strength with hand dimension (length) where $r = 0.06807$ and p is less than 0.05 suggesting that there is very weak co-relation which is statistically significant

17. Co-relation of pinch grip strength with hand dimension (width):

TABLE NO 17:

r	0.06172
p	0.2181

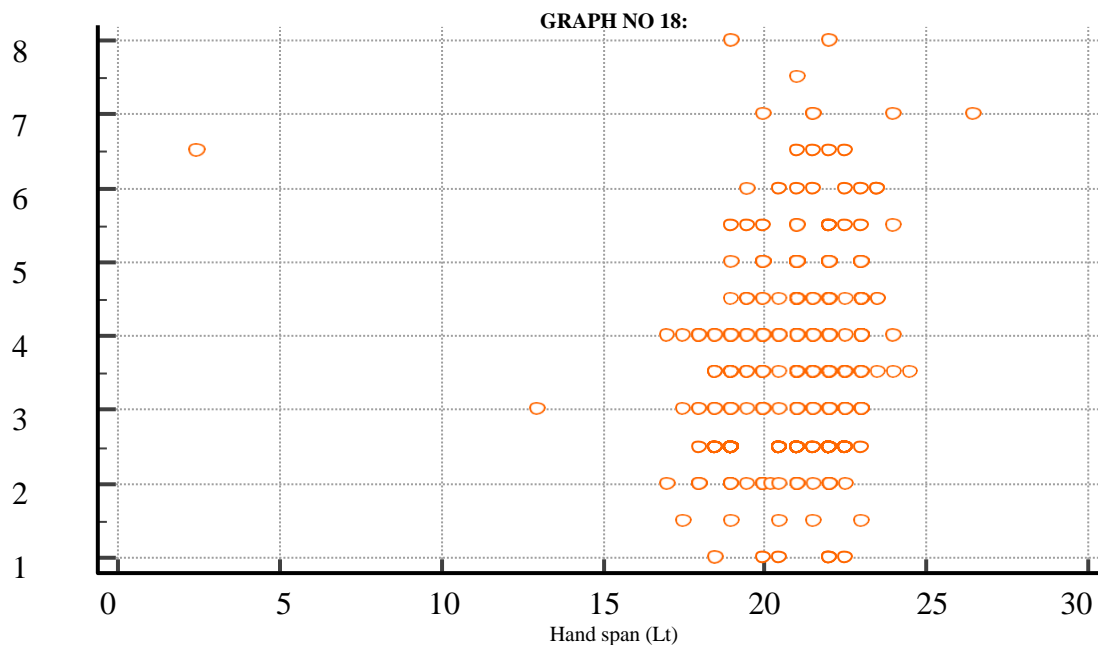


INTERPRETATION: The above table and graph states that there is positive co-relation between left palmer pinch grip strength with hand dimension (width) where $r = 0.06172$ and p is less than 0.05 suggesting that there is very weak co-relation which is statistically significant

18. Co-relation of pinch grip strength with hand span:

TABLE NO 18:

r	0.09366
p	0.0613



INTERPRETATION: The above table and graph states that there is positive co-relation between left palmer pinch grip strength with hand span where $r = 0.09366$ and p is less than 0.05 suggesting that there is very weak

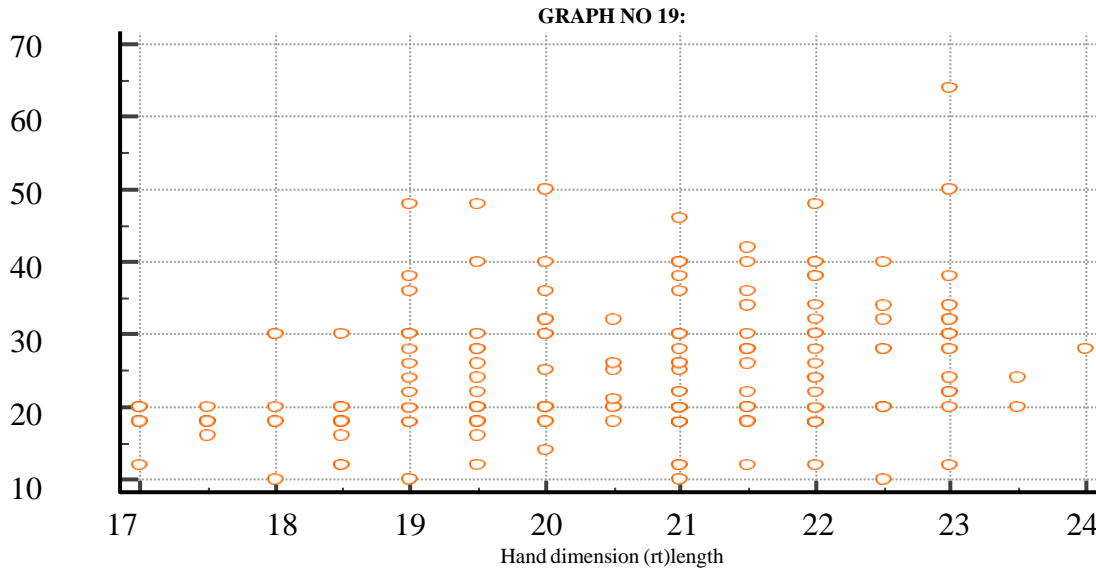
co-relation which is statistically significant

AGE GROUP 37-64 (n=200):
HAND GRIP STRENGTH:
RIGHT:

