AN ASSOCIATION OF DOMINANT HAND GRIP STRENGTH WITH SELECTED ANTHROPOMETRIC VARIABLES IN SCHOOL GOING BOYS

Dr. Pintu Sil
Assistant Professor
Govt. College of Physical Education for Women
Dinhata, CoochBehar, West Bengal, India

Abstract

The purpose of the study was to find out the best predictor of hand grip strength (HGS) among the different anthropometric parameters of dominant hand. The present study deals with the correlations between dominant hand grip strength (HGS) with selected five anthropometric variables, namely, wrist width, femur width, wrist circumference, biceps girth and total arm length. For this purpose a total of 500 normal, healthy school-going boys aged 10-14 years were selected randomly from different schools of CoochBehar district, West Bengal, India. Mean and Standard deviation were calculated for each variable as descriptive statistics and Coefficient of Correlation was measured by Pearson's Product Moment Method using standard statistical software. The significance level was set for the present study was only 0.05 level of confidence. The findings of the present study indicated a strong association of dominant right hand grip strength with all the anthropometric variables considered for the present project in school going boys. From the findings it may be concluded that hand grip strength, especially of the right hand, has more strong association with the wrist width than the wrist circumference in school going boys. Dominant hand grip strength has also strong and significant relationship with femur width, biceps girth and total arm length. Results also revealed that the femur width has to be considered as the best predictor of hand grip strength than others variables in school going boys.
Keywords: Hand grip strength, Anthropometric variables, School-going boys

Introduction

The hand muscles play a vital role in the performance of day to day activities of normal life such as using tools or transferring objects from one position to another. Handgrip strength is a measure of strength of several muscles in the hand and the forearm. It is measured in kilograms by squeezing a handgrip strength dynamometer with one's maximum strength. The power of grip is the result of forceful flexion of all finger joints with a maximal voluntary force that the subject is able to exert under normal biokinetic conditions. The relationships between handgrip strength with the number of variables have been reported by several studies. Positive correlation have been revealed between hand grip strength (HGS) with morbidity (Klidjian et al., 1980), mortality (Phillips, 1986), the risk of falling (Wickham et al., 1989), a range of functional ability variables (Hughes et al. 1997; Hyatt et al.1990) and nutritional status (Gao et al., 1996; Kaur & Koley, 2010). Hand grip strength is very much important to perform different sports skill also. It has a tremendous influence in batting of Cricket, Badminton, Tennis etc. People sometimes called that those who have wider wrist has more grip strength or long arm has more grip strength etc. Present study therefore was initiated to find out the relationship between handgrip strength with different anthropometric variables of dominant hand such as wrist width, wrist circumference, femur width, biceps girth and total arm length. Finding will be helpful to find out the best anthropometric variable as a predictor of grip strength for dominant hand.

Materials and Methods

A total of 500 school going boys from different schools of CoochBehar district, West Bengal were selected randomly as subject for the present study. The age of the subjects was from 10 to 14 years.
Grip strength was measured by Hand Grip Dynamometer. Wrist width and Femur width were measured by Bone calipers. Wrist circumference and Biceps girth were measured by steel tape. Total arm length was measured by Anthropometric rod.
Mean and Standard Deviation were used as descriptive statistics for each variables. For the purpose of investigation of the relationship between dominant hand grip strength with selected anthropometric variables of the same hand, Coefficient of Correlation (r-value) was calculated using Pearson's Product Correlation Method. The level of Significance was considered for the study was only 0.05 level.

Results

The Mean value and the Standard Deviation of hand grip strength and other selected anthropometric variables have presented in Table No. 1.

Table-1
MEAN AND STANDARD DEVIATION OF DIFFERENT VARIABLES

| Anthropometric Variables	Mean	Standard Deviation
Grip strength	30.39	13.09
Wrist width	4.28	0.43
Wrist circumference	12.98	3.55
Femur width	5.47	0.56
Biceps Girth	19.05	2.48
Arm length	60.06	7.14

Coefficient of Correlation (r-value) between hand grip strength with other anthropometric variables have been presented in Table-2.

