Review Of Research
Volume-2, Issue- 5 , Feb -2013
ISSN : 2249-894X
Available online at www. lbp.world

COMPARISON OF MUSCULAR CONTRACTION AMONG HIGH AND LOW PLAYING ABILITY OF HANDBALL PALYERS

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ABSTRACT

The study was conceptualized with a purpose to find out the muscular contraction during execution of the skills. Hence, keeping the above purpose of study in mind, the title of the research work was conceptualized as "Comparison of Muscular Contraction and Force Generation among Players of High and Low Playing Ability Groups". The study was delimited to 8 high and 8 low playing ability groups, age ranged between 18 to 24 years. The study was delimited to muscular contraction of high and low playing ability groups of Handball on the following muscles which are Rectus Femoris, Gastrocnemius, Medial Deltoid, and Gluteus Maximus and further delimited to the University players of different games only. It was hypothesized that high playing ability groups would have more muscular contraction than low playing ability groups. Purposive sampling was considered for selection of subjects. The requirement of the testing procedure was explained to the subjects. The data for the selected muscles were obtained with the help of the instrument EMG Bio-feedback of Thought technology with eight channels, operated by the investigator at the time of take-off. Before the actual testing, the subjects were given a complete demonstration after that electrode points were marked in the presence of physiotherapist and then subjects were asked to come one by one and perform the skill and their data on muscular contraction was recorded in micro volt (μv). In order to find out the comparison of Muscular Contraction between High and Low Playing Ability players of Handball independent t-test was used. The level of significance for the entire analysis was set at the 0.05 level of confidence. The data were analyzed by using SPSS Version 17.

INTRODUCTION

Sports are no spontaneous inventions. They originate from the basic human drive to investigate and to learn; this is realized by concentrating on certain objects, events and problems of which it is tried to clarify their existence, causes, and effects as well as to formalize this as understanding and knowledge. New sciences are originating in a continuous process of differentiation either by new themes and problems or by separation from already established

theoretical and scientific fields. Sports sciences are considered as a part of pedagogy which helps in the process of scientific development (Schmitz, 1979). Research findings indicate that high level of technique perfection alone cannot produce success in competitive sports. It also demands a higher level of game specific speed, strength, endurance, flexibility, co-ordination and optimum fitness (Johnson, 1975). The role of sports biomechanics also is becoming wider and understood in sports community and the demand for service increasing, Researcher in sports biomechanics will have to consider carefully how much time they can devote to the provision of scientific services without impairing their performance as scholar researcher. To avoid the problems inherent in this situation, it may be necessary to develop programs of study for the training of technique in sports biomechanics, technicians who can provide the kind of services sought by sporting bodies (Hay, 1984). In the last few decades, biomechanics has demonstrated considerable growth evolving from an exercise in the filming of human movement to an applied science with a powerful array of measurement and modeling techniques. The simple descriptive approach which was characteristic of early work has been superseded by attempts to explain the mechanisms underlying movement. Consequently, biomechanics has emerged as an important area of scientific investigation in a variety of disciplines. Included among these are automobile safety, biomedical engineering, ergonomics, exercise science, orthopedic surgery, physical rehabilitation, and sport (Hay, 1993). Locomotion is possible only through the repeated contraction of many muscles at the correct times. Contraction is controlled by the central nervous system, which comprises the brain cord. Voluntary muscle contractions are initiated in the brain, while the spinal cord initiates involuntary reflexes. Movement involves electrical activity in the muscles, which can be measured by electromyography (EMG). Researches commonly accomplish this by either attaching surface electrodes to the skin over muscles, or inserting fine wire electrodes into a specific muscle. These electrodes detect muscles electrical activity, which then can be recorded by a computer or polygraph recorder (Magill, 2003). The muscles play an important role in execution of sports techniques. The contribution of various muscles in generation of force during skill execution cannot be underestimated and with this the study was conceptualized to find out the muscular involvement in different body segments and force of muscular contraction during execution of the skills. Hence, it was hypothesized that the high playing ability groups will have stronger muscular contraction than low playing ability groups.