19. Co-relation of hand grip strength with hand dimension (length):

TABLE NO 19:

r	0.2516
p	0.0003

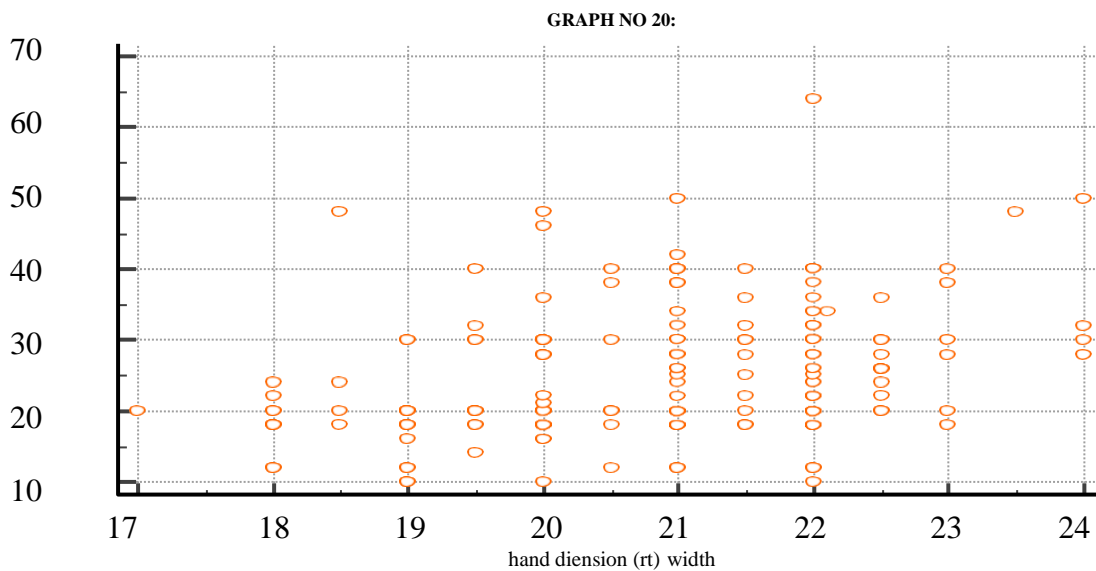


INTERPRETATION: The above table and graph states that there is positive co-relation between right hand grip strength with hand dimension (length) where $r = 0.2516$ and p is less than 0.05 suggesting that there is weak co-relation which is statistically significant

20. Co-relation of hand grip strength with hand dimension (width):

TABLE NO 20:

r	0.3138
p	<0.0001

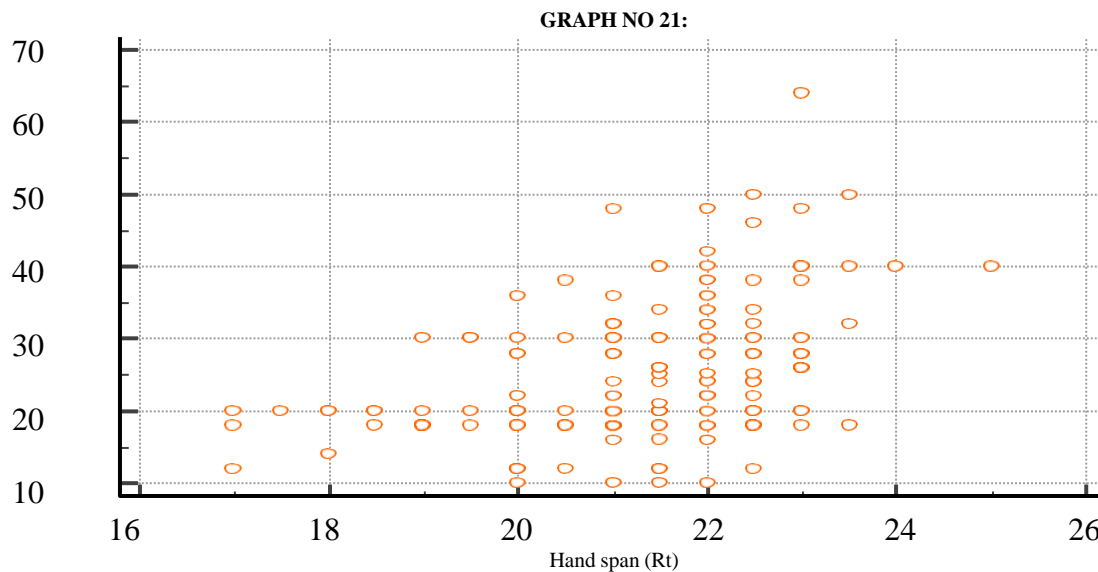


INTERPRETATION: The above table and graph states that there is positive co-relation between right hand grip strength with hand dimension (width) where $r = 0.3138$ and p is less than 0.05 suggesting that there is weak co-relation which is statistically significant

