Relative Effect of Aerobic and Anaerobic Training onExplosive Power Among Moderate Altitude Inhabitants

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Abstract

The purpose of this study was to examine the effect of aerobic and anaerobic training on explosive poweramong moderate altitude inhabitants of kashmir region.To achieve the purpose of the study, forty-five(45) male inhabitantswho had represented intercollegiate games and sports from Government Degree College, Kulgam, affiliated with Kashmir university of Jammu & Kashmir (UT) during academic year 2020-21 were randomly selected as subjectsand their age ranged between 18 and 23 years. The selected subjects were randomly assigned into three equal groups namely two experimental group and one control group. Group I (Aerobic training), Group II (Anaerobic training) and Group III (Control group) and each group comprised of fifteen (15) subjects each. Both the experimental groups underwent their respective experimental treatment for twelve weeks, 3 days per week and one session on respective days. The control group was not undergone any training other than their daily routine. Explosive power was taken as criterion variable for this study and was measured by standing broad jump. The data collected from three groups were statistically analysed by using analysis of covariance (ANCOVA)to know the significant difference among the groups. Whenever obtained 'F' ratio for adjust post-test mean was found significant, the Scheffe's test was applied as post hoc test to determine the significant difference between paired means.The two experimental groups namely aerobic and anaerobic training achieved significant improvement on explosive power among moderate altitude inhabitants.

Keywords: Aerobic, Anaerobic Training, Explosive Power and Moderate Altitude Inhabitants.

Introduction

Different training methods have been commonly used toimprove physical fitness and its related standards of performance of athletes. The training methods include interval training, Fartlektraining, circuit training, weight training, altitude training, resistancetraining, hypoxic training, continuous training, alternate pacerunning, parcourse training and plyometric training. Each of thesetraining has its own advantage and disadvantage and each one isused to develop some specific components of physical fitness.Moreover, by their very nature of movement pattern, each training canbe classified as either aerobic or anaerobic.

In aerobic training, the warm up is short and with a low intensity. The aerobic training warm-up is longer because muscles relive a much more aggressive treatment than in an aerobic training, sprints are part of an anaerobic training while longer belongs with a more comfortable rhythm belong to an aerobic training. Aerobic exercise in physical exercise of relatively low intensity that depends primarily on the aerobic energy generating process. Aerobic literally refers to use of oxygen to adequately energy demands during exercises via aerobic metabolism. The intensity should be between 60 and 85% of maximum heart rate. Aerobics exercise and fitness can contrast with anaerobic exercise of while strength training and short distance running are most salient examples. The two types of exercise differ by the duration and intensity of muscular contraction involved as well as by how energy is generated within muscle.

Anaerobic training is shorter than aerobic training in duration (less than two minutes), in which oxygen is limiting factor in performance, and requires energy from anaerobic sources. These energy sources involve the utilization of phosphagen and lactic acid by the athlete's body; and enables them to perform brief near maximal muscular activity (less than 2 min). events or activity that lasts up to 30 seconds in length, rely almost exclusively on the phosphagen system.

Anaerobic exercise is used by athletes in non-endurance sports to build power and by body builders to build muscle mass. Muscles that are trained under anaerobic conditions develop biologically differently giving them greater performance in short duration-high intensity activities **(Green, 1995).**

Normally energy supply for performing a task comes eitherfrom aerobic or anaerobic metabolism. In aerobic metabolismglycogen is oxidized with oxygen and formed into carbon-di-oxide,water and A.T.P. through various chemical reactions. On the otherhand, anaerobic metabolism occurs without the help of oxygen and inthis, lactic acid and ATP-CP are produced for the system to function.The basic difference in these two energy sources is that the aerobic metabolism is predominant in those activities which are of lowintensity and longer duration. Whereas anaerobic metabolism ispredominant in those activities which are of high intensity and shortduration. Therefore, on the basis of above classification, the primarysource of energy for an activity may be indicated depending upon itsintensity and duration. For instance, 100 mtr sprint is 100%anaerobic and marathon is 100% aerobic **(Uppal, Dey and Singh,1983).**

While developing an efficient training program, physicaleducation teachers and coaches have to recognize the major source ofenergy utilized to perform a given task and then through overloadprinciple, develop that particular energy source so that the performancecapacity of the sportsmen can be improved**.**

