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INFLUENCE OF GRIP STRENGTH WITH DIFFERENT BODY POSTURES IN COLLEGIATE

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ABSTRACT

The objective of the study was influence of grip strength with different body postures. Study design was Non-Experimental, study type was observational. Inclusion criteria were both males and females, age between 17 to 22 years. 30Subjects were selected according to inclusion and exclusion criteria. Grip strength was measured in three main postures standing ,sitting and squatting, forearm in mid prone position and elbow 90 degree flexion for right hand, Grip span variations as 1cm, 2cm, 3cm and 4cm was conducted by using a hand held dynamometer. The statistical analysis was done (ANOVA).The results of the study showed that Mean and S.D values were in standing was 15.09±6.47,sitting was 14.93±6.25 and squatting was 16.5±7.45.There was close association of hand grip strength between standing, sitting and squatting. The study concluded that there was no difference in the force production of grip strength in different postures for right hand.

KEYWORDS: ***Grip strength, posture, handheld dynamometer, Collegiate, Squatting, Grip span.***

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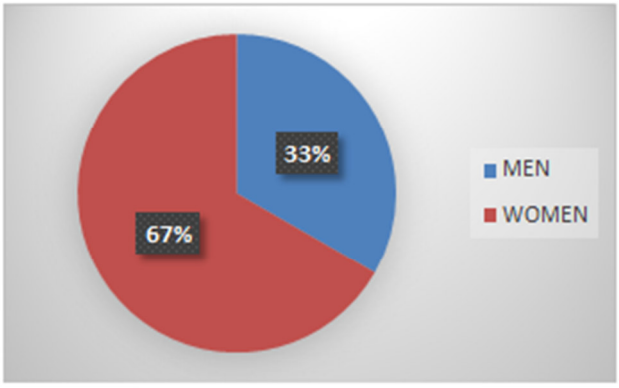
INTRODUCTION

Hand grip strength is widely considered as an objective index of functionality of upper extremity which can be optimized with a reliable evaluation[1,2].It is used as surrogate measurement of overall muscle strength[3].Hand functionality is considered to be vital in most of the daily activities involving upper limb be it to perform daily life activities, such as holding objects, using a handrail or bus supports, carry out domestic tasks, self-care activities, that is, to maintain functionality and independence. There are 35 muscles involved in movement of the forearm and hand, with many of these involved in gripping activities. During gripping activities the muscles of the flexor mechanism in the hand and forearm create grip strength while the extensors of the forearm stabilize the wrist. Muscular fitness has been defined as "muscular strength and power other properties of muscle that contribute to its mass and quality[4]. Now a day's most of the young adults are leading sedentary life and work styles. They spent their time in studying, social networking and fast food indulging is more compared to their attention to sports, games etc., among college going youth to build up and maintain their muscle strength. Grip strength was one of the important techniques for measurement of muscle strength and assessment of muscle function[5].It is a strong predictor of morbidity and mortality in middle aged and elderly subjects[5,6,7]and of olderpopulation'sdisability[8].Poornima et al., suggested that decline in muscle strength in the type 2 diabetes mellitus. This stated that decline grip strength is associated with the metabolic profile[9].It is an indicator of nutritional status, content of bone mineral, muscular strength and functional integrity of upper extremity. Overall, hand grip strength can be a measure to evaluate the fitness among young adults. Manual and mechanical methods are employed to hand grip strength for assessment and evaluation. Hand held dynamometer is considered to be a reliable instrument in evaluating grip strength and is used widely in rehabilitation[10].It is used to measure the force of flexor muscles of hand generated during gripping the dynamometer [11,12,13].Certain variables like body posture of the participants during test, position of various segments like shoulder, elbow, forearm and wrist, dominance of hand, time of testing, gender and age, body mass index, hand circumference and limb length are considered to affect gripstrength[14,15,16.] In 1981, the American Society of Hand The rapistsre commended seated position with should eradduction and neutral rotation, elbow flexion to90 degree and forearm and wrist inneutral position for evaluating grip strength as the position of upper extremity and it segments influenced gripstrength[17].The position of body is not same in all functional activities. The present study aimed at measuring the grip strength in different positions of body and its segments, in combinations as mentioned below: Body Postures – standing, sitting, and squatting and elbow position is 90 degree flexion for right hand.

METHODOLOGY

The study design was non experimental study, study type was observational, sampling method was convenient sampling, and the study setting was SRM College of Physiotherapy and SRM College of Occupational Therapy. The Subjects were selected according to inclusion and exclusion criteria. The procedures were explained in detail and consent form was provided.30 subjects aged between 17 to 22 years both male and female were included as shown in Graph1.Exclusion criteria were the individuals with recent trauma, fracture and upper limb defects who unable to undergo hand grip strength measurement. Hand grip strength was measured using hand held dynamometer in three main postures Standing, Sitting and squatting, forearm in mid prone position and elbow 90 flexion, grip span variations as 4cm,3cm,2cm and 1cm. Subjects were explained about dynamometer, the way to hold it in different body postures and arm positions. The subject was made to stand erect and the forearm in midprone Position and elbow in 90 degree flexion. In sitting and squatting the arm was adducted and the Forearm in midprone position and elbow in 90 degree flexion. When the subject was ready, they squeezed the dynamometer using with maximum isometric effort maintained for about 5 seconds and the readings were recorded for right hand. Readings were taken for different spans 4cm, 3cm, 2cm and 1cm in kilograms. Average was taken for analysis.

