

Comparison of Handgrip Strength in Male and Female Medical Students: A Cross Sectional Study

Kiran Buge¹, Sunita Nighute², Rangrao Bhise³, Shivakumar Uppara⁴

Author Affiliation

¹Associate Professor ²Professor,
^{3,4}Assistant Professor, Department
of Physiology, DVVPF's Medical
College, Ahmednagar, Maharashtra
414111, India.

Corresponding Author

Sunita Nighute, Professor,
Department of Physiology, DVVPF's
Medical College, Ahmednagar,
Maharashtra 414111, India.

E-mail: bugekiran@gmail.com

Received on: 07.10.2019

Accepted on: 13.11.2019

Abstract

Introduction: Handgrip muscle strength is the maximum force developed during maximal voluntary contraction under a given set of conditions. It can be quantified by measuring the amount of static force that a person's hand can squeeze around a dynamometer. It is widely accepted that hand grip strength provides an objective index of functional integrity of the upper extremity. The present study aimed to compare maximal hand grip strength on the basis of gender. *Materials and Methods:* Present study was conducted on 120 healthy medical students in 18–24 years age group (60 male and 60 female) of DVVPF'S Medical College Maharashtra. The grip strength of dominant hand was measured twice at an interval of 1 minute, and higher reading recorded was considered to be the maximum hand grip strength for each student. *Results:* Data was analyzed by paired t test using SPSS. We noted that handgrip strength in male students was statistically significant ($p < 0.001$) as compared to female students. *Conclusion:* Hand grip muscle strength is more in male students as compared to female students in 18–24 years age group.

Keywords: Dynamometer; Female; Hand grip muscle strength; Male.

How to cite this article:

Kiran Buge, Sunita Nighute, Rangrao Bhise et al. Comparison of Handgrip Strength in Male and Female Medical Students: A Cross Sectional Study. *International Physiology*. 2019;7(3):104–106.

Introduction

Handgrip muscle strength is the maximum force developed during maximal voluntary contraction under a given set of conditions.¹ It is the muscle strength and force that a person can generate with their hands and can be quantified by measuring the amount of static force that a person's hand can squeeze around a dynamometer.² Assessment of muscle strength and function plays a distinctive role in field of sports. 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. Assessment of hand grip strength may be used in the investigations and follow up of patients with neuromuscular disorders.³ It is also used as a functional index of nutritional status.⁴ It is widely accepted that grip strength provides

an objective index of functional integrity of the upper extremity.⁵

Aim

1. To measure hand grip muscle strength in healthy first year medical students.
2. To compare hand grip strength amongst male and female students.

Materials and methods

This is a cross sectional study conducted in research lab of Physiology department of Dr. Vithalrao Vikhe Patil Foundation's Medical College, Ahmednagar. By convenient sampling method, 120 healthy subjects from first year student population of our institute (60 male and 60 female) in the age group of 18–24 years participated in our study. Those

students suffering from any major illness in past or present, history of injury/nerve damage to upper limbs, history of any medications affecting motor function and those with musculoskeletal disorder were excluded from the study. The study was approved by the Institutional Ethical committee. Duration of study was 3 months.

At the beginning, the purpose and procedure of this study was explained to all the participants. Informed written consent was taken from all the subjects. Maximum handgrip strength was measured with handgrip dynamometer (INCO Ambala India). The most common and easiest method of assessment for grip strength is the use of handheld dynamometer. The subjects exerted grip strength using the handgrip device while sitting in chair with their elbow straight and close to the body.⁶ The maximum grip strength of the dominant hand was measured twice within one minute time interval and greater value amongst the two was considered for further analysis. For Statistical analysis, Paired t test was applied using SPSS software. p - Value < 0.05 was considered statistically significant and < 0.001 was statistically considered to be highly significant.

Results

Present study included 120 healthy first year medical students. Amongst these, 60 were male and 60 were female students. Age and Physical characteristics like height (cm) and weight (Kg) were recorded for all the students.

