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RESEARCH ARTICLE

EFFECT OF RESISTED EXERCISES VERSUS FREE WEIGHT EXERCISES FOR THE IMPROVEMENT OF GRIP STRENGTH OF CRICKET PLAYERS.

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Abstract

The aim of the study was to evaluate the effect of resisted exercises and free weight exercises on improvement of grip strength of cricket players. A total sample of 40 cricket players were taken in the age group of 17 to 19 years. The height, weight and BMI were measured at the beginning of the study. The grip strength was measured using hydraulic hand dynamometer at the beginning of the study and as well as at the end of 3 weeks of intervention. The subjects were divided into 2 groups in which group A were given resisted exercises for hand using hand gripper and theraputty and group B were given resisted exercises for hand using free weights like dumbbells and weight disc. The result of the study showed that there is significant improvement in hand grip strength in both the groups after 3 weeks of intervention. The study concludes that hand gripper and theraputty can also be used for improvement of grip strength of cricket players.

Introduction:-

Sport is a worldwide phenomenon. Amongst sports, Cricket events are more popular as it is a great fun and people of all ages can enjoy it (Dr.Jadhav et al, 2014). [2] Cricket is a game of endurance as well as strength. For bowling, batting and throwing the ball during fielding, use of forearm strength is essential (Koley& Yadav, 2009). [15] For the ball games in which the use of the hand is essential, hand morphology and functional properties could be important for the performance (Barut et al., 2008). [10]

Hand grip strength is a significant predictor of performance in various sports activities, viz. lawn tennis (Lucki & Nicolay, 2007) [23], club volleyball (Melrose, Spaniol, Bohling, &Bonnette, 2007) [24], ten-pin bowling (Tan, Aziz, Teh, & Lee, 2001) [25], rock climbing (Watts, Newbury & Sulentic, 1996) [26]. 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 bio kinetic conditions. Hand grip strength is a physiological variable that is affected by a number of factors including age, gender and body size among others (ShyamalKoley et al, 2009). [1]

Grip strength determines the handedness of an individual, an important field of population variation study (ShyamalKoley et al, 2011). [6] It is often used as an indicator of overall physical strength (Massey-Westrop.N et al &Foo.L.H) [11,12], hand and forearm muscle performances (Nwuga, 1975) [13] and as a functional index of nutritional status (Kenjle.K et al, 2005 &Kaur.N et al, 2010) [14,16] and physical performance (Samson MM et al, 2000 &Onder.G et al,2002) [17,18]. Hand grip strength can also be used as predictor and shoulder power (P. Sathya et al 2016) [22]

Improvement of hand strength is very essential for better performance in sports that involves hand activity. There are studies that says there is positive correlation between the hand grip strength and the shoulder power. While training cricket players equal importance should be given to strengthen hand grip and shoulder power (P. Sathya et al 2016) [21]

It is well known that muscle strength can be improved with a strength training program (J.C.Colado, 2010). [9] Strength training is commonly considered to be progressive resistance exercise but any intervention that involves attempted repetitive effortful muscle contractions can result in increased motor unit activity, thereby potentially increasing strength (Louise Ada et al, 2006).[7]

There are different type of exercises to improve hand muscle strength like power web, Thera putty, hand gripper, table with pulleys, free weights etc. Weight training is a common type of strength training for developing the strength of skeletal muscles. It uses the force of gravity (in the form of weighted bars, dumbbells or weight stacks) to oppose the force generated by muscle through concentric or eccentric contraction (A.Suresh, 2012). [8]

Resistive Hand Exerciser has the shape that feels great in the hand. It's designed to provide effective resistive therapy in a wide variety of exercises for the fingers, hand, wrist, and forearm. With regular use, there is improvement in grip strength, increase dexterity and mobility. Hand Putty can be formed into the various illustrated shapes, providing a balanced exercise program. Strengthening opposing muscles maintains a delicate muscular balance which improves one's dexterity and coordination. (P.Sathya et al, 2014). [5]

There are fewer studies done on improvement of hand strength by giving different exercises in cricket players. Hence the need of this study is to evaluate the effect of different resisted exercises like hand gripper, theraputty and free weight exercises in the improvement of grip strength in cricket players.