21. Co-relation of hand grip strength with hand span:

TABLE NO 21:

r	0.4183
p	<0.0001

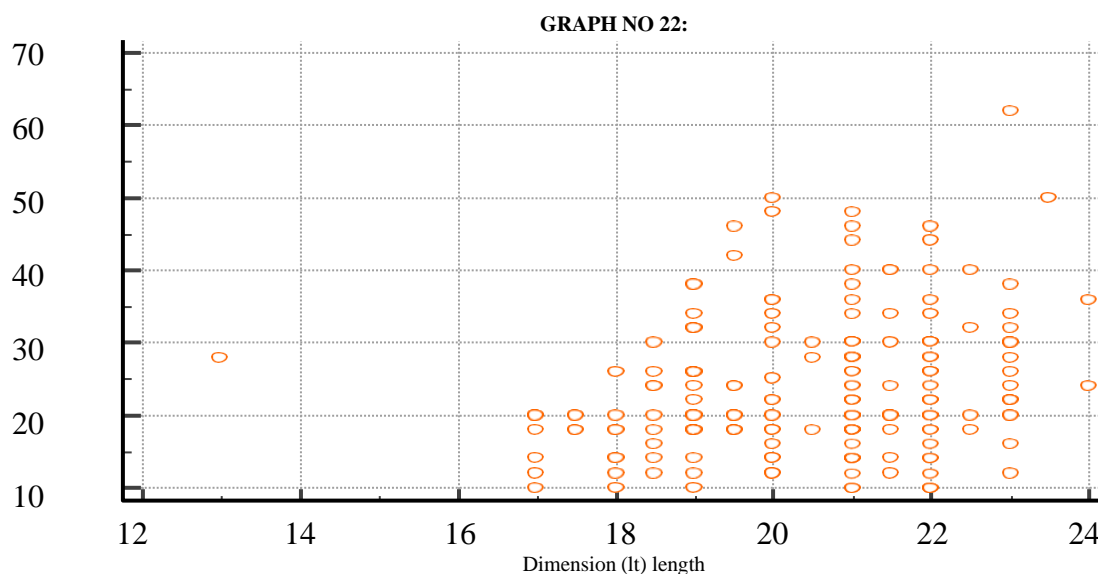


INTERPRETATION: The above table and graph states that there is positive co-relation between right hand grip strength with hand span where $r= 0.4183$ and p is less than 0.05 suggesting that there is moderate co-relation which is statistically significant

LEFT:
22. Co-relation of hand grip strength with hand dimension (length):

TABLE NO 22:

r	0.4183
p	<0.0001

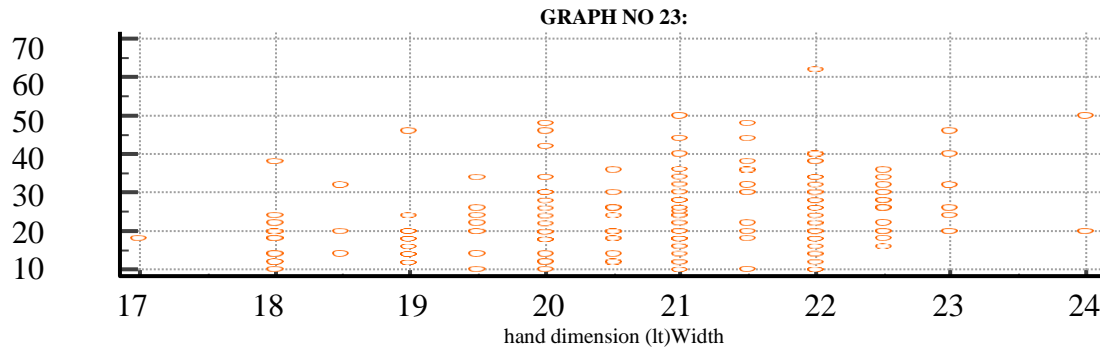


INTERPRETATION: The above table and graph states that there is positive co-relation between left hand grip strength with hand dimension (length) where $r= 0.4183$ and p is less than 0.05 suggesting that there is moderate co-relation which is statistically significant

23. Co-relation of hand grip strength with hand dimension (width):

TABLE NO 23:

r	0.2757
p	0.0001

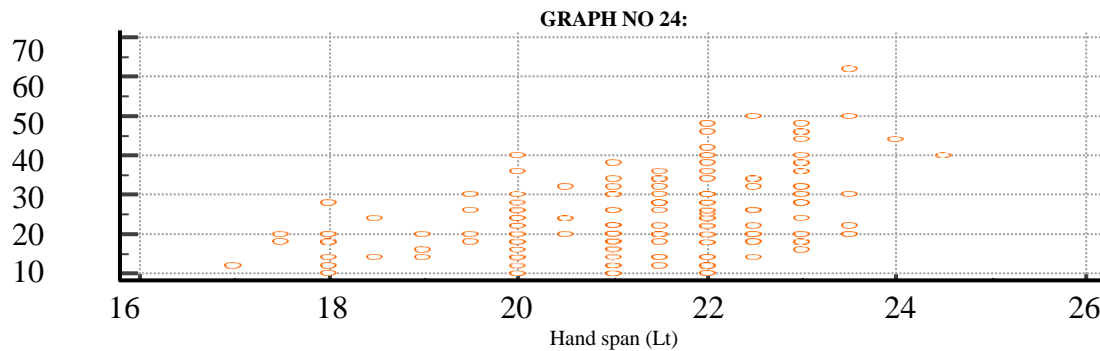


INTERPRETATION: The above table and graph states that there is positive co-relation between left hand grip strength with hand dimension (width) where $r= 0.2757$ and p is less than 0.05 suggesting that there is weak co-relation which is statistically significant

24. Co-relation of hand grip strength with hand span:

TABLE NO 24:

r	0.4223
p	<0.0001



INTERPRETATION: The above table and graph states that there is positive co-relation between left hand grip strength with hand span where $r= 0.4223$ and p is less than 0.05 suggesting that there is very weak co-relation which is statistically significant

