



Isometric and Isotonic Exercises Training on the Performance of Muscular Strength

Dr. Prasannakumar Shivsharanappa

Assistance Professor (contract base), University of Agriculture Sciences, DHARWAD, KARNATAKA.

ABSTRACT

The purpose of present study is to discover the effect and relationship exists between Isotonic and Isometric Exercises involved in the Muscular Strength in putting a shot.

In this study there were 45 boys age between 22-25 involved and all of them were students of University College of physical education, Gulbarga University. They were classified into three groups; Experimental group (1) was initiated to undergo the isometric exercises. Experimental group (2) was given training in isotonic exercises. Group (3) namely control group was not given any training. The experimental period was six weeks. The suitable statistical method "F" ratio was used to compute 3 Groups were involved in the study.

The isotonic exercises were found to be more effective than the isometric exercises from the fact that the rate of improvement of the subjects who performed isotonic exercises was faster than the isometric exercises.

KEYWORDS : Isotonic & Isometric exercises and Muscular Strength

introduction

"A sound mind in a sound body" is a good dictum that has stood the best test of time. There have been a number of studies tending to show that shows that mind and body are tending to show that mind and body are inseparable. Ancient thinkers of Greek, Aristotle, combined moral intellectual and physical excellence. At Athens an uneducated body was as much a disgrace as an untrained mind.

Physical fitness is one of the facts of a person's all round harmonious development. Physical fitness is the cultural phenomenon of great complexity and magnitude is historically preconditioned level of health and comprehensive development of a person. Physical fitness adds grace to the young, wealth to the poor, ornament or rich and acts as a consoling factor to the old. The place of physical fitness in any society reflects something of that society's characteristics.

Physical fitness is essential for all games sports. Physical fitness implies the ability to function at one's level of efficiency in all his/her daily living. Physical fitness is an instrument for social good. It is the capacity to successfully and fully respond physically,

mentally and emotionally to the force of life without undue deliberations. "Physical fitness is the ability of an individual to live and balanced life. It involves physical, mental, emotional and spiritual factors and the capacity for their wholesome knowledge".

The primary components of physical fitness identified by the President's council on physical fitness and sports were:

- * Muscular strength
- * Muscular Endurance
- * Flexibility
- * Cardio respiratory Endurance
- * Muscular power
- * Balance
- * Speed
- * Freedom from obesity
- * Agility
- * Reaction time

Out of the above physical fitness components the most important components "Muscular Strength".

In this study researcher has attempted to discover the effect and relationship exists between Isotonic and Isometric Exercises involved in the Muscular Strength in putting a shot.

For throwing events, strength of the muscle is the most important and necessary factor. The technique is based on the training schedule. Fitness factors such as extent flexibility Weber has identified static strength, dynamic strength and explosive power as important requirements for high performance.

"Wilf paish states that Shot putting is the domain of the big, strong person and although it is one of the technical events, it can be enjoyed and success achieved at a fairly low skill level provided there is a high speed strength level".

"Parry O Brain, the originator and polished craftsman of shot-put emphasizes the importance of strength in the shot put performance". To him "the shot is 60% strength, 30% technique and 10% mental perception".

Training and carefully selected coaching method are essential for better performance in any sports activity. Miller puts these facts forth and he says, "The factors involved in successful shot putting are strength, body size, speed and many hours of careful coaching."

MUSCULAR STRENGTH, ISOTONIC AND ISOMETRIC EXERCISES

Muscular strength

Muscular strength may be defined as the maximal muscular force or tension used in the creation or prevention of the movement in one maximal effort of the muscle group. Four basic types of muscular contraction produce muscular strength.

Hence, muscular strength may be subdivided into four categories as given below:

- Isotonic muscular strength
- Isometric muscular strength
- Isokinetic muscular strength
- Eccentric muscular strength

Isotonic muscular strength

"Muscle length changes with movement of the limbs. The muscle shortens and thickens". It is maximal force used to create a maximal vigorous movement produced by Isotonic contraction (concentric or a dynamic contraction).

Several weight exercises characterize the actual movement involved in the activity of the concerned sport. As a result there are a variety of weight exercises and a variety of technique to suit the demands. However, the principle behind the mechanical fundamental of force exercise remains unchanged.

Isometric muscular strength

"Muscle length remains constant. Change in muscle forces takes place, load maximum length of muscle is constant due to constant angle of joints of the limbs being maintained". It is the maximal force created to prevent maximal load movement by a particular muscular group or a combination of muscle groups.

Physiological research has shown that isometric activity at angles of 130° degree for the knee causes the muscle to work at maximum tension, forcing the muscle to respond to the high stimulus. This re-

sults in an increase in the size and growth of the muscle as well as strength. Therefore, isometric muscle tension is greater than that of isotonic tension.

methodology

Shot put is one of the important field events, consisting of various sequences of movements, techniques and training methods.

STATEMENT OF THE PROBLEM

The purpose of the study was to find out the effect of isotonic and isometric exercises on shot put performance.

Hypothesis

It is hypothesized that isotonic exercises towards shot put performance might result in significant improvement than isometric exercises.

Limitations:

1. Factors other than isotonic and isometric exercise were not considered.
2. There was no consideration towards personality traits of an individual in relation to his performance.
3. There was no control over the diet of the subjects.

delimitations

1. The study was conducted on 45 male subjects selected from Gulbarga university physical education students, the subjects were in the age group of 22-25.
2. Even though physical efficiency qualities such as strength, agility, co-ordination, and explosive power etc. correct application of mechanical principles are the determining factors in shot put performance, the effects of isotonic and isometric exercises were only considered in this study.
3. The distance put by the subjects using their own style measured throwing ability.
4. This study was conducted on an experimental basis for a period of six weeks only.