All exercise programmes, and indeed all life, rely on the cells' ability to provide enough energy to meet the demands placed on them. It is critical to emphasise that the breakdown of foods does not directly release cellular energy for life and physiological work.The breaking of chemical bonds in food releases the energy required to produce and use the high energy molecule known as adenosine triphosphate (ATP). ATP is the primary energy currency of all living organisms. Cells metabolically split a phosphate group from ATP molecules (as needed), releasing energy for life functions and exercise requirements. When one or both of the two terminal phosphate molecules attached to the ATP are detached, energy is released. In the presence of water, each phosphate group is separated from the ATP, and approximately 7.3 kilocalories of usable energy are immediately liberated to the cell to do work **(Zhul& Kravitz, 2012).**

Explosive power has a got two components in it i.e., linear and vertical. Both are done in the absence of oxygen within shortest time, in events like long jump, triple jump, high jump and pole vault. Therefore, these linear explosive power and vertical explosive power are a part of anaerobic power that are used in events for distance and height respectively. In exercises for explosiveness, the object is to develop the ability to generate the greatest force in the shortest amount of time. In the process, one muscle develops elasticity (resiliency), which is the key to explosiveness and is one of outcomes from doing plyometric exercises or drills.(**Kenney., Wilmore& Costill, (2015).**

Explosive power outputs are the main determinant of performance in activities requiring one movement sequence to produce a high velocity at release or impact. explosive muscle actions are required in throwing, jumping, and striking activities. In addition, sudden bursts of power are needed when rapidly changing directions or accelerating during various sports or athletic events (e.g., basketball, baseball, soccer, and gymnastics).

For example, the height which an athlete jumps when re-bounding in basketball is determined purely by velocity with which he or she leaves the floor. At the bottom of movement, the body stops momentarily. Then as athlete extends the trunk, hips, knees and ankles, the body is accelerated upward to a maximum take-off velocity as he or she leaves the floor. This take-off velocity is determined by force the muscles can generate against the floor multiplied by the time during which the forces are applied**(Komi,1986).**

Methodology

For the accomplishment of the study forty-five college men (N=45) were randomly selected as subjects. The age of the subjects were ranged between 18-23 years. The subjects were randomly divided into 3 equal groups, containing twelve (15) in each group. Group I was given aerobic training, Group II were given anaerobic training and Group III was under control. The experimental groups were treated with aerobic and anaerobic exercises for the period of twelve weeks and control group did not participate in any specific training. After the treatment period was over all the subjects were administered with the criterion measures which was considered as post-test.

Study Design

The study was formulated as a true random group design, consisting of a pretest and a post test. The subjects (N= 45) were randomly segregated into three groups of twelve each. The groups were assigned as aerobic training group-1 (N=15), anaerobic training group-II (N=15), and other group acted as control group, underwent no specific training group-III (N=15). Pre tests were conducted form all the subjects on selected dependent variable(explosive power). The post tests were conducted on the above said dependent variable after the experimental period of twelve weeks for all the three groups.

Variable and Test

Standing Broad Jump (Explosive Power)

The subject stands behind the toe board with his feet slightly apart. He was instructed to jump as farthest as possible by bending knees and swinging arms to take off for the broad jump in the forward direction. The subject attempts to jump as far as possible, landing on both feet without falling backwards. Three attempts were allowed. The measurement was taken from take-off line to the nearest point of contact on the landing (back of the heels).Record the longest distance jumped, the best of three attempts, the score is measured in feet and inches.

Analysis

The data collected from two experimental groups and control group during pre- and post-period were statistically analysed to examine the changes on explosive power among moderate altitude inhabitants and the results of the study are presented in the table- 4.1-A

Analysis of Explosive Power

The statistical analysis of mean, percentage of changes and‘t’ ratio of the collected data on explosive power among two experimental groups and control group are presented in table 4.1.A.

