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Comparison of Power Grip Strength in Male Knitter and Sedentary Worker

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Abstract

Context: *The measurement of power grip strength is a simple and inexpensive method to assess hand functions. It is influenced by the health status and the level of occupational demand using hand. The study was carried out to compare the power grip strength of Bangladeshi male knitters and sedentary workers.*

Materials & Methods: *A cross sectional analytical study was conducted in Dhaka Medical College, Dhaka from January 2017 to December 2017 on thirty three (33) adult Bangladeshi male sedentary workers (group A) and ninety nine (99) adult Bangladeshi male knitters (group B). Ninety nine participants of knitters were further subdivided into three subgroups according to their working experience in years. Hand grip strength dynamometer (Camry, USA) was used to measure the power grip strength.*

Results: *Statistically significant difference (P<0.05) of mean power grip strength was observed between sedentary workers (group A) and knitters (group B) in both hands whereas the mean power grip strength was greater in the knitters than the sedentary workers. Among the knitters the more experienced subgroup had non-significantly higher (P<0.05) power grip strength than the less experienced subgroups.*

Conclusion: *The present study showed that power grip strength was higher in male Bangladeshi knitters compared to sedentary workers in both hands.*

Key words: *Power grip, hand grip strength dynamometer, knitter.*

Introduction

Hand is a very complex structure capable of not only a multitude of motor tasks but also of relaying sensory information about the temperature, the shape and texture of objects to the brain.[1] Human hand is unique in being free of habitual locomotor duty and devoted entirely to functions of manipulation. Its effectiveness in these activities is due to particular configuration of the bones and muscles which permits opposition of the pulp surface of the thumb to the corresponding surfaces of the other four finger tips in a firm grasp, together with a highly elaborated nervous control and sensitivity of the fingers.[2] Human hand is a prehensile part of upper limb endowed with grasping and precision movements for skilled works. Prehensile movements of the hand have been described as three basic forms of grip namely precision, power and hook grips.[3] The power of handgrip is the result of forceful flexion of all finger joints with the maximum voluntary force that the subject is able to exert under normal biokinetic conditions which uses several muscles in the hand and forearm.[4] Hand grip strength is a physiological variable that is affected by a number of factors including age, gender and body size among others. Hand grip strength has a positive correlation with lean body mass and physical activity. It determines the muscular strength of an individual.[5] Bangladesh is becoming an industrial country. In

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Bangladesh garment factories meet a major part of export yearly. So, the importance of studying power grip strength of knitters carries immense practical application.

The current study aims the comparison of power grip strength between male knitters and sedentary workers.

Materials and Methods

This cross sectional analytical study was carried out in the Department of Anatomy, Dhaka Medical College, Dhaka from January 2017 to December 2017. The participants were selected through convenient and purposive sampling. The study was done on two groups, 33 adult Bangladeshi male sedentary workers (group A) and 99 participants of knitter (group B). Group B was further divided into three subgroups according to their period of working experience. Subgroups B_1, B_2 and B_3 had working experience of 5-10 years, 11-15 years and 16 or more years respectively. The present study was conducted on study subjects ranging from 23 to 49 years of age. Subjects having hand anomaly, hand deformity, trauma in hand and history of surgery in hand were excluded.

Hand grip strength dynamometer (Camry, USA) was used to measure the power grip strength. The subject was asked to seat on a chair with the elbow flexed at 90^o and forearm in semi-prone position, lying on an arm-rest. He was requested to squeeze the dynamometer three times with each hand. To overcome fatigue of hand muscles, the subject was given one minute resting period between each squeeze. Mean value of three squeezes were taken into account.

After collection of data, statistical analysis was done by the software, SPSS (Statistical Package for Social Sciences), Version 22.0.

Ethical clearance

The study was approved by Ethical Review Committee (ERC) of Dhaka Medical College, Dhaka.

Results

In group A, mean power grip strength was 35.62±2.14 kg and 34.93±1.91 kg for right and left hand respectively. In group B, mean grip strength was 41.65±3.38 kg and 39.89±3.32 kg for right and left hand respectively. Significant difference ($p<0.001$) was observed between group A and group B in the mean power grip strength in both hand whereas the mean grip strength was higher in group B than that of group A (Table I).

In subgroups B_1, B_2 and B_3, mean power grip strength was 36.98±2.69 kg, 43.31±3.23 kg and 44.65±2.56 kg for right hand and 35.34±2.52 kg, 42.03±3.13 kg and 42.30±2.99 kg for left hand respectively. Significant difference was observed among the subgroups in mean power grip strength (Table II)

Table I

Comparison of power grip strength between group A (sedentary worker) and group B (knitter)

Power Grip Strength (kg)	Group A(n=33) (Mean±SD) (Range)	Group B(n=99) (Mean±SD) (Range)	p value
Right hand	35.62±2.14	41.65±3.38	0.000*
	(31.5-39.8)	(33.4-49.2)	
Left hand	34.93±1.91	39.89±3.32	0.000*
	(31.2-39.4)	(33-48.5)	

Comparison between Group A and Group B was done by unpaired student's 't' test.
*=Significant

Table II

Comparison of power grip strength among subgroups of knitter (group B1, B2 and B3)

Power Grip Strength (kg)	B_1(n=33) Mean±SD (Range)	B_2(n=33) Mean±SD (Range)	B_3(n=33) Mean±SD (Range)	p value
Right hand	36.98±2.69	43.31±3.23	44.65±2.56	0.000*
	(33.4-43.9)	(37-47.8)	(40.2-49.2)	
Left hand	35.34±2.52	42.03±3.13	42.30±2.99	0.000*
	(31.7-40.9)	(36.5-46.80)	(38-48.5)	

Comparison between subgroup was done by one-way ANOVA (Post Hoc)
*= Significant

Significant difference was observed between B_1 and B_2 (p=0.000) and between B_1 and B_3 (p=0.000) subgroups in the mean right hand power grip strength. No significant difference was observed between B_2 and B_3 (p=0.177) subgroups in the mean right hand power grip strength whereas mean right hand power grip strength was lower in B_1subgroup than that of B_2 and B_3 subgroups (table III).