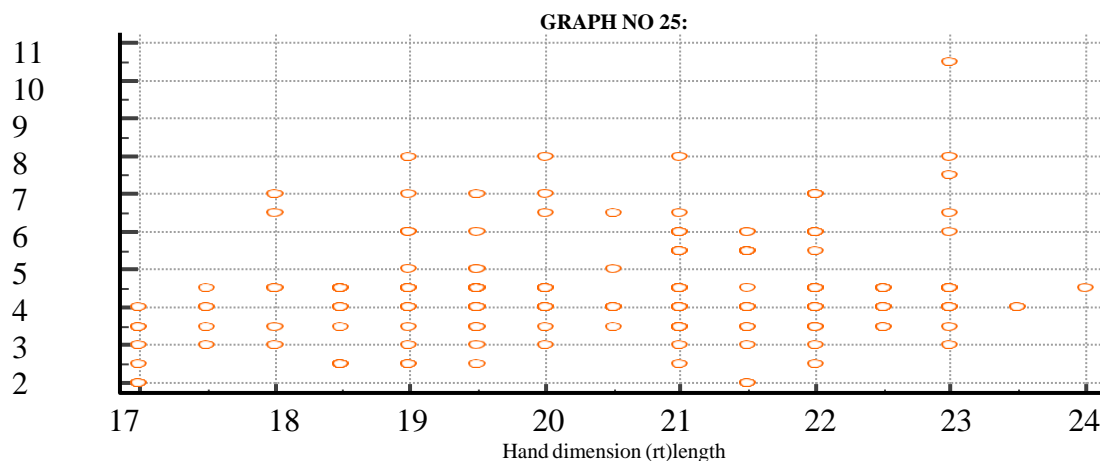
LATERAL PINCH:
RIGHT:

25. Co-relation of pinch grip strength with hand dimension (length):

TABLE NO 25:

r	0.1924
p	0.0063

PINCH GRIP STRENGTH:

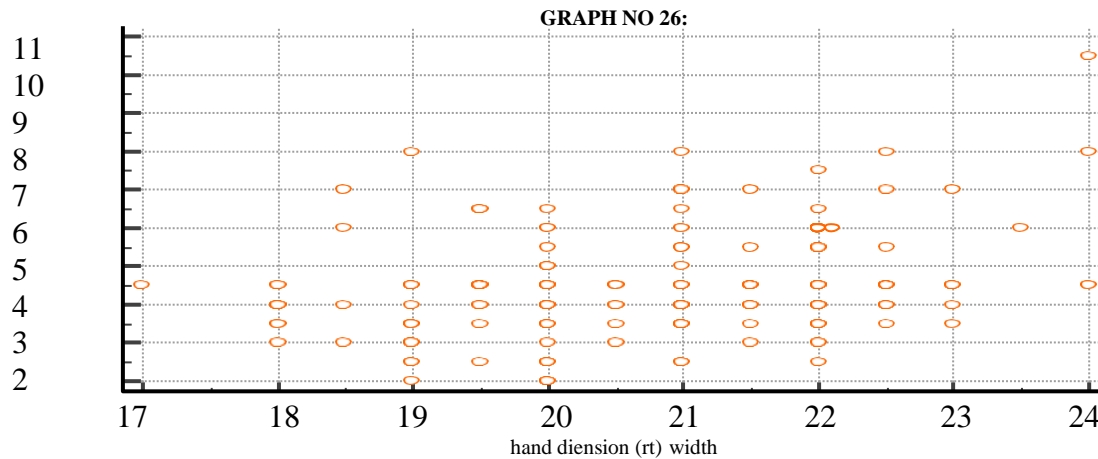


INTERPRETATION: The above table and graph states that there is positive co-relation between right lateralpinch grip strength with hand dimension (length) where $r= 0.1942$ and p is less than 0.05 suggesting that there is very weak co-relation which is statistically significant

26. Co-relation of pinch grip strength with hand dimension (width):

TABLE NO 26:

r	0.287
p	<0.0001

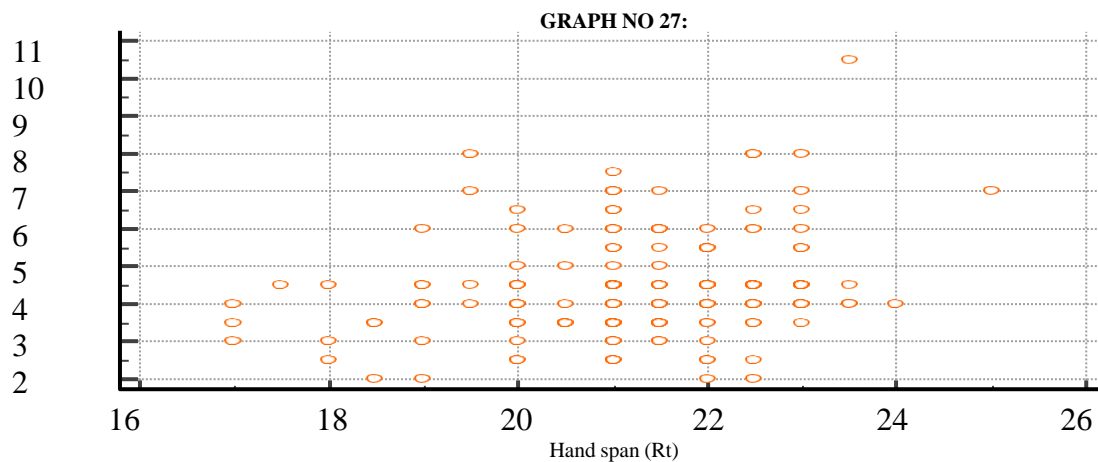


INTERPRETATION: The above table and graph states that there is positive co-relation between right lateralpinch grip strength with hand dimension (width) where $r= 0.2870$ and p is less than 0.05 suggesting that there is weak co-relation which is statistically significant