Table 4.1.A
Descriptive Statistical Analysis of the Data on Explosive Power

Variable	Groups	Pre Test Mean	Post Test Mean	MD	%	T
Explosive Power	ATG	2.21	2.26	0.05	2.26	9.86
	ANTG	2.20	2.32	0.12	5.45	6.73
	CG	2.19	2.21	0.02	0.91	1.42

**Significant at 0.05 level for df of 1 and 14 is 2.15*

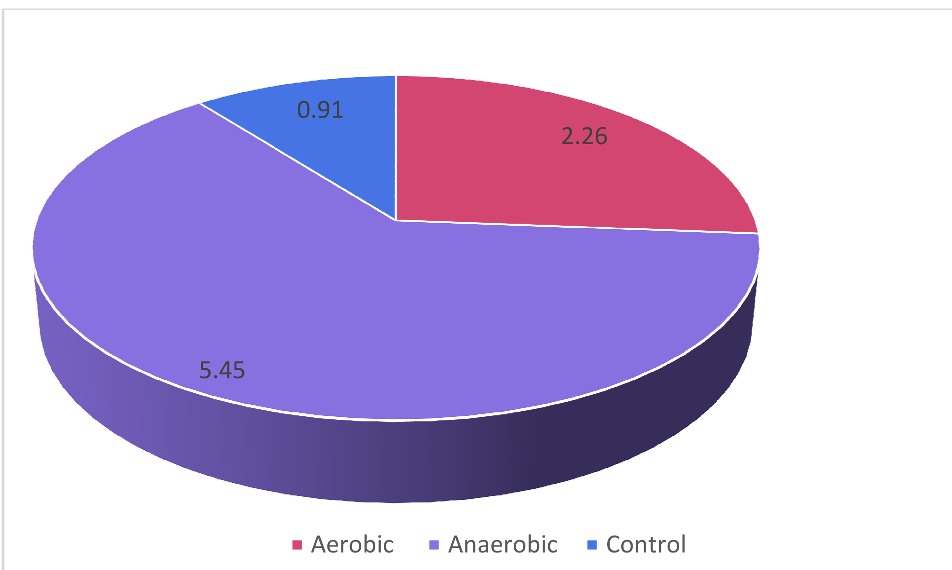
It is clear from the table 4.1.A, that there was significant difference between pre-test and post test data on explosive power of aerobic training group, because obtained 't" ratio of 9.86 is greater than the required table value of 2.15 at 0.05 level of significance for the df of 1 and 14, similarly there was also significant difference between pre-test and post-test on explosive power of anaerobic training group because obtained 't' ratio of 6.73 is greater than the required table value of 2.15 at 0.05 level of significance for the df of 1 and 14.

However, insignificant difference wasfound amongpre- and post-control group, as obtained 't' ratio of 1.42 is lesser than the required table value of 2.15 at 0.05 level of significance for the df of 1 and 14.

The percentage of changes on explosive power of aerobic training group, anaerobic training group and control group are 2.26%, 5.45% and 0.91% respectively.

The percentage of changes on explosive power of aerobic training group, anaerobic training group and control group are given in the figure-4.A.

Figure 4.A
Pie Diagram showing the percentage of changes on Explosive power



The data collected from the three groups on explosive power was statistically analysed by ANCOVA and the results are presented in table- 4.2-A.

Table 4.2.A
Analysis of Covariance for the Pre and Post tests on Explosive Power of Aerobic training group (ATG), Anaerobic training Group (ANTG) and Control Group (CG)

Test	ATG	ANTG	CG	SOV	SS	DF	MS	F
Pre test Mean SD(±)	2.21 0.114	2.20 0.121	2.19 0.130	BG	0.003	2	0.001	0.090
				WG	0.628	42	0.015	
Post test Mean SD(±)	2.26 0.114	2.32 0.119	2.21 0.112	BG	0.095	2	0.047	3.563*
				WG	0.558	42	0.013	
Adjusted Post test Mean	2.25	2.32	2.22	WG	0.078	2	0.039	13.939*
				BG	0.115	41	0.003	

Table value2 to 42 & 2 to 41 is 3.23

Table 4.2.A shows that the pre-test mean values on explosive power of aerobic training group, anaerobic group and Control group are 2.21, 2.20and 2.19 respectively. The obtained ‘F’ ratio of 0.090pre-test score was lesser than the required table value of 3.23 for df 2 and 42 for significance at 0.05 level of confidence on explosive power. The post-test mean values on explosive power of aerobic training group, anaerobic training group and control group are 2.26, 2.32 and 2.21 respectively. The obtained ‘F’ ratio value of 3.563 for post test score was greater than the required table value of 3.23 for the df 2 and 42 for significance at 0.05 level of confidence on explosive power.