Table III

Multiple comparison of right hand power grip strength among subgroups of knitter (B_1, B_2, B_3)

Subgroup	p value
B_1 vs B_2	0.000*
B_1 vs B_3	0.000*
B_2 vs B_3	0.177^{ns}

*=Significant ns=Non significant
mean value of B_1= 36.98±2.69
mean value of B_2= 43.31±3.23
mean value of B_3= 44.65±2.56

Significant difference was observed between B_1 and B_2 (p=0.000) and between B_1 and B_3 (p=0.001) subgroups in the mean left hand power grip strength. No significant difference was observed between B_2 and B_3 (p=1.000) subgroups in the mean left hand power grip strength whereas mean left hand power grip strength was lower in B_1subgroup than that of B_2 and B_3 subgroups (Table IV).

Table IV

Multiple comparison of left hand power grip strength among subgroups of knitter (B_1, B_2, B_3)

Subgroup	p value
B_1 vs B_2	0.000*
B_1 vs B_3	0.001*
B_2 vs B_3	1.000^{ns}

*=Significant ns=Non significant
mean value of B_1= 35.34±2.52
mean value of B_2= 42.03±3.13
mean value of B_3= 42.30±2.99

Discussion

Knitters were selected for the present study on the basis of the observation that they regularly and repeatedly use power grip strength to hold the instrument for their daily purpose. Sedentary workers do not use the power grip strength regularly and repeatedly in their work. The mean right and left power grip strength of the sedentary workers (group A) and the knitters (group B) in the present study was 35.62±2.1 kg, 34.93±1.91 kg and 41.65±3.38 kg, 39.89±3.32 kg respectively. Significant difference (P<0.001) was observed between group A and group B in the mean power grip strength in both hands whereas the mean power grip strength was higher in the group B than the group A.

Chittababu in 2014 found 71.63±7.87 kg and 67.62±7.45 kg mean hand grip strength of right

and left hand respectively in male handball players which was significantly higher (P<0.001) than the group B of the present study.[6]

Fallahi and Jadidian in 2011 carried out a study on grip strength in athletes and non-athletes and reported 48.15±7.98 kg mean hand grip strength of dominant hand which was higher than the group B of the present study findings. They also reported significant (P<0.001) differences of mean hand grip strength between athletes and non-athletes.[7] Huma et al[8] carried out a study on 1st year MBBS students at CMH Lahore Medical College and reported 32.76±11.69 kg mean grip strength of dominant hand. This finding was lower than that of group B of the present study. Another study was carried out by Barut et al[9] on male handball players. The researchers reported 22.89±10.84 kg and 22.12±10.52 kg mean grip strength of right and left hand respectively. These findings were lower than group B of the present study findings.

Conclusion

Significant difference of mean power grip strength was observed between sedentary workers and knitters in both hands whereas the mean power grip strength was greater in the knitters than the sedentary workers. In the knitters group, the more experienced subgroup had non-significantly higher power grip strength than the less experienced subgroups.

References:

1. Vivekanand G, Rekha J, Kumar AC. Evaluation of hand anthropometric measurements and grip strength in healthy kitchen workers. International journal of Anatomy Physiology and Biochemistry. 2016; 3(1): 1-5.
2. Barut C, Demirel P, Kiran S. Evaluation of Hand Anthropometric measurements and Grip Strength in Basketball, volleyball and Handball players. International Journal of Experimental and Clinical Anatomy. 2008;2(2): 55-59.
3. Salmons S. Muscles, In: Williams, L.P., GRAY'S ANATOMY, 38th ed. London: Churchill Livings Stone. 1995; 733-889
4. Koley S, Kaur M. Correlations of Handgrip Strength with Selected Anthropometric Variables in Indian Junior Kabaddi players. Human Biology Review. 2009;4(3): 240-249.
5. Koley S. Yadav M, Sandhu J. Estimation of Hand Grip Strength and its Association with some Anthropometric traits in Cricketers of Amritsar, Punjab, India. The Internet Journal of Biological Anthropology. 2009;3(1): 1-7.
6. Chittibabu B. Relationship Between Hand Grip Strength With Selected Hand Anthropometric Variables Among University Male Handball Players. International Journal of Current Research. 2014; 6(11): 10384-10386.
7. Fallahi AA, Jadidian AA. The effect of hand dimensions, hand shape and some anthropometric characteristics on handgrip strength in male grip athletes and non-athletes. Journal of Human Kinetics. 2011;29(1): 151-9.
8. Huma SK, Madiha A, Shahid H, Ghani M. Skeletal muscle function in a sample population of 1st year MBBS students at CMH Lahore Medical College. Biomedica. 2014; 30(4): 251-4.
9. Barut C, Demirel P, Kiran S. Evaluation of Hand Anthropometric measurements and Grip Strength in Basketball, volleyball and Handball players. International Journal of Experimental and Clinical Anatomy. 2008; 2: 55-59.