27. Co-relation of pinch grip strength with hand span:

TABLE NO 27:

r	0.2229
p	0.0015

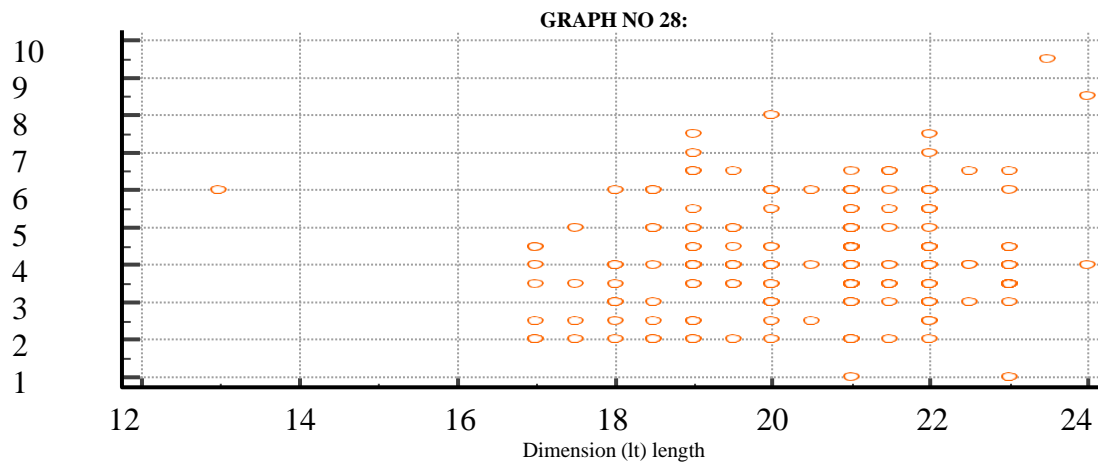


INTERPRETATION: The above table and graph states that there is positive co-relation between right lateralpinch grip strength with hand span where $r= 0.2229$ and p is less than 0.05 suggesting that there is weak co-relation which is statistically significant

LEFT:
28. Co-relation of pinch grip strength with hand dimension (length):

TABLE NO 28:

r	0.1197
p	0.0912

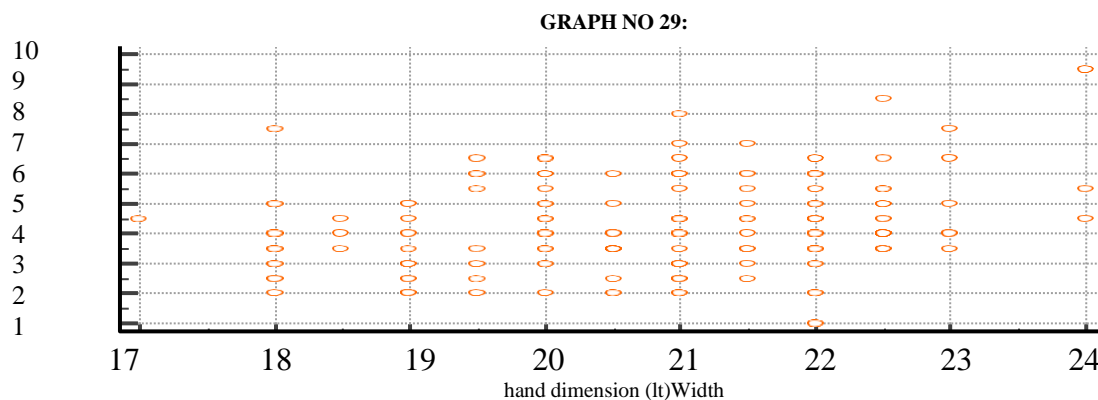


INTERPRETATION: The above table and graph states that there is positive co-relation between left lateral pinch grip strength with hand dimension (length) where $r= 0.1197$ and p is less than 0.05 suggesting that there is very weak co-relation which is statistically significant

29. Co-relation of pinch grip strength with hand dimension (width):

TABLE NO 29:

