



Effect of Tubics on Anaerobic Capacity and Leg Strength of Higher Secondary School Girls

Prof. (Dr.) Vinu Bhaskar*

Professor & Head of the Department Physical Education,
Govt. T.D. Medial College, Alappuzha
Email:vinubhaskar@gmail.com

Dr. Anilkumar N.**

Associate Professor & Head of the Department Physical Education,
Dr. B.R. Ambedkar Memorial Government Arts and Science College,
Balussery, Kinalur (P.O.), Kozhikode
Email:anilkumarcoach@gmail.com

Abstract

The purpose of the study was to determine the effect of Tubics on Anaerobic Capacity and Leg Strength of Higher Secondary School Girls. The subjects of the study were sixty female Higher Secondary School students from Alappuzha, Kerala, India. The average age of the subjects was 17 years, ranging from 16 to 18 years. The subjects were equally assigned to one experimental group and one control group by using random sampling method. Pre- test was conducted for the experimental and control groups for the selected strength variables and data is recorded. The experimental group participated in the training program five days per week for a period of 10 weeks. The control group was not allowed to do any form of exercises during



this period. The data were taken at the conclusion of the period of 10 weeks. Standard tests were conducted to measure selected variables under the study. Anaerobic Capacity was measured in Kgms^{-1} by using Sergeant vertical jump test as an indirect method with the application of the equation, $p=2.2 \times \text{Wt.} \times \sqrt{D}$. The weight of the subject recorded in Kg with standard weighing machine. The number of inches between the jump and reach in Sargent vertical jump test measured to the nearest half inch. The distance between the jump and reach was further multiplied by body weight and then divided by 12 to get the measurement in foot/pounds.

Leg Strengths were measured by the Back & Leg Dynamometer as the maximum force exerted in kgs. To find out the significant differences between Pre-test and Post-test scores of experimental and control groups data were analyzed by applying 't' test. The level of significance was .05. The mean obtained by the two groups found different from each other. The findings of the study indicated that experimental group was significantly better than the control group.

Keywords: *Tubics, Anaerobic Capacity, Leg Strength & Dynamometer.*

Introduction

The desire to be healthy and attractive is almost universal. The best way to improve bodily measurement and proportion is through a combination of appropriate diet and exercise. To develop body symmetry and good posture, one should engage in gross motor activities rather than specialize in one activity that develops only one area of the total fitness of the body. Health and wellness promotion includes efforts to alter personal life-style to enhance the quality of life, just as physical fitness is altered by regular physical activity. Wellness is a state of being that is altered by one's behavior that is partially or totally in one's own control. Some of the healthy life-styles that are considered to be very important to optimal wellness are exercising regularly, eating properly, managing stress, learning first-aid, adopting good personal health behaviors, protecting the environment and managing time effectively.

Developing strength and power is an inevitable part of any training program and it also provides a better appearance to one's body shape. A successful exercise program can improve one's self image and self esteem. It can make a person feel



good and develop a positive view about life. Today young people are willing to spend more time and money for this purpose. Younger generation of today is well aware of the need and importance of possessing a healthy physique. But it is not possible for every one to spend a huge amount in the health clubs and gymnasiums especially in such a poor country like India. Here comes the significance of low cost and easily available training methods. One such method could be Tubics and it can be defined as the resistance exercises performed with a bicycle inner tube.