METHODOLOGY

16 male players were selected as subjects from L.N.U.P.E., Gwalior for the study. Players were selected from Handball game (8 from high and 8 from low playing ability group). Hence, purposive sampling was considered for selection of subjects and there age ranged from 18-24 years. The following muscles as variables for the study were mentioned below as Rectus Femoris (RF), Gastrocnemius (GCM), Medial Deltoid (MD), Gluteus Maximus (GM). The data for the selected muscles were obtained at take-off of jump shot, free throw and jump serve techniques of three different games. Before the actual testing, the subjects were given a complete demonstration of test and the purpose of the test was explained in detail to them.

anatomical landmarks of selected muscles were marked that can easily be palpated for identification and location of selected muscles for electrode application by the investigator, then electrode points were marked in the presence of expert and subjects were allowed to practice trials in order to get familiarized with the test. Muscles activities during skill execution of selected games were measured by EMG using Bio Tech Thought Technology of eight channels. The data were recorded in micro volt (µv). On the day of testing each subject was oriented to the testing protocol as Warm-Up, Electrode placement, Practice & familiarization, EMG equipment and Processing, and Exercise Testing Protocol. In order to find out the comparison of Muscular Contraction among High and Low Playing Ability Groups independent t-test was used. For analysis purpose, the level of significance was set at 0.05. The data were analyzed by using SPSS Version 17.

RESULT AND DISCUSSION

Table - 5
Comparison of muscular contraction of rectus femoris muscle among high and low playing ability of handball players during jump shot (take-off)

Variables	Group	N	Mean	Std. Dev	df	t-ratio
Rectus Femoris Right	High	8	330.77	18.65	14	1.016
	Low	8	345.54	36.61		
Rectus Femoris Left	High	8	547.85	42.23	14	5.969*
	Low	8	451.54	17.28		

* Significant at 0.05 level tab $t_{0.05}$ (14) =2.145

Table-5 revealed that Rectus Femoris of left leg showed significant difference between high and low playing ability group, because the calculated value of t (5.969) is higher than the tabulated value of t (2.145) at 0.05 level of significance.

Whereas the Rectus Femoris of right leg showed insignificant difference among the player of high and low playing ability group as the calculated value of t(1.016) is less than the tabulated value of t (2.145) at 0.05 level of significance.

Table - 8
Comparison of muscular contraction of gastrocnemius muscle among high and low playing ability handball players during jump shot (take-off)

Variables	Group	N	Mean	Std. Dev	df	t-ratio
Gastrocnemius Right	High	8	326.11	10.52	14	1.471
	Low	8	308.05	33.08		
Gastrocnemius Left	High	8	374.64	28.15	14	1.513
	Low	8	351.88	31.91		

* Significant at 0.05 level. Tab $t_{0.05}$ (14) =2.145

Table-8 revealed that the calculated value of Gastrocnemius muscles of both leg i.e., t (1.471) of right and t (1.513) of left leg is less than the tabulated value of t (2.145) at 0.05 level of significance. It may therefore be concluded that the muscular contraction of Gastrocnemius muscle among high and low playing ability of handball players at the moment take-off during jump shot more or less similar.

Table - 10
Comparison of muscular contraction of medial deltoid muscle among high and low playing ability handball players during jump shot (take-off)

Variables	Group	N	Mean	Std. Dev	df	t-ratio
Medial Deltoid Right	High	8	332.65	17.96	14	0.104
	Low	8	333.72	22.99		
Medial Deltoid Left	High	8	348.49	15.20	14	0.704
	Low	8	338.11	38.84		

* Significant at 0.05 level. Tab $t_{0.05}$ (14) =2.145

Table-10 revealed that Medial Deltoid muscle showed insignificant difference of both legs among high and low playing ability of handball players in the technique of jump shot at the moment take-off, as the calculated value of Medial Deltoid muscles of both leg i.e., t (0.104) of right and t (0.704) of left leg is less than the tabulated value of t (2.145) at 0.05 level of significance. It may therefore be concluded that the muscular contraction of Medial Deltoid muscle among high and low playing ability of handball players at the moment take-off during jump shot more or less similar.

