

Comparison Of Handgrip Muscle Strength In Sportsmen And Sedentary Group

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Abstract

Introduction: Assessment of muscle strength tests has been a popular form of testing muscle function in sports and exercise as well as in other movement related sciences for several decades. Muscle strength has been defined as the maximum force developed during maximal voluntary contraction under a given set of conditions. Strength testing has been extensively employed in a number of human movement related disciplines.

Aim and objective; To determine muscular strength by handgrip dynamometer in sportsmen and control group.

Material and method; This study is a cross sectional study. 50 sedentary medical students as control group were selected from a medical college. 50 sportsmen were selected from a local sports institute. Sportsmen in the age group of 18-25 years, playing that game for 3-5 years,

Result; Muscle strength in sportsmen (47.74 ± 4.67) kg was higher than in control group (41.60 ± 4.67) kg.

Keywords; Sportsmen , muscle strength, handgrip dynamometer

I. Introduction

Handgrip Muscle strength has been defined as the maximum force developed during maximal voluntary contraction under a given set of conditions.(1) Hand grip strength is a general term used by strength athletes, referring to the muscular strength and force that they can generate with their hands. The strength of a hand grip is the result of forceful flexion of all finger joints, thumbs, and wrists with the maximum voluntary force that the subject is able to exert under normal biokinetic conditions(2). Assessment of handgrip muscle strength tests has been a popular form of testing muscle function in sports and exercise as well as in other movement related sciences for several decades. It is often used as an indicator of the overall physical strength. Handgrip strength testing has been extensively employed in a number of human movement related disciplines. The aim of athletic strength testing has been to provide normative values for particular sport disciplines, to select young athletes, to distinguish among different performance levels, or to evaluate the effects of physical exercise in athletic training procedures. The assessment of hand grip strength is important in a number of situations. It may be used in the investigation and follow-up of patients with neuromuscular disease (3) (Wiles, Karni & Nicklin, 1990). It is also use as a functional index of nutritional status(4,5,6) (Brozek, 1984; JeeJeebhoy, 1998 and Vaz, Thangam, Prabhu, & Shetty, 1996). Finally an important purpose of muscle strength testing common for athletic, ergonomics and medical related studies has also been the assessment of functional movement performance. The relationship between the strength of active muscle groups and selected movement performance has often been interpreted as external validity of muscle strength tests. Sporting success depend on conditional and coordinative ability such as strength, speed, endurance, mobility and skills, technical- tactic ability, personal abilities, physical characteristics and health factors (Ozbar et al. 2002)(7).In sports, strength is known to increase sporting success and performance. Especially, hand grip strength (grasping strength) the most important determinant. Hand grip strength is a physical trait that plays an important role providing effectiveness and efficiency during daily work and sports activities. Moreover, in terms of performance, hand grip is an important indicator in many sports. Muscle strength and power are decisive in individual and team sports' successful performance (Newton et al., 1994). (8)

II Aim; To determine handgrip muscle strength by handgrip dynamometer in sportsmen and control group.

II. Material and method

The study population comprised of sportsmen and sedentary group This study is a cross sectional study. 50 sedentary medical students as control group were selected from a medical college. 50 sportsmen were selected from a Krida Probhodhani Pune. Sportsmen in the age group of 18-25 years, playing that game for 3-5

years, healthy sportsmen, without history of major illness in past. Subjects with any cardiopulmonary disease, smokers, alcoholics and tobacco chewers were excluded. . Sedentary group comprised subjects not taking active part in any sports. Sportsmen group consisted of players involved in various sports activities like cricket, hockey, tennis, basketball, handball. The subjects were carefully selected at random from medical college aged between 18-25years, non-obese and willing to participate in the study. The informed consent was obtained and procedure was explained to each subject during test.

Anthropometric measurements like height and weight of each subject were measured before the test procedure.

The handgrip strength was measured by using handgrip dynamometer (INCO.INDIA LTD.AMBALA). The most common method of assessment for grip strength is the use of a handheld dynamometer (Ramkumar & Chittibabu,2012).(9)

Ethical Approval ; The study was approved by the Institutional Ethics and Research Committee at B.J medical college Pune. Written informed consent was taken from all the subjects and their identification information that was collected during the study was kept strictly confidential.

Procedure:

The handgrip dynamometer was held in the dominant hand, in sitting position, with the forearm extended in front on a table and elbow flexed at 90°.The subject was instructed to hold the dynamometer in such a way that second phalanx is against the inner stirrup. The subject was then asked to grip the dynamometer handle with as much force as possible. If necessary the examiner stabilized the dynamometer and encouraged the subject to give their best performance. The reading is taken in kilograms as indicated by the pointer on the dynamometer. Three readings were taken with a gap of two minutes between two readings and maximum value was recorded and analyzed .

III. Statistical analysis

The detailed data was entered into the Microsoft excel sheet and subsequently analyzed by using SPSS (Statistical package for social science) 11.5 software. Values were reported as Mean ± SD. Sportsmen and control group comparison was analyzed by applying unpaired “t” test. Significant P value was set at less than 0.05 (P < 0.05).