Methodology:

The subjects of the study were sixty female Higher Secondary School students from various schools Alappuzha, Kerala, India. The average age of the subjects was 17 years, ranging from 16 to 18 years. The subjects were randomly assigned to an experimental group (N=30) and a control group (N=30). Random sampling method is used for this. The experimental group had to undergo Tubics, thrice a week for the period of 10 weeks. The control group did not involve in any similar form of training. The Tubics program included warm-up, work out and limbering down sessions for a duration of 40 minutes. The tubics are strengthening exercises done with the help of a bicycle inner tube. It requires tensing of muscles for a continuous period of approximately 10seconds. These exercises can be performed anywhere and do not require much space. The workout consists of the following exercises such as bench press, shrugs, side bends, stand ups, hammer curl, overhead press, chest pull, pull-downs, sitting rows, sit ups, back arch and calf curves performed with a bicycle inner tube. These tube exercises are designed for chest, shoulders, arms, abdomens, back, thigh and calf muscles respectively. The intensity was bi-weekly increased by increasing the number of repetitions and the time of holding final position using the bicycle inner tube. Two weeks of adaptations period was also given. The data pertaining to selected variables such as anaerobic capacity and leg strength were collected by administering the appropriate test and measurement procedures. Anaerobic Capacity was measured in Kgms^{-1} by using Sargent vertical jump test as an indirect method with the application of the equation, $p = 2.2 \times \text{Wt.} \times \sqrt{D}$ (Wt = Weight and D= The Distance covered in the vertical jump.) The weight of the subject recorded in Kg with standard weighing machine. The number of inches between the jump and reach in vertical jump test measured to the nearest half inch. The distance between the jump and reach was further multiplied by body weight and then divided by 12 to get the measurement in foot/pounds. Leg strength was measured by back and leg dynamometer as maximum force exerted in kgs.



Statistical Analysis:

To determine the difference between pre and post test means dependent ‘t’ test was employed.

Results:

The data pertaining to the selected variables of the experimental and control groups were tested with ‘t’ test. The level of significance chosen was 0.05 level. The obtained ‘t’ values were presented in the table 1

Table 1

Difference in means of Experimental and Control Groups in Anaerobic Capacity and Leg Strength

Variable	Group	Number	Initial Mean	Final Mean	Mean difference	S.E	‘t’ ratio
Anaerobic Capacity (Kgms ¹)	EXP.	30	76.43	79.71	3.2787	0.334	9.82**
	CON.	30	76.53	76.71	0.185	0.233	0.79
Leg Strength (kgs)	EXP.	30	31.83	34.03	2.20	0.111	19.75**
	CON.	30	29.47	29.50	0.033	0.089	0.37

** Significant at .01 level of confidence; ‘t’ value needed for the significance at .01 level with 29 degrees of freedom is 2.045. EXP - Experimental Group; CON -Control Group.

From table 1 it is evident that in the case of the experimental group, significant changes were noticed in the anaerobic capacity and leg strength following 10 weeks of Tubics. The obtained ‘t’ values for the anaerobic capacity was 9.82 and leg strength was 19.75. All are higher than the required table values. In the case of the control group, no changes were seen in all the selected variables.



Figure 1
Mean Difference in Anaerobic Capacity for Experimental and Control Groups (Means in Kgms⁻¹)