Methodology:-

Study design:- Prospective Cross Sectional study
Study Population:- Cricket player
Sample size:- 40
Sampling Method:- Purposive Sampling
Study setting:-

- Shivaji Park Cricket ground
- Matunga Gymkhana Cricket ground
- D. Y. Patil sports academy

Inclusion Criteria:-

- Age group 17-19 years
- Male intercollegiate Cricket Players
- Cricket players without any history of upper limb trauma and medical illness
- Players with minimum of 3 years of playing experience.

Exclusion Criteria:-

- Subjects with surgical records
- Subjects with history of upper limb trauma and medical illness
- Subjects giving history of previous ailments or deformities
- Female cricket players
- Players with less than 3 years of playing experience

Materials Used:-

- Hydraulic Hand Dynamometer
- Resistive Hand Gripper
- Green Theraputty
- Weight Discs(1kg)
- Dumbbells(1kg)

Ethical Approach:-
The study was approved by the University Ethical Committee. Informed consent was obtained from each subject before entering in the study. The subjects were explained about the whole procedure and the purpose of the study.

Procedure:-
The subject's demographic details such as Age, Dominance, Height & Weight of each participant was noted & BMI was calculated before proceeding the study.

The subjects were randomly divided into two groups A & B. Each group consisted of 20 subjects. The hand grip was evaluated at the beginning and end of three weeks with calibrated hydraulic hand dynamometer followed by which subjects of group A & B were given two different sets of exercise programs for a period of three weeks.

Evaluation of Hand Grip - Each participant was first seated on the chair with straight back and forearm resting on the chair in 90°. Procedure was demonstrated to the participant. Grip strength was assessed first on dominant hand & then on non-dominant. The calibration of the instrument was tested periodically during the study and also in between the 3 squeezes. The participants were asked to squeeze the dynamometer 3 times with each hand. There was a one minute resting period between each squeeze in order to overcome fatigue. The mean value of 3 squeezes was taken into account.

Exercises program:-
Group A- was given resistance exercises i.e. Hand gripper & Theraputty (green colour) for 20 repetitions of each exercise per day with a rest period of 5 mins in between the two exercises.

Group B- was given weight exercises i.e. weight discs (1kg) & dumbbells (1kg) for 20 repetitions of each exercise per day with a rest period of 5 mins in between the two exercises.

After three weeks the grip strength of cricket players was again assessed. Further the increase in the grip strength of the two groups A & B was noted to co-relate the effects of both the exercises given to group A & group B.

Results:-

Table 1:- Group statistics.

	group	N	Mean	Std. Deviation	Std. Error Mean
Pregrip dominant	Resisted exercise	20	33.5375	8.18385	1.82997
	Free weight exercise	20	33.8870	4.25777	.95207
Postgrip dominant	Resisted exercise	20	36.9465	7.63936	1.70821
	Free weightexercise	20	34.6140	4.54885	1.01715
Pregripnondominant	Resisted exercise	20	33.1195	8.20082	1.83376
	Free weight exercise	20	35.1235	4.88074	1.09137
Postgripnondominant	Resisted exercise	20	36.7795	8.34826	1.86673
	Free weightexercise	20	35.4975	4.87334	1.08971

Table 2:- Group A (hand gripper & theraputty).

Paired Samples Test									
		Paired Differences					t	df	Sig.(2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Pregripdompostgripdom	-3.40900	1.40925	.31512	-4.06855	-2.74945	-10.818	19	.000
Pair 2	Pregripnondompostgripnondom	-3.66000	1.57781	.35281	-4.39844	-2.92156	-10.374	19	.000

Table 3:- Group B (weight discs & dumbbells).

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Pregripdompostgripdom	-.72700	.82758	.18505	-1.11432	-.33968	-3.929	19	.001
Pair 2	pregripnondompostgripnondom	-.37400	.39415	.08813	-.55847	-.18953	-4.244	19	.000

Discussion:-

In this study, a total sample of 40 inter collegiate cricket players were taken. The objectives of the study were 1) To evaluate the effect of resistance exercises (gripper & Theraputty) in the improvement of grip strength in intercollegiate cricket players. 2) To evaluate the effect of free weight exercises (dumbbells & weight disc) in the improvement of grip strength in intercollegiate cricket players. 3) To compare the effects of resistance exercises with free weight exercises in the improvement of grip strength in intercollegiate cricket players.

