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COMPARATIVE BETWEEN EFFECT OF CIRCUIT TRAINING AND PLYOMATRIC TRAINING ON AEROBIC ENDURANCE AND ANAEROBIC POWER

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ABSTRACT

Today science become so advance even the small factors influence the performance science pick it out. So day by day the experiment becomes the important part of the research. The study was formulated as an experimental design of 12 weeks Circuit Training and Plyometric training programmed. The selected 120 Football and Cricket players were divided into two Experimental groups as Football Players (FP) group and Cricket Players (CP) group, and one Control (C) group; each group consisted of 40 subjects. Football players found significantly improve in aerobic endurance but there is no significant improvement found in anaerobic power. It sow that circuit training is beneficial for the anaerobic capacity. The results for the cricket players group which was given the plyometric training show significant improvement in both aerobic endurance and anaerobic power. But there is no significant found in control group in both the aerobic endurance and anaerobic power, it prove that the training is effective.

Keywords: Circuit Training, Aerobic, Anaerobic, Cricket and Football.

INTRODUCTION:

No matter training improve the performance level of the players in every event of sports. Even the individuals do practice their physical training to keep healthy. Today science become so advance even the small factors influence the performance science pick it out. So day by day the experiment becomes the important part of the research. "Sports training are a planned and controlled process in which, for achieving a goal, changes in complex sports motor performance ability to act and behaviour are made through measures of content, methods and organization".

Circuit training: Circuit training is a formed type of training in which the trainees goes through a series of selected exercises of activities that are performed in a sequence or in a circuit. Plyometric training: Plyometric training is an intense, advanced form of exercise in which the muscles are first stretched, then contracted (the pre-stretching makes the muscle contract with greater force). Plyometric movements are powerful and high-impact, although the impact should be controlled as much as possible. Aerobic capacity: Physical activity in which metabolic demands can be met by the oxygen transport i.e. oxygen supplied by respiration during activity provides sufficient energy for executing the activity. Anaerobic capacity: Anaerobic capacity is a person's total capacity for a single sustained about of anaerobic work whether it is a longer intermitted series or a shorter continuous effort where oxygen is sufficient for energy production.

Chamari, presented a new test to assess aerobic performance in soccer by means of a specific dribbling track: the Hoff test. It was further determined whether improvement in maximal oxygen uptake was reflected in increased distance covered in the Hoff test. 18 male soccer players (14 years old) were tested both in the laboratory and using the Hoff test before and after 8 weeks of soccer training. The distance covered in the Hoff test correlate significantly with maximum oxygen uptake, and improved by 9.6% during the 8 weeks training period, while maximum oxygen uptake and running economy improved by 12 and 10% respectively. Backward multiple regressions showed maximum oxygen uptake to be the main explanatory variable for the distance covered in the Hoff test. The study demonstrated a significant correlation between laboratory testing of VO_{2max} and performance in the Hoff test. Furthermore, training induced improvements in VO_{2max} were reflected in improved performance in the Hoff test. It was suggested that it should be a goal for active U-15 soccer players to cover more than 2100 meters in the Hoff test, as this requires a VO_{2max} of above 200 ml.kg (0.75), $^{-1}min^{-1}$, min^{-1}, which should serve as a minimum in modern soccer. Haynes[i] examined the differences in aerobic capacity, strength and power relative to weight and lean body weight between male and female collegiate athletes. 41 male and 37 female alpine skies cross country skies and middle distance and distance runners at the University of Colorado served as subject's measurement included

skin fold thickness, VO_{2max}. Isomeric, knee extension strength, margaria Kalamen stair run and the vertical jump. It was concluded that training has reduced the differences in aerobic capacity and strength but not power to the point where they can be emplaced by the differences in lean body weight between males and females. The purpose of the study was concern to develop various experimental trainings for evaluating performance factors of football and cricket players at various levels based on different performance limiting variables. So, research scholar intended to undertake the study on "Comparative between Effect of circuit training and plyomatric training on aerobic endurance and anaerobic power".