r	0.2136
p	0.0024

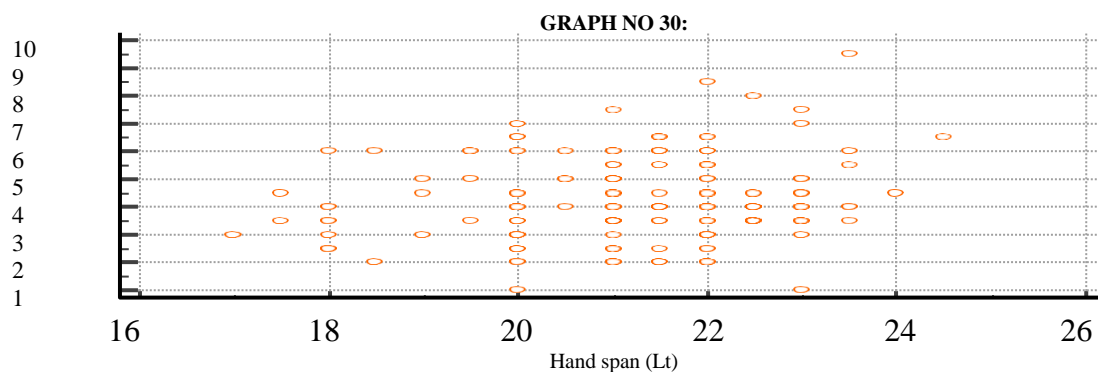


INTERPRETATION: The above table and graph states that there is positive co-relation between left lateral pinch grip strength with hand dimension (width) where $r= 0.2136$ and p is less than 0.05 suggesting that there is weak co-relation which is statistically significant

30. Co-relation of pinch grip strength with hand span:

TABLE NO 30:

r	0.1454
p	0.04



INTERPRETATION: The above graph states that there is positive co-relation between left lateral pinch grip strength with hand span where $r= 0.1454$ and p is less than 0.05 suggesting that there is very weak co- relation which is statistically significant

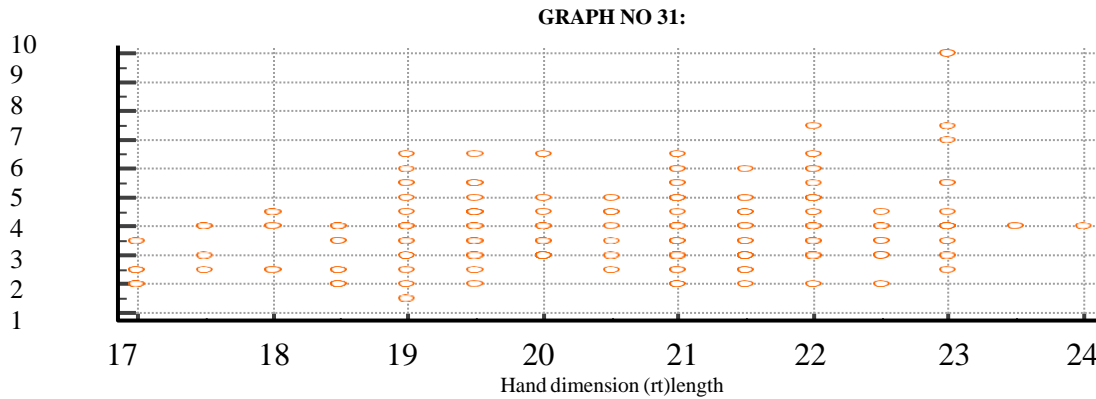
PALMER PINCH:

RIGHT:

31. Co-relation of pinch grip strength with hand dimension (length):

TABLE NO 31:

r	0.2268
p	0.0012

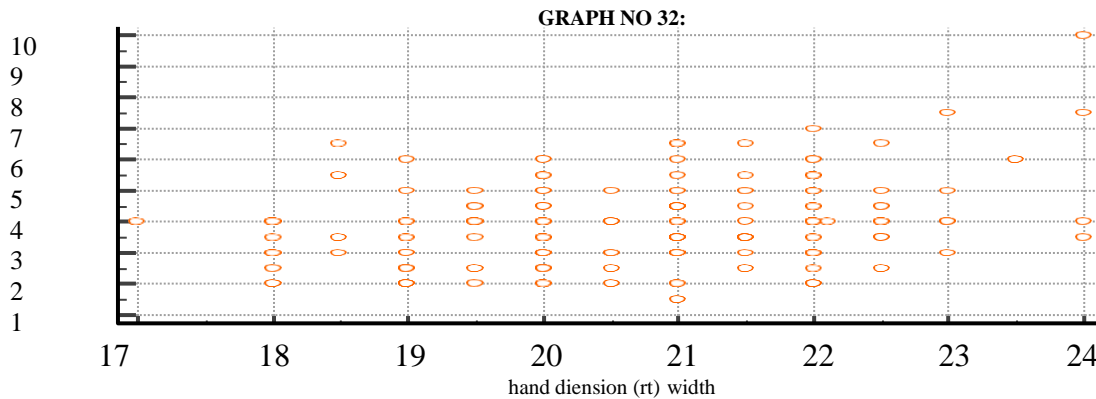


INTERPRETATION: The above table and graph states that there is positive co-relation between right palmer pinch grip strength with hand dimension (length) where $r= 0.2268$ and p is less than 0.05 suggesting that there is weak co-relation which is statistically significant