Table 1: Mean values of physical characteristics in male and female medical students

Sr. No	Parameters	Male	Female
1	Age (years)	20.89 \pm 2.50	20.32 \pm 2.12
2	Height (cm)	167 \pm 5.98	163 \pm 5.10
3	Weight (Kg)	65 \pm 9.10	61 \pm 9.30

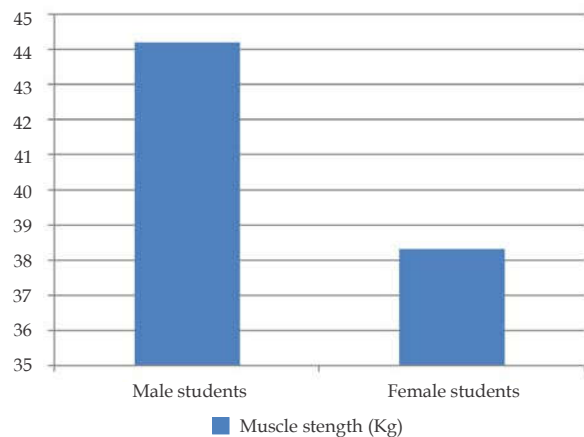
* $p < 0.05$ statistically significant ** $p < 0.001$ statistically highly significant

Statistically, no significant difference was noted in mean values of age, height and weight between male and female medical students (Table 1).

Table 2: Maximum handgrip strength in male and female medical students

	Muscle strength in Kg (Mean \pm SD)	p - value
Male students (n = 60)	44.21 \pm 5.0	< 0.001 (significant)**
Female students (n = 60)	38.30 \pm 4.21	

* $p < 0.05$ statistically significant ** $p < 0.001$ statistically highly significant



Graph 1 Comparison of muscle strength in male and female medical students

Discussion

Handgrip strength is one of the most commonly used tests for assessing muscular fitness in adults and it is also used as an important indicator of sports efficiency.

In present study, handgrip strength was compared amongst 60 male and 60 female medical students. This can provide baseline data/handgrip reference values in 18-24 years age group medical students.

In our study, Handgrip strength was noted to be statistically significant in male students as compared to female students. (Table 2 and Graph 1)

Christine described that, Females of age 16 years and older have muscle strength about two third less as compared to males of same age group. Gender differences in muscle strength may be because of observed variations in their physical activities of daily life.⁷ In addition gender difference was found in maximum handgrip strength due to sex difference in muscle mass.

Leyk D et al. Showed that mean maximal hand grip strength in men was more than in women.⁸ Heyward VH et al. noted that sex-related strength difference is more pronounced in the upper body due to muscle mass in men as compared to women.⁹ Study conducted by Shah et al showed that mean handgrip strength in healthy adult males is more as compared to females.¹⁰

Similarly, Shyamal Koley and Shrikant Goud have also noted handgrip strength is maximum in males as compared to females.¹¹

However, our study was restricted to medical students of 18-24 years of age group. Different age groups need to be studied.

Conclusion

We concluded that this study gives a baseline of normative data in sample population of MBBS students at DVVPPF's Medical College Maharashtra. In the present study hand grip strength in male might have increased due to physiological maturation found in muscle growth.

Acknowledgements

The authors are thankful to under graduate MBBS students for their participation.

References

1. Sale DG. Testing strength and power In Mac Dougal JD, Wenger HA, Green HJ editors. Physiological testing of the high performance athlete. (IL) Human kinetics, Champaign III 1991. pp.21-75.
2. Massy-Westropp N, Gill TK, Taylor AW Bohannon R and Hill CL. Hand grip strength: Age and Gender stratified normative data in a population based study. BMC Research Notes 2011 April 14;4:127-33.
3. Wiles CM, Karni Y, Nicklin J. Laboratory testing of muscle function in the management of neuromuscular disease. J Neurol Neurosurg Psychiatry. 1990 May;53(5):384-387.
4. Jeejeebhoy KN. Nutritional assessment. Nutrition. 2000 Jul-Aug;16(7-8):585-90.
5. Mayers DB, Grennan DM, palmar DG. Handgrip function in patients with rheumatoid arthritis. Arch Phys. Med. Rehabil 1982;61:362-72.
6. Ramkumar B, Chittibabu B. Evaluation of dominant and non dominant hand grip strength among cricket, handball and Volleyball players. International Journal of physical education sports and yogic sciences 2012;2(1):41-3.
7. Hiroshi K, Demura S. Gender differences and laterality in maximal handgrip strength and controlled force exertion in young adults. Health journal 2011;3(11) 684-8.
8. Leyk D et al. Hand grip strength of young men, women and highly trained female athletes. Eur J Appl Physiol. 2007 Mar;99(4):415-21.
9. Heyward VH, Johannes-Ellis SM, Romer JF. Gender differences in strength. Res Quart 1986;57(2):154-9.
10. Shah S, Nahar P, Vaidya S, Salvi S. Upper limb muscle strength and endurance in chronic obstructive pulmonary diseases. Indian J med Res 2013;138(4):492-6.
11. Shyamal Koley and Srikanth Goud B. Correlations of Handgrip Strength With Selected Anthropometric Variables in Indian Junior and Senior Badminton Players. International Journal of Recent Scientific Research. 2016;7(4);10351-5.