METHODOLOGY:

One hundred twenty male players, 60 Football players and 60 Cricket Players of Manipur State were selected as the subjects under the association of football and cricket of the State of Manipur. The average age of the subjects was 18 - 24 years as obtained from State records of their respective association of the State of Manipur. The level of participation of players was State and National levels competition. The reliable tests for reliable variables had been selected.

(1). Aerobic Capacity: To determine the aerobic capacity, Cooper's12 Minutes Run-Walk Test was conducted and recorded the distance covered in metres and converted into miles. The aerobic capacity (VO_{2max}) was expressed in $ml.kg^{-1}min^{-1}$, and (2). Anaerobic Capacity: To determine the anaerobic capacity, Sargent Jump-Lewis Nomogram was employed, and anaerobic capacity was expressed in $Kg\text{-}m.sec^{-1}$.

Table-1

RELIABILITY CO-EFFICIENT OF TEST ITEMS OF AEROBIC CAPACITY AND ANAEROBIC CAPACITY

Sl. no.	Name of test items	Co-efficient of 'r'
1.	Cooper's 12minute Run-Walk test (aerobic capacity)	0.85*
2.	Sergeant Jump-Lewis Nomogram (anaerobic capacity)	0.98*

DESIGN OF THE STUDY:

The study was formulated as an experimental design of 12 weeks Circuit Training Programmed and Plyometric training programmed. The selected 120 Football Players and Cricket players were divided into two Experimental groups as Football Players (FP) group and Cricket Players (CP) group, and one Control (C) group; each group consisted of 40 subjects. The 2 specific test items of aerobic capacity and anaerobic capacity were administered on the subjects of two experimental groups and one control group before administering the training design to obtain the data of initial test (pre-training test score). The duration of the training period was of 12 weeks (84days). The Football Players (FP) and Cricket Players (CP) groups were given 5 days circuit and plyometric training per week respectively. The control group was kept without giving any specific training of both circuit and plyometric training programmed. Detailed procedures adopted in these regard are described under the heading of Administration of Training. The final test items were re-administered on selected aerobic and anaerobic tests by the same tester after 12 weeks training programme.

ANALYSIS OF DATA:

The data analysis conducted in two different ways; for comparison of Football, Cricket and Control groups of different Pre- test and Post-test scores of Aerobic endurance and Anaerobic capacity, t-test for Independent samples (Separate Variance formula)[ii] is implemented. The t Test for Independent Samples (Separate Variance) is given by the formula:

$$t = \frac{M_1 - M_2}{\sqrt{SD_1^2/N_1 + SD_2^2/N_2}}$$

Where, t = t Test for Independent Samples (Separate Variance), M_1 = mean of sample 1, M_2 = mean of sample 2, SD_1 = standard deviation of sample 1, SD_2 = standard deviation of sample 2, N_1= numbers in sample N and N_2 = numbers in sample 2. And for Pre-test Post-test comparison the t - tests for Correlated means was used [iii]. The t -tests for Correlated means is given by the formula:

$$t = \frac{\sum D}{\sqrt{N\sum D^2 - (D)^2 / N - 1}}$$

Where, t = t Test for correlated means, D = subtracting score of the before treatment (pre test) score from the after treatment (post test) score. D^2 = for each subject by squaring the D value, $\sum D$ = algebraically sum of the D values and $\sum D^2$ = sum of the D^2 values.

Level of significance

For testing the significant difference level the calculated't' values are compared with the table value. The 't' values of (degrees of freedom) d.f. 39 (N -1 = 40 - 1 = 39) (for all the three groups) at 0.05 significant level is 2.045, and at 0.01 significant level is 2.750 respectively for two tails. For testing the level of significance for one-tailed test the calculated 't-values' are compared with the table value. The 't' values of (degrees of freedom) d.f. 39 (N -1 = 40 - 1 = 39) (for all the three groups) at 0.05 significant level is 1.697, and at 0.01 significant level is 2.457.

RESULT:

Comparison of pre-test aerobic endurance between the football, Cricket and Control players group: The comparison of pre-test aerobic endurance among the football, cricket and control players groups' are presented in below tables.