32. Co-relation of pinch grip strength with hand dimension (width):

TABLE NO 32:

r	0.275
p	0.0001

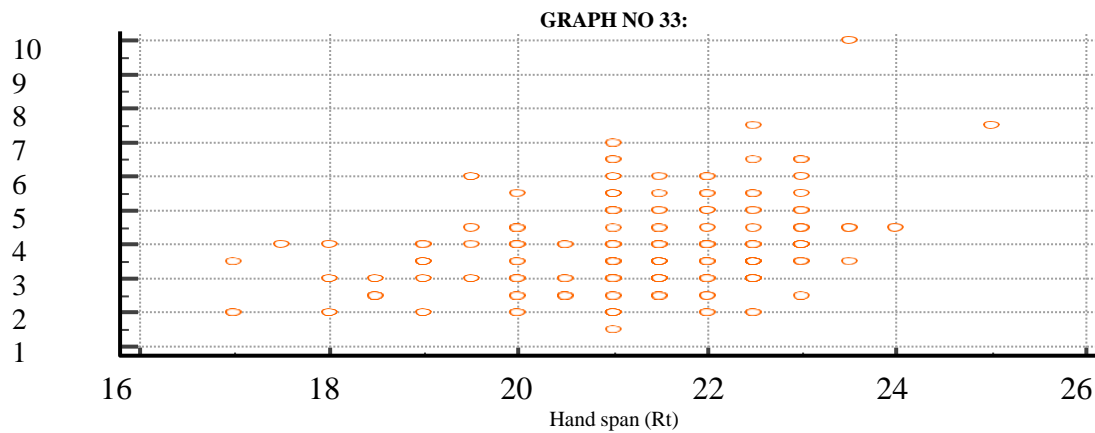


INTERPRETATION: The above table and graph states that there is positive co-relation between right palmer pinch grip strength with hand dimension (width) where $r= 0.2750$ and p is less than 0.05 suggesting that there is weak co-relation which is statistically significant

33. Co-relation of pinch grip strength with hand span:

TABLE NO 33:

r	0.3344
p	<0.0001

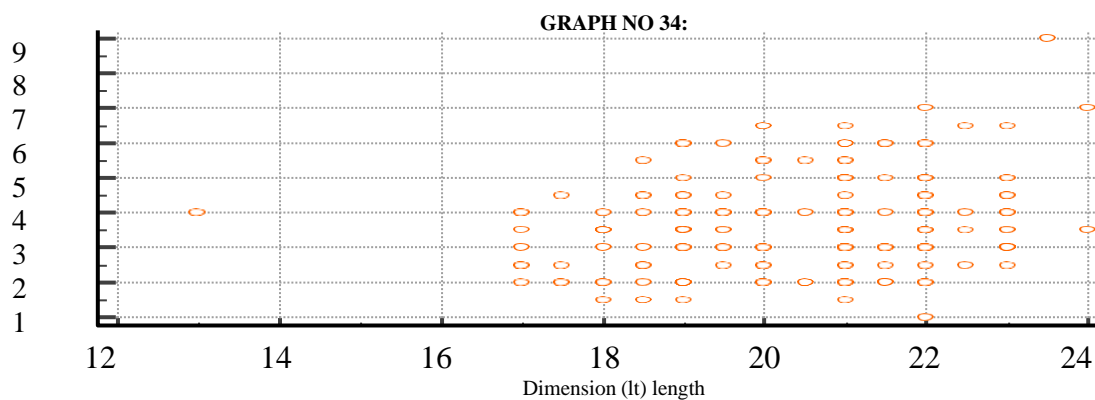


INTERPRETATION: The above table and graph states that there is positive co-relation between right palmer pinch grip strength with hand span where $r= 0.3344$ and p is less than 0.05 suggesting that there is weak co-relation which is statistically significant

LEFT:
34. Co -relation of pinch grip strength with hand dimension (length):

TABLE NO 34:

r	0.1844
p	0.009

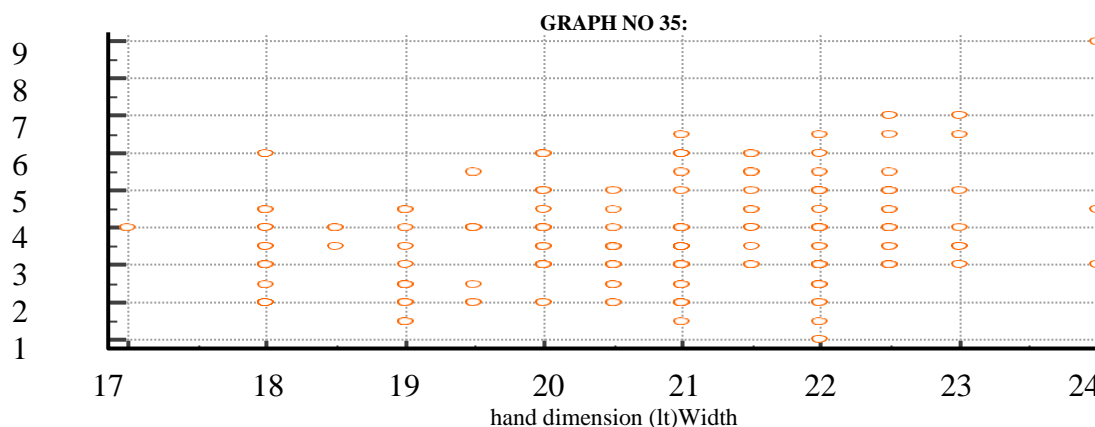


INTERPRETATION: The above table and graph states that there is positive co-relation between left palmer pinch grip strength with hand dimension (length) where $r= 0.1844$ and p is less than 0.05 suggesting that there is very weak co-relation which is statistically significant