IV. Result

Table I: Mean values of physical characteristics in sportsmen and Control Group

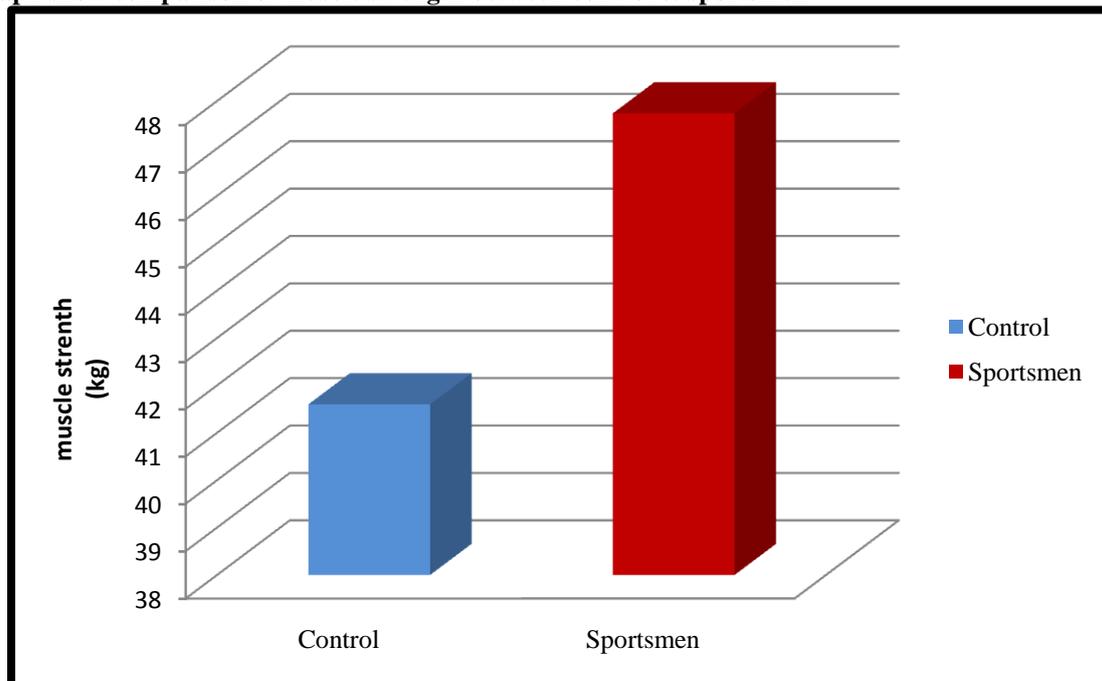
Sr. No.	Parameters	Sportsmen	Control group
		Mean ±SD	Mean ±SD
1	Age (years)	20.18± 2.19	20.12±2.22
2	Height (cm)	170.3±6.39	179.7±6.08
3	Weight (kg)	64.96±8.55	63.82±8.72

There was no significant difference in mean values of age, height and weight (p>0.05) between the two groups. That means the two groups were comparable with respect to these parameters.

Table II. show comparison of muscle strength between control and sportsmen

	Muscle strength (kg)	
	Control	Sportsmen
Mean	41.60	47.74
SD	±4.67	±4.59
SEM	0.66	0.64
P	P<0.001 (Significant)	

Graph show comparison of muscle strength between control & sportsmen



Mean value of muscle strength in sportsmen was higher than control group. The difference between mean value of muscle strength of sportsmen and control group was statistically significant ($p < 0.001$). Muscle strength in sportsmen (47.74 ± 4.67) kg was higher than in control group (41.60 ± 4.67) kg. The difference between muscle strength values of sportsmen and control was statistically significant. ($P < 0.001$)

V. Discussion

In the present study hand grip strength of sportsmen have been evaluated and compared with sedentary control group. In our study muscle strength in sportsmen (47.74 ± 4.67) kg was higher than in control group (41.60 ± 4.67) kg. The difference between muscle strength values of sportsmen and control was statistically significant. ($P < 0.001$)

De AK conducted similar kind of study on kabbadi players in comparison with football goalkeepers. He found more muscle strength in kabbadi players as compared to football goalkeepers (10). **Shymal Koley and M.Kumar Yadav** found more hand grip strength in cricketers as compared to sedentary control group. The difference may be due to the effect of regular physical activities and training programmers in cricketers (11). **J Adams & Wilson & Whittaker** found higher values of the handgrip strength in rock climbers (12,13) **Bale and Wenger** measured handgrip strength of female basketball players and controls.(14) It was observed that there was a significantly higher value of handgrip strength in female basketball players as compared to controls. **Kraemer et al** showed that isometric strength was greater for dominant handgrip in teenage tennis players than in non tennis players (15). **Luis Carrasco et al** found higher values of handgrip strength in dominant hand in young top table tennis players (16). The hand grip strength reflects overall physical strength of an athlete(17) hand and forearm muscles performances(18)) and physical performance (19). Hand grip strength is a significant predictor of performance in various sports activities, viz. lawn tennis(20) (club volleyball (21), ten-pin bowling(22) (, rock climbing(12,13).

In female volleyball players, dominant handgrip strength had significantly positive correlations ($P \leq 0.01$) with all compare to control group.(23) **B. Chittibabu and N. Akilan** shown that there was no significant difference between university level cricket and handball players dominant and non dominant hand grip strength.(25) **Shyamal Koley and Srikanth Goud** in male and female badminton players, dominant and non-dominant handgrip strength had significantly positive correlations with height, weight. **Amandeep Singh and Vishaw Gaurav** found higher values of handgrip strength in baseball players as compared to cricketers and softball players.

VI. Conclusion

In the present study hand grip strength might have increased due to regular physical exercise and endurance. Strength training induces increase in muscle strength. Hand grip strength is a physiological variable

that is affected by number of factors like age, gender and body size. There is a strong correlation between grip strength and various anthropometric traits. Hand grip strength is a significant predictor of performance in various sports activities. The findings of the present study have immense practical application in selection of talents in sportsmen. It would be beneficial to the sportsmen in term of optimizing training programs separately for particular sports. The findings of the present study carry immense practical application in particular sports.

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