Table No.2:

T-test for comparison the mean values of Aerobic Capacity (Pre-test) between football and cricket Players

Aerobic t-test of the pre- test of football and cricket			
	means	SD	t-value
Football	57.7025	2.786643	0.045976316
Cricket	56.3675	3.093284	

*Significant at 0.05 and **significant at 0.01confidante level.

Table 2, reveals that there is no significant difference in aerobic endurance between football and cricket players since estimated 't' value 0.045976316 was found smaller than the table value 2.042 at 0.05 significant level and 2.750 at 0.01 significant level (t-value0.045976316 < p-value = 2.042 at 0.05 significant level).

Table No.3:

T-test for comparison the mean values of Aerobic Capacity (Pre-test) between football and control group Players

Aerobic t-test of the pre- test of football and control groups			
	means	SD	t-value
Football	57.7025	2.786643	0.002521938
control group	55.9875	2.075398	

*Significant at 0.05 and **significant at 0.01confidante level.

Table 3, reveals that there is no significant difference in aerobic endurance between football and control group players since estimated 't' value 0.002521938 was found smaller than the table value 2.042 at 0.05 significant level and 2.750 at 0.01 significant level (t-value 0.002521938 < p-value = 2.042 at 0.05 significant level).

Table No.4:

T-test for comparison the mean values of Aerobic Capacity (Pre-test) between cricket and control group Players

Correlation t-test of the pre- test and post-test			
	means	SD	t-value
Cricket	56.3675	3.093284	0.520698497
control group	55.9875	2.075398	

*Significant at 0.05 and **significant at 0.01confidante level.

Table 4, reveals that there is no significant difference in aerobic endurance between cricket and control group players since estimated 't' value 0.520698497was found smaller than the table

value 2.042 at 0.05 significant level and 2.750 at 0.01 significant level (t-value 0.520698497 < p-value = 2.042 at 0.05 significant level).

Comparison of pre-test anaerobic capacity between the football, Cricket and control players group: The comparison of pre-test anaerobic capacity among the football, cricket and control players groups' are presented in below tables.

Table No.5:

T-test for comparison the mean values of Anaerobic Capacity (Pre-test) between football and cricket group Players

Anaerobic t-test of pre-test of football and cricket groups			
	Means	SD	t-value
Football	74.4	5.275974	0.031322703
Cricket	71.625	6.019999	

*Significant at 0.05 and **significant at 0.01confidante level.

Table 5, reveals that there is no significant difference in anaerobic capacity between football and cricket group players since estimated 't' value 0.031322703 was found smaller than the table value 2.042 at 0.05 significant level and 2.750 at 0.01 significant level (t-value 0.031322703 < p-value = 2.042 at 0.05 significant level).

Table No.6:

T-test for comparison the mean values of Anaerobic Capacity (Pre-test) between football and control group Players

Anaerobic t-test of pre-test of football and control groups			
	means	SD	t-value
Football	74.4	5.275974	0.151671698
control	72.6	5.830072	

*Significant at 0.05 and **significant at 0.01confidante level.

Table 6, reveals that there is no significant difference in anaerobic capacity between football and control group players since estimated 't' value 0.151671698 was found smaller than the table

value 2.042 at 0.05 significant level and 2.750 at 0.01 significant level (t-value 0.151671698 < p-value = 2.042 at 0.05 significant level).

Table No.7:

T-test for comparison the mean values of Anaerobic Capacity (Pre-test) between cricket and control group Players

Anaerobic t-test of pre-test of cricket and control groups			
	means	SD	t-value
Cricket	71.625	6.019999	0.464045946
control	72.6	5.830072	

*Significant at 0.05 and **significant at 0.01confidante level.

Table 7, reveals that there is no significant difference in anaerobic capacity between cricket and control group players since estimated 't' value 0.464045946 was found smaller than the table value 2.042 at 0.05 significant level and 2.750 at 0.01 significant level (t-value 0.464045946 < p-value = 2.042 at 0.05 significant level).

Since there is no significant different found in pretest score as compared between the three groups there is no different of aerobic and anaerobic efficiency between the three groups.