35. Co-relation of pinch grip strength with hand dimension (width):

TABLE NO 35:

r	0.2562
p	0.0003

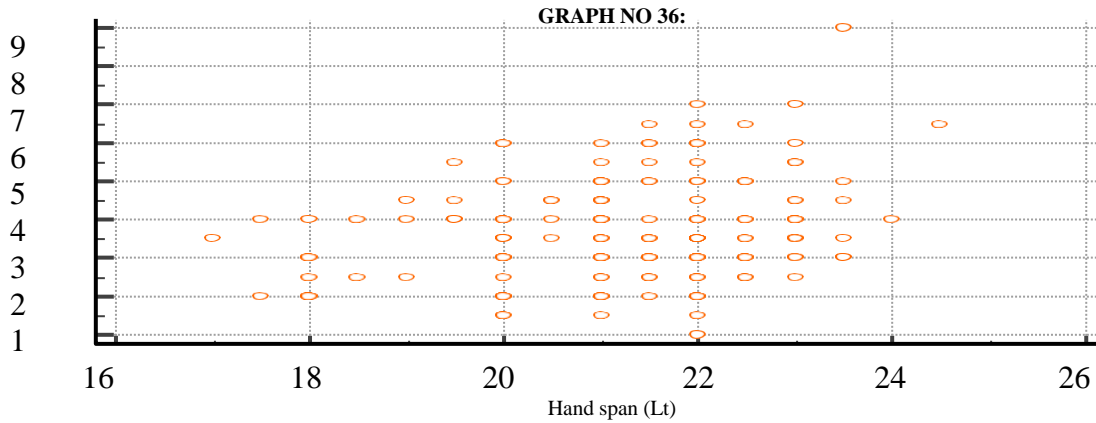


INTERPRETATION: The above table and graph states that there is positive co-relation between left palmer pinch grip strength with hand dimension (width) where $r= 0.2562$ and p is less than 0.05 suggesting that there is weak co-relation which is statistically significant

36. Co-relation of pinch grip strength with hand span:

TABLE NO 36:

r	0.2495
p	0.0004



INTERPRETATION: The above table and graph states that there is positive co-relation between left palmer pinch grip strength with hand span where $r= 0.2495$ and p is less than 0.05 suggesting that there is weak co-relation which is statistically significant

hand as compared to non-dominant hand.^[3] The Grip Strength of 18-36 years aged population was found to be less than the population of 37-64 years, this might be because age is positively correlated with hand grip strength, with increasing age, the size of the limb also gradually increases, the length and the width of the hand increases.^[13]

DISCUSSION

The measurement of the hand grip strength is an important component for hand rehabilitation. It assesses the patient’s initial limitations and provides a quick reassessment of patient’s progress throughout the treatment. It is a marker of physiological functioning and integrity of anatomical structures of hand.

There was a positive correlation between the Hand grip strength with hand span and hand dimension in healthy individuals. The reason might be that hand span and hand dimension might be affected by grip force, exertional level, maximal grip strength and submaximal grip strength which is supported by MacDermid et al (2012), where in significant positive correlations were noted between hand grip strength and hand length, hand width and hand span of respective sides in healthy population.^[14]

In this study, Correlation of Hand Grip Strength and Pinch Strength (lateral and palmar) with Hand dimension (hand length and hand width), Hand Span were studied.

In our study we found that in the population aged 18-36 years (n=400) and 37-64 years (n=200) showed that hand grip strength of dominant hand was greater than the non-dominant hand. This might be because of the usage of the dominant hand for purposeful activities than the non-dominant hand. This correlates with the study done by Bibi Noonari et al (2019) that there is 10% higher handgrip strength of the dominant

Table and Graph no. 7 to 12 and 25 to 30 for both age group shows that there was a positive correlation between the pinch strength (lateral) with hand dimension and hand span of dominant and non-dominant in healthy individuals was found. The reason for this might be because performances of the activities of daily living (ADL) are spontaneous with normal functioning hands.

With hand injuries resulting in impairments of the ADL, these seemingly innocuous tasks become arduous. The ADL tasks brought about by the key pinch include; insertion and removal of a key or the Automated Teller Machine (ATM) card, operating a clothes zipper, insertion or removal of a plug, stabbing food with the prongs of a fork, operating a remote control. The key pinch strength has been demonstrated as a standard objective clinical test for evaluating the outcome of surgical procedures on the hand^[13]

Similarly, it was found that the pinch grip strength (lateral) of age group 18-36 years was less than age group 37-64 years because age is positively correlated with hand grip strength, with an increasing age, the girth of the limb also gradually increases, both the length and the width increases.^[13]

Table and graph no. 13 to 18 and 31 to 36 shows positive correlation between the pinch strength (palmar) with hand dimension and hand span of dominant and non-dominant hand in healthy individuals was found. This is because the males usually have more muscular strength in general than females, mainly due to the difference in the size of the muscle in view of the male testosterone hormone responsible for enhancing that size. This is because of weaker predictors being body weight and hand size measurements.^[14]

Also, it was found that pinch grip strength (palmer) for age 18-36 years was weaker than the age group 37- 64 years. This is because of some studies that have indicated strong predictors of hand strength as sex, age, body height and mid forearm circumference and weaker predictors being body weight and hand size measurements.⁽¹⁵⁾

CONCLUSION

This study concludes that there is positive co-relation between Hand Grip strength and Pinch Strength with Hand dimension, Hand span and Dominance.

Limitation of study

1. Small Sample Size

Future scope

1. This study can be further carried out in other population of persons living in urban areas and those in rural areas that have not been evaluated.
2. It can be taken in different anthropometric measures.
3. It can be further carried out in different pinch grips like pad to pad and tip to tip.

Declaration by Authors

Ethical Approval: Approved

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Conflict of Interest: The authors declare no conflict of interest.

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