The findings of the study revealed that in group A exercises done with the hand gripper & theraputty (green) showed significant increase in grip strength post 3 weeks of performing the given exercises. The mean of the pre grip of dominant hand in this group was 33.53, whereas the mean of the post grip of dominant hand was 36.94. The mean of the pre grip of non-dominant hand in this group was 33.11 & the post grip of non-dominant hand was 36.77. This shows that there was a significant increase in the post grip strength of both the dominant as well as the non-dominant hand in group A since p value < 0.05. According to a study done by Sangwon Kong et al exercise with GD Hand Gripper significantly improved all the 3 types of pinch and grip strength (Sangwon Kong et al, 2014). [3] Following resistance exercise/increased loading there is a transient increase in protein synthesis within muscle (Keith Baar et al, 2014). [4] It was already proved that performing exercise with increased resistance caused more protein synthesis in the muscles and increased the total volume of muscles. (Fleckenstein JL et al & Keen DA et al, 1985). [19,20,4]

Exercises done with weight discs & dumbbells (Group B) also showed significant increase in grip strength post 3 weeks of performing the given exercises by group B. The mean of the pre grip of dominant hand in this group was 33.88, whereas the post grip of dominant hand was 34.61. The mean of the pre grip strength of non-dominant hand was 35.12, whereas the post grip of non-dominant hand was 35.49. This shows that there was a significant increase in the post grip strength of both the dominant as well as the non-dominant hand in group B since p value < 0.05 .Weight training is a key element to maintaining a fit and healthy body, as well as improving athletic performance. Weight training builds muscle, fastens metabolism, burns fat and is the basis of a strong, firm muscular body better performances can be the product of a number of factors. Similarly according to a study done by A.Suresh the finding of the study reveals that significant improvement on right and left hand grip strength of experimental group (weight training exercise) than the control group after the twelve weeks of training program (A.Suresh, 2012). [8]

When comparison was made among the two independent groups i.e. Resistance exercise group (Group A) & Weight exercise group (Group B) no significant difference between the two groups could be demonstrated since p value > 0.05. But when comparison was done between pre and post grip strength in group A & group B independently both showed significant improvement. Hence, both the exercises were beneficial for improving the hand grip strength in cricket players. Therefore, gripper & theraputty as they are handy and easy to use they can also be used to improve grip strength in cricket players.

Conclusion:

The study concludes that both the Resistance as well as the Free Weight Exercises were equally effective for improving the hand grip strength in cricket players. Hence, either of the exercises or a combination of the two mentioned exercises can be helpful while training the cricket players for improvement of hand grip strength.