Table - 12
Comparison of muscular contraction of gluteus maximus muscle among high and low playing ability handball players during jump shot (take-off)

Variables	Group	N	Mean	Std. Dev	df	t-ratio
Gluteus Maximus Right	High	8	279.94	19.68	14	1.686
	Low	8	253.41	39.90		
Glutious Maximus Left	High	8	286.97	15.18	14	1.626
	Low	8	273.97	16.76		

* Significant at 0.05 level. Tab $t_{0.05}$ (14) =2.145

Table-12 revealed that the calculated value of Gluteus Maximus muscles of both leg i.e., t (1.686) of right and t (1.626) of left leg is less than the tabulated value of t (2.145) at 0.05 level of significance. It may therefore be concluded that the muscular contraction of Gluteus Maximus muscle among high and low playing ability of handball players at the moment take-off during jump shot more or less similar.

Rectus femoris of left leg muscle showed significant difference during take-off phase in jump shot in handball among high and low playing ability group. As the rectus femoris is only two joint muscle in the quadriceps group of muscles having prime function during extension of knee. As this muscle is stronger due to quadriceps curl as well as from leg press exercise.

And rest of the selected muscles didn't show any significant difference among handball players of high and low playing ability group during take-off phase in jump shot. As the handball players execute the technique of jump shot on one leg, that (take-off) foot is left so gastrocnemius (right & left), Medial Deltoid (right & left), Gluteus Maximus (right & left) muscles showed little electrical activity at moment take-off of both groups i.e high and low group.

CONCLUSION

It the light of above finding of the study this was concluded that the Muscle contraction of Rectus femoris of left leg muscle of Handball players during take-off phase in jump shot showed significant difference among high and low playing ability groups and gastrocnemius (right & left), Medial Deltoid (right & left), Gluteus Maximus (right & left) muscles showed no significant difference among high and low playing ability groups.

The hypothesis stated earlier that the high playing ability groups will have stronger muscular contraction than low playing ability groups was partially accepted and partially rejected.

BIBLIOGRAPHY

Josef N. Schmitz, "Development and Status of Sports Pedagogy in the Federal Republic of Germany", (International Journal of Physical Education, Vol. 38, Issue: 2, Spring Edition 1979)

R Johnson & E.R. Buskis, "Science and Medicines of Exercise and Sports" (New York: Harpe &Bros. Publication, 1975)

Games G. Hay, "Sports Biomechanics- A Study Report" Journal of Sports Sciences, Vol. 2; (1984)

James. G. Hay, "The Biomechanics of Sports Techniques", (3rd Ed; Practice Hall Englewood Ciffs, New Jersey, 1993)

Richard A. Magill, "Motor Learning and Control", Mc Grow-Hill Companies, Inc., New-York, (2003)

Choffin Don B., Andersson Gunnar B.J., Martin Bernard J., Occupational Biomechanics. John Willey & Sons, New Jersey, Fourth Edition, 2006.

Johnson R & Buskis E.R. ed.(1975). Science and medicines of Exercise and Sports (New York: Harpe &Bros. Publication).

Avedisian Lori; Kowalsky Don S.., C Albro Richard.; Daniel Goldner, C Gill Robert., "Abdominal Strengthening Using the Abvice Machine as Measured by Surface Electromyographic Activation Levels", Journal of Strength and Conditioning Research, 2005, 19(3).

Bartlett Robert, "Introduction to Sports Biomechanics" (Google Book Result ,1997).