RESULTS



The influence of hand grip strength with different body postures were analyzed by using IBMSPSS version 20.0 software

Graph 1
Gender distribution

Table 1
Hand grip strength in various postures for right hand

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
Standing	30	15.0917	6.46992	1.18124	1.18124	17.5076
Sitting	30	14.9333	6.25842	1.14263	1.14263	17.2703
Squatting	30	16.5167	7.45386	1.36088	1.36088	19.3000
Average	30	15.5139	6.70960	.70725	.70725	16.9192

Table 1 shows in standing Mean Grip strength was 15.09, sitting was 14.93 and squatting was16.5.

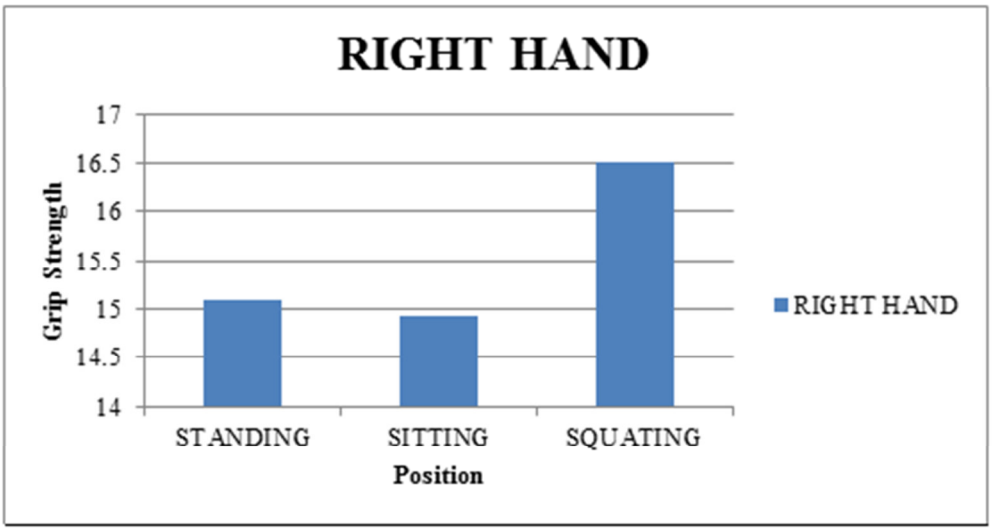
Table 2
Association of grip strength in different body postures

	Sum of Squares	D F	Mean Square	F	Sig.
Between Groups	45.626	2	22.813	.501	.608
Within Groups	3961.044	87	45.529		
Total	**4006.670**	**89**			

Table 3
Association of grip strength in different body postures

Grouping Variable	Grouping variable	Mean Difference	Std. Error	Sig.
Standing	Sitting	.15833	1.74221	.995
	Squatting	-1.42500	1.74221	.693
Sitting	Standing	-.15833	1.74221	.995
	Squatting	-1.58333	1.74221	.636
Squatting	Standing	1.42500	1.74221	.693
	Sitting	1.58333	1.74221	.636

Table 2,3 shows close association of hand grip strength between standing, sitting and squatting postures.



Graph 2
Mean hand grip strength for right hand in standing, sitting and squating in elbow 90 degree position

DISCUSSION

Hand grip strength is considered as an important factor in rehabilitation medicine which involves hand injuries. Hand grip force had been proven highly variant in different positions of arm, forearm, elbow, wrist and hand. Body posture variations also produce significant changes in its force production[18]. The present study aimed at measuring the grip strength for right hand at different body Positions as standing, sitting and squatting and elbow position is 90 degree flexion. The statistical analysis (ANOVA) was done. The results of the study showed that Mean and S.D values were in standing was 15.09±6.47, sitting was 14.93±6.25 and squatting was 16.5±7.45. According to Graph 2 there was close association of hand grip strength between standing, sitting and squatting. Results of various

studies stated that standing and sitting positions produced better hand grip strength than the supine lying and the exact mechanism on this difference due to multiple factors including the planes of motion in which the movement takes place and the effect of gravity on the moving segment[18]. However more standard conclusion can be made biomechanically while analyzing the changes in force production in different body positions associated with variations in forearm and elbow positions. The comparisons between different body postures showed no difference in hand grip strength between standing and sitting postures with mean of force production almost equal[18]. Hillman et al (2005) revealed elbow extended at 0 degree is significant in maximum production of hand grip strength than flexion was contradictory[19].The present study was conducted with wrist in neutral position during all body segment variations. The changes in varying positions of upper limb can be attributed to the fact that force production results from length tension relationship. Pronation results in relative shortening of long flexor muscles as radius crosses over ulna responsible for decreased hand grip strength[18].Thats why in this study forearm kept in midprone position The recommendations were the hand grip strength influencing factors such as gender, age, hand dominance, different positions of elbow, forearm and wrist can be analyzed. The limitations in this study were hand grip strength was not taken in supine lying, geriatric or sedentary people.

CONCLUSION

It is mandatory in rehabilitation to understand minor changes in body and body segments affect hand grip performance. The study concluded that no difference in force production in hand grip strength between standing, sitting and squatting postures in the elbow 90 degree flexion.

CONFLICT OF INTEREST

Conflict of interest declared none.

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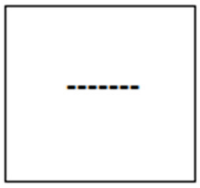

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