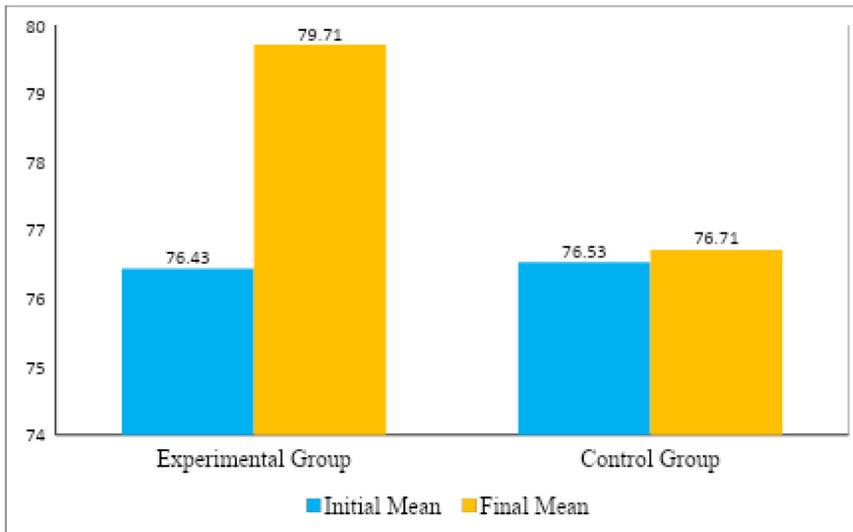
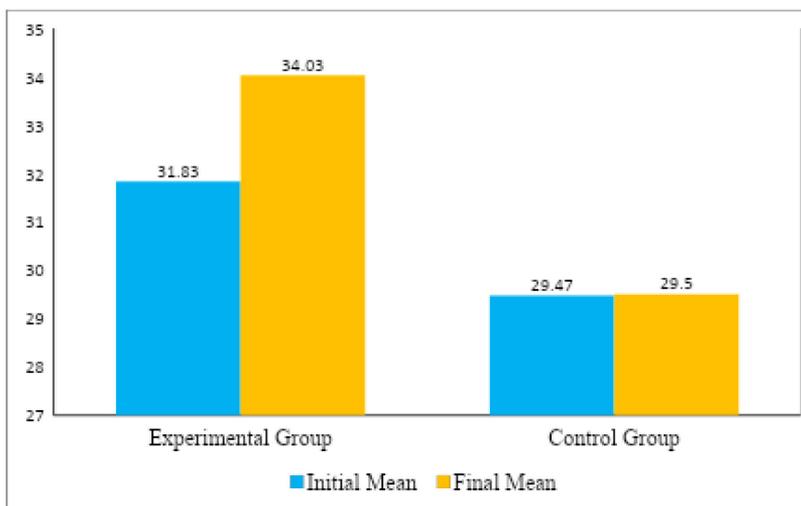


Figure 2
Mean Difference in Leg Strength for Experimental and Control Groups (Means in Kgs)





Discussion

The 10 weeks of Tubics program was associated with changes to the Anaerobic Capacity and Leg Strength variables in the subjects under the study. The analyses of the results reveal that the Anaerobic Capacity increased in the case of the experimental group. It might be due to the fact that the Anaerobic Capacity is a measure of explosive power. It is a combination of speed and strength abilities. So improvement in strength might have improved the anaerobic power. It may be due to an increase in the lean body mass and consequently more anaerobic development of the muscles. The explosive power depends upon muscle composition, muscle cross section and metabolic process. Tubic workout might have increased the size of the ATP-CP pools and their depletion rate and muscle buffering capacity which in turn contributes to the improvement in anaerobic power of the experimental group. Leg Strength of the experimental group showed improvement after 10 weeks of Tubics. The leg muscles are exercised following the progressive overload principle, the exercised muscles are bound to increase in contractile nature or cross section including the muscle mass with relative decomposition of fat which makes the muscles stronger. Aagaard P, Andersen JL, Bennekou M *et al* (2011) studied the effects of resistance training on endurance capacity and muscle fiber composition in young top-level cyclists. Aleksandar Markov (2020) also studied the anaerobic capacity of lower limbs is crucial for gymnast's performance. Beattie K, Carson BP, Lyons M, Kenny IC (2017) examined the effect of maximal- and explosive-strength training on performance indicators in cyclists. Naghibzaden, M.S. (1987) also studied the effect of circuit weight training on aerobic capacity and strength. Exercise physiologists opine that strength is directly proportional to the cross section of the muscles. The greater muscle strength is attributed by an increase in the concentration of the contractile protein (Myosin) and mitochondria (size & number) and other anaerobic enzymes (both in quantity & quality). Therefore significant improvement in strength might have occurred due to an increase in muscle mass and contractile nature of the muscles. Mihri Baris Karavelioglu, Halit Harmanci, Metin Kaya and Mustafa (2016) also studied the effects of plyometric training on anaerobic capacity and motor skills in female futsal players. In the case of control group, no significant changes were noticed in any of the selected variables during the same period.



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