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Reference:-
1. Shyamal, Koley, and Kumar Mahendra Yadav. "An association of hand grip strength with some anthropometric variables in Indian cricket players." Factauniversitatis-series: Physical Education and Sport 7.2 (2009): 113-123.2.
2. Dr. Jadhav CD et al 'Study of Correlation Of Hand Grip Strength And Percentage Of Lean Body Mass In Cricket Players' (IJAPB: Volume:1; Issue:3; December 2014,ISSN(Online):2394-3440).
3. Kong, Sangwon, et al. "The effect of two different hand exercises on grip strength, forearm circumference, and vascular maturation in patients who underwent arteriovenous fistula surgery." Annals of rehabilitation medicine 38.5 (2014): 648-657.
4. Baar, Keith, Gustavo Nader, and Sue Bodine. "Resistance exercise, muscle loading/unloading and the control of muscle mass." Essays in biochemistry 42 (2006): 61-74.
5. P. SATHYA, RAMAKRISHNAN K. S, S. MAKESH BABU, S. KHUSHBOO & VIDYALAXMI V. "POWER WEB, RESISTIVE HAND EXERCISER AND HAND PUTTY EXERCISES FOR PINCH STRENGTH IN DENTAL PROFESSIONALS." International Journal of Humanities, Arts, Medicine and Sciences 2.7 (2014): 13-20.
6. Koley, Shyamal, and Satinder Pal Kaur. "Correlations of handgrip strength with selected hand-arm-anthropometric variables in indian inter-university female volleyball players." Asian journal of sports medicine 2.4 (2011): 220.
7. Ada, Louise, Simone Dorsch, and Colleen G. Canning. "Strengthening interventions increase strength and improve activity after stroke: a systematic review." Australian Journal of Physiotherapy 52.4 (2006): 241-248.
8. A. Suresh ' Effect Of Weight Training On Hand Grip Strength Of Pondicherry University Students' (International Journal of Social Science & Interdisciplinary Research Vol.1 Issue 11, November 2012, ISSN 2277 3630).
9. Colado, Juan C., et al. "A comparison of elastic tubing and isotonic resistance exercises." International journal of sports medicine 31.11 (2010): 810.
10. B.Chittibabu & N.Akilan 'Comparison Between University Level Cricket And Handball Players On Right And Left Hand Grip Strength' (International Journal for Life Sciences and Educational Research Vol.2(3), pp.97-99,July-2014 E-ISSN : 2321-1229; P-ISSN : 2321-1180).
11. Massy-Westropp, Nicola, et al. "Measuring grip strength in normal adults: reference ranges and a comparison of electronic and hydraulic instruments." The Journal of hand surgery 29.3 (2004): 514-519.
12. Foo, LengHuat, et al. "Influence of body composition, muscle strength, diet and physical activity on total body and forearm bone mass in Chinese adolescent girls." British journal of nutrition 98.06 (2007): 1281-1287.
13. Nwuga, V. C. "Grip strength and grip endurance in physical therapy students." Archives of physical medicine and rehabilitation 56.7 (1975): 297-300.
14. Kenjle, Kavita, et al. "Grip strength as an index for assessment of nutritional status of children aged 6-10 years." Journal of nutritional science and vitaminology 51.2 (2005): 87-92.
15. Amandeep Singh &Vishaw Gaurav 'Comparative Study Of Hand Grip And Shoulder Girdle Strength Among Intercollege Level Cricket, Baseball And Softball Players' (International Multidisciplinary Research Journal, Vol 2; Issue 3; Sept 2014; ISSN No: 2321-5488).
16. Kaur, Navdeep, and ShyamalKoley. "An Association of Nutritional Status and Hand Grip Strength in Female Labourers of North India." Anthropologist 12.4 (2010): 237-43.
17. Samson, Monique M., et al. "Relationships between physical performance measures, age, height and body weight in healthy adults." Age and ageing 29.3 (2000): 235-242.
18. Onder, Graziano, et al. "Change in physical performance over time in older women The Women's Health and Aging Study." The Journals of Gerontology Series A: Biological Sciences and Medical Sciences 57.5 (2002): M289-M293.

19. Fleckenstein, JAMES L., et al. "Finger-specific flexor recruitment in humans: depiction by exercise-enhanced MRI." Journal of Applied Physiology 72.5 (1992): 1974-1977.
20. Keen, DOUGLAS A., GUANG H. Yue, and ROGER M. Enoka. "Training-related enhancement in the control of motor output in elderly humans." Journal of Applied Physiology 77.6 (1994): 2648-2658.
21. Dr. Sathya .P 1,Dr. Vasanthi Kadhiravan2,K.S.Ramakrishnan3, Trupti Milind Vedak4. "Correlation between Hand Grip Strength and Shoulder Power in Cricket Players." International Journal of Science and Research (IJSR) ijsr.net volume 5 Issue 3 (2016) 348-352.
22. Dr. P. Sathya1, Dr. Vasanthi Kadhiravan2, Dr. Ramakrishnan K.S3, Anjali R. Ghodake4 3/2016. "Association between Hand Grip Strength and Shoulder Power in Intercollegiate Cricket Players." International Journal of Innovative Research in Science, Engineering and Technology 5.3 (2016): 3085-3091.
23. Lucki, Natasha C., and Christopher W. Nicolay. "Phenotypic plasticity and functional asymmetry in response to grip forces exerted by intercollegiate tennis players." American Journal of Human Biology 19.4 (2007): 566-577.
24. Melrose, Donald R., et al. "Physiological and performance characteristics of adolescent club volleyball players." The Journal of Strength & Conditioning Research 21.2 (2007): 481-486.
25. Tan, B., et al. "Grip strength measurement in competitive ten-pin bowlers."Journal of sports medicine and physical fitness 41.1 (2001): 68.
26. Watts, P., V. Newbury, and J. Sulentic. "Acute changes in handgrip strength, endurance, and blood lactate with sustained sport rock climbing." The Journal of sports medicine and physical fitness 36.4 (1996): 255-260.