THE SAMPLE:

To find out an effective instructional technique in putting the shot, the investigator proposed to carry put a study among the men of 22-25 years of age who had no previous experience in putting the shot. In this study there were 45 male students involved and all of them were selected from UCPE Gulbarga University Gulbarga. The subjects were treated randomly and by sampling technique.

Test administration

The selected samples were classified into three equal and homogeneous groups. Experimental Group (1) was initiated to undergo the isometric exercises. Experimental Group (2) was given training in isotonic exercises. The third group, namely the Control Group was not given any training. First the three group sample's muscular strength test was measured by giving trials to putting the shot. Further, the samples were given training for six weeks continuously during morning and evening hours. After the training again three group's muscular strength test was measured. Thus the performance of the sample before and after training conditions was taken to assess the muscular strength. The data of both pre and post training conditions were analyzed statistically.

During the experimental period, Group 1 and 2 had practice in the respective forms of the session. The investigator gave carefully planned supervisory and instructional guidance. All the subjects were given proper guidance and effective instruction to present the tests. Athletic dress as also prescribed. The necessary marking to signify the throwing area were made. The subjects had adopted the rules and regulations strictly while they executed the performance. Measurements were made by steel measuring tape.

Isometric exercises: A list of representative tension exercises was given to the subjects and the number of repetitions per set was ten. Totally three sets were allowed.

Isotonic exercises: The subjects were given isotonic exercises with weights and each subject had to complete three sets of ten repetitions. The weight training exercises for the upper and lower portions

of the body were done on alternate days.

Three chances were given and the best performance scores were recorded for the three groups at the beginning and completion of the six-week session. The data thus collected were statistically analyzed.

Statistical analysis:

1. MEAN
2. SD
3. t-test

RESULTS AND DISCUSSION

This study was conducted with a view to determine the effect of isotonic and isometric exercises on shot put performance. Since it was equivalent groups in the initial test were more or less similar, scores were recorded for the three groups at the beginning and completion of the six-week session. The data collected were subjected to statistical analysis by "t" ratio to determine the significance of difference.

Table-1

Table Showing result of Performance in Putting the Shot of Three Groups

Training		Groups		
		Isotonic	Isometric	control
Pre training	M	6.11	6.04	6.19
	SD	2.14	2.06	2.19
Post training	M	7.56	7.16	6.18
	SD	3.42	3.02	2.16
t-values		2.41**	2.07*	0.02

*Significant at 0.01 level

**Significant at 0.05 level

The table explains computation of t- ratio shows that the effect of training in isometric exercises and isotonic exercises on putting the shot was significant. The mean scores in pre training condition were most of all similar among all groups, where as in post training, experimental groups performance are increased i.e., the isotonic training group has 7.56 (pre training 6.11) and the isometric training group has 7.16 (pre training 6.04) but the control group has not made any difference in the performance because the group has not underwent in any training. When the t-test was administered to find significant difference between two conditions the t-value were found significant which shows clearly in the above table.

The mean of the final performance of the Isotonic exercise group was higher than the mean of the Isometric exercise group. So it could be safely predicted that the isotonic exercise group showed a faster rate of improvement than the isometric exercise group.

conclusions:

1. It was proved that there was significant improvement in putting the shot by two experimental groups due to the training in isometric and isotonic exercises.
2. The isotonic exercises were found to be more effective than the isometric exercises from the fact that the rate of improvement of the subjects who performed isotonic exercises was faster than the isometric exercises.
3. There was not significant improvement in the performance of putting the shot in the control group.
4. The better performance during the final readings of the subjects of the experimental groups can be attributed to the development of strength in shoulder, upper arm, forearm, back, wrist, and finger and leg muscles.

Recommendation:

1. The isotonic exercises and isometric exercises are very simple and economical in time consumption. So they can be included in the regular programme of physical education in schools and colleges and the importance should be made known to the students as well as the public.
2. The isotonic and isometric exercises are recommended to non-athletes who wish to have physical fitness and shape.
3. Isotonic exercises can be included in the training schedule of Discus, Javelin and Hammer throwers.

4. The same study may be conducted for different age levels to derive the appropriate schedule for each group.
5. Similar studies might be conducted on other athletic events, namely, jumping, sprinting, etc.

REFERENCES

- Barrow, Harold M., and McGee, Rosemary., A Practical Approach to Measurement in Physical Education, Philadelphia: Lea and Febiger, 1973.
- Bresnahan, George T., and Tuttle, W.W., Track and Field Athletics, St. Louis: the C.V.Mosby Company, 1947.
- Clark, H.Garrison, and Clark, David H., Advanced Statistics with application to physical education, Englewood Cliffs, N.J.Prentice-Hall, Inc., 1972.
- Johnson, Barry L., and Nelson, Jack K., Practical Measurements for Evaluation in Physical Education, Minneapolis: Burgess Publishing Company, 1969.
- Mazumdar, D.C., Encyclopedia of Indian Physical Culture, Baroda: Good Companions, 1950.
- Miller, Richard F., Fundamentals of Track and Field Coaching, London: McGraw Hill Book Company, 1952.
- Paish, Wilf., Track and Field Athletics, London: Lepus Books, 1976.
- Singer, Robert N., Motor Learning and Human Performance, New York: Mc Millan Publishing Company, 1971.
- Thirunarayana, G., and Hariharan.S., Method in Physical Education, Karaikudi: C.T. ana Hill Publications, 1968.
- Wakefield, Frances., Harkins, Dorothy., and Cooper, John M., Track and Field Fundamental for beginners, St. Louis: The C.V. Mosby Company, 1970.