Table-2
COEFFICIENT OF CORRELATION OF DIFFERENT ANTHROPOMETRIC VARIABLES WITH GRIP STRENGTH IN SCHOOL-GOING BOYS

S. No	Variables	Coefficient of Correlation (r)
1	Wrist Width	0.710**
2	Wrist Circumference	0.285**
3	Femur Width	0.790**
4	Biceps Girth	0.755**
5	Arm length	0.661**

** Significant at 0.01 level

From Table-2 it is revealed that all the anthropometric variables selected in this study have a strong and positive correlation with dominant hand grip strength. Among these the femur width has highest correlation value (r = 0.79) with grip strength than other variables. The second highest correlation value (r = 0.755) with hand grip strengths was found for biceps girth in this study.
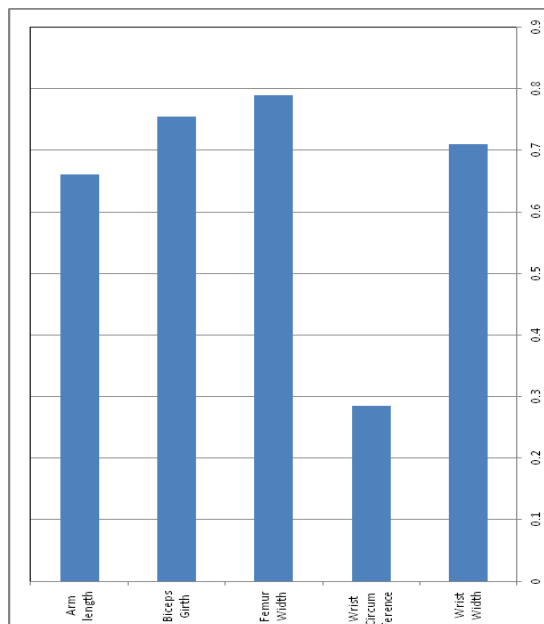
Discussion on Findings

Several studies were conducted throughout the world to establish the relationship between hand grip strength (HGS) with other anthropometric variables from different dimension. Findings of the present study also added some new knowledge in this field. Present study revealed a strong and significant positive correlation between hand grip strength (HGS) with other anthropometric measurements of dominant hand such as wrist width, wrist circumference, femur width, biceps girth and total arm length. Reith (1990) revealed existence of significant correlation between grip strength with all dimensions of hand. Link, Lukens and Bus (1995) reported in their study that grip strength was significantly correlated with hand width for both the right (p < .0001) and the left hands (p < .001). Significant correlation between hand grip strength and shoulder- to-hip ratio (SHR) was reported by Gallup, White and Gallup (2007). Koley and Pal (2009) in their study also reported statistically significant positive correlations between dominant hand grip strength with hand breadth, upper arm circumference, forearm circumference in male students.

Present study revealed that wrist width has stronger correlation (r = 0.710) with grip strength than wrist circumference (r = 0.285) and femur width also has stronger correlation (r = 0.790) with grip strength than biceps girth (r = 0.755). All these correlation values were statistically significant (p < 0.01). These findings suggested that different bones width (Femur, Radius and Ulna) of the dominant hand have more importance in hand grip strength. Higher correlation value of biceps girth (r = 0.755) with hand grip strength than wrist

circumference (r = 0.285) indicated that biceps muscle has a strong influence in hand grip strength because muscle produces strength and power. Chen (2011) reported that muscle volume is more important to perform physical function. Lowest correlation value (r = 0.285) for wrist circumference with hand grip strength has found in this study might be due to the fact that presence of least muscles group in this region. Total arm length has higher positive correlation (r = 0.661) with hand grip strength might be due to the reason that long arm helps to produce more force when it works as body lever during squeezing the grip of grip dynamometer.

Table-2 revealed that highest correlation exists between hand grip strength with femur width (r = 0.790) and biceps girth (r = 0.755) than the other variables considered in the present study. Though Reith (1990) concluded his study with no anthropometric dimension appears to be strong enough to predict grip strength but present findings suggested that femur width and biceps girth of dominant hand might be considered as most useful predictors as hand grip strength in school going boys.

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