The adjusted post-test mean value on explosive power of aerobic training group, anaerobic training and control group are 2.25, 2.32 and 2.22respectively. The obtained ‘F’ ratio value of 13.939 for adjusted post test score was greater than the required table value of 2.15 for df 2 and 41 for the significance at 0.05 level of confidence on explosive power.

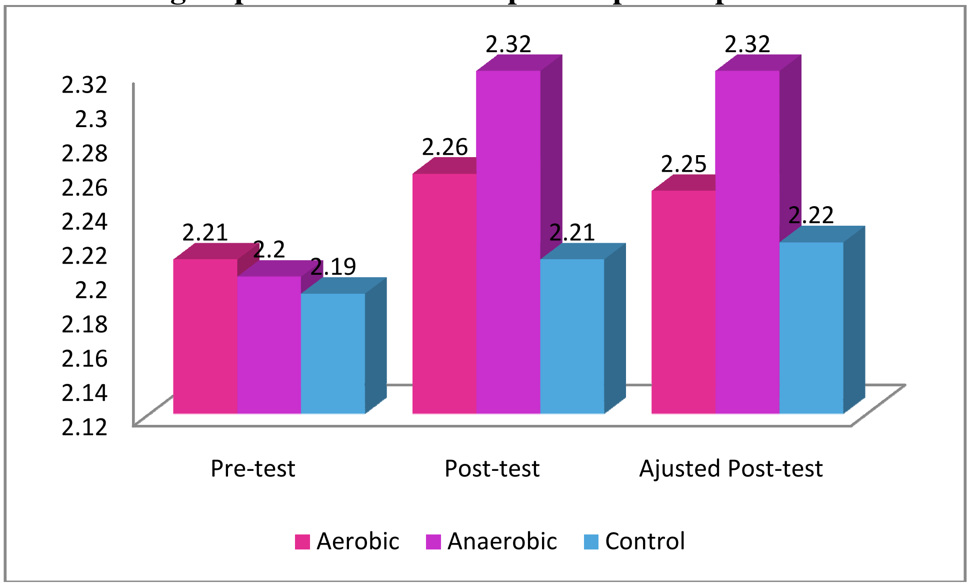
The results of the study indicated that there was significant difference among the adjusted post-test mean of ATG training group, ANTG training group and control group on explosive power. The Scheffe's test was applied as post hoc test and the results are presented in table- 4.3-A.

Table- 4.3-A
The Scheff's Test for the Differences between Paired Means on Explosive power

ATG	ANTG	CG	MD	CI
2.25	2.32		0.07	0.05
2.25		2.22	0.03	0.05
	2.32	2.22	0.10	0.05

From the table- 4.3-A, it was imperative that both aerobictraining group and anaerobic training group differed significantly from control group on explosive power. Significant differences were found between Aerobic training group and anaerobic training group in improving explosive power of moderate altitude inhabitants. Therefore, twelve weeks of Anaerobic training showed greater improvement than aerobic training on explosive power of moderate altitude inhabitants.The findings of the study implies that both the groups improved but anaerobic training were significantly better in improving explosive power than other groups confined to this study. The changes in explosive power are presented in figure 2-A.

Figure 2-A
The Pre, Post and Adjusted Mean Values of Aerobic Training group, Anaerobic Training group and Control Group on Explosive power



Discussion on Findings

The aerobic training showed an improvement of 2.26% on explosive power during twelve weeks of training programme. Similarly,anaerobic training showed an improvement of 4.45% on explosive power during the same training programme of twelve weeks. Control group did not showed any improvement during the whole course of twelve weeks training programme. The improvement on explosive power among anaerobic training was due to the varied intensities in training of both groups. The findings of this study were also agreed with findings of Andy Li-An Ho (2013),Gururaj, S., & Arumugam, S. (2017), Ashok Kumar and Dr. M. Sundar (2018)**,** Kumar, V., & Arumugam, S. (2019)and G. Nelson Durai, Jim Reeves & Arumugam (2020).

Conclusion

The two experimental groups namely aerobic training group and anaerobic training group achieved significant improvement on explosive power among moderate altitude inhabitants. Aerobic training group showed an improvement of 2.26% and anaerobic training group showed an improvement of 5.45.% on explosive power due to 12 weeks of aerobic training and anaerobic training programme.

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