Comparison of means of pre-test and post-test Aerobic and anaerobic capacity of the two experimental groups and one control group are given below:

Table No.8:

Correlation T-test for pre-test and post-test the mean values of Aerobic endurance of football Players

Correlation t-test of the pre- test and post-test			
	Means	SD	t-value
Pre-test	57.7025	2.786643	5.30631**
Post-test	59.835	2.201462	

*Significant at 0.05 and **significant at 0.01confidante level.

Table 8, reveals that there is significant difference in aerobic endurance between pre-test and post-test since estimated 't' value 5.30631 was found larger than the table value 2.457 at 0.01 significant level (t-value 5.30631 > p-value = 2.457 at 0.01 significant level).

Table No.9:

Correlation T-test for pre-test and post-test the mean values of Anaerobic capacity of football Players

Correlation t-test of the pre- test and post-test			
	Means	SD	t-value
Pre-test	74.4	5.275974	1.55247
Post-test	78.375	4.600376	

*Significant at 0.05 and **significant at 0.01confidante level.

Table 9, reveals that there is no significant difference in anaerobic capacity between pre-test and post-test of football players since estimated 't' value 1.55247 was found smaller than the table value 1.697 at 0.05 significant level (t-value 1.55247 < p-value = 1.697 at 0.05 significant level).

Table No.10:

Correlation T-test for pre-test and post-test the mean values of Aerobic endurance of cricket Players

Correlation t-test of the pre- test and post-test			
	Means	SD	t-value
Pre-test	56.3675	3.093284	8.29959**
Post-test	59.6475	2.84956	

*Significant at 0.05 and **significant at 0.01confidante level.

Table 10, reveals that there is significant difference in aerobic endurance between pre-test and post-test since estimated 't' value 8.29959 was found larger than the table value 2.457 at 0.01 significant level (t-value 8.29959 > p-value = 2.457 at 0.01 significant level).

Table No.11:

Correlation T-test for pre-test and post-test the mean values of Anaerobic endurance of cricket Players

Correlation t-test of the pre- test and post-test			
	means	SD	t-value
Pre-test	71.625	6.019999	5.49119**
Post-test	75.25	4.743416	

*Significant at 0.05 and **significant at 0.01confidante level.

Table 11, reveals that there is significant difference in anaerobic endurance between pre-test and post-test since estimated 't' value 5.49119 was found larger than the table value 2.457 at 0.01 significant level (t-value 5.49119 > p-value = 2.457 at 0.01 significant level).

Table No.12:

Correlation T-test for pre-test and post-test the mean values of aerobic capacity of control group Players

Correlation t-test of the pre- test and post-test			
	Means	SD	t-value
Pre-test	55.9875	2.075398	0.067918548
Post-test	55.72	1.974348	

*Significant at 0.05 and **significant at 0.01confidante level.

Table 12, reveals that there is no significant difference in aerobic endurance between pre-test and post-test of control group players since estimated 't' value 0.067918548 was found smaller than the table value 1.697 at 0.05 significant level (t-value 0.067918548 < p-value = 1.697 at 0.05 significant level).

Table No.13:

Correlation T-test for pre-test and post-test the mean values of anaerobic capacity of control group Players

Correlation t-test of the pre- test and post-test			
	means	SD	t-value
Pre-test	64.28	9.384171	0.045923952
Post-test	64.8675	10.10977	

*Significant at 0.05 and **significant at 0.01confidante level.

Table 13, reveals that there is no significant difference in anaerobic capacity between pre-test and post-test of control group players since estimated 't' value 0.045923952 was found smaller than the table value 1.697 at 0.05 significant level (t-value 0.045923952 < p-value = 1.697 at 0.05 significant level).

DISCUSSION:

Discussion of Pre-test comparison of the Aerobic endurance: Before the training there was significant different was found in aerobic and anaerobic efficiency between the three groups.

Discussion of Pre-test Post-test comparison of the Aerobic endurance and Anaerobic capacity: Football players found significantly improve in aerobic endurance but there is no significant improvement found in anaerobic power. It sow that circuit training is beneficial for the anaerobic capacity. The results for the cricket players group which was given the plyometric training show significant improvement in both aerobic endurance and anaerobic power. But there is no significant found in control group in both the aerobic and anaerobic power.

CONCLUSION:

In present study there is no difference of aerobic endurance and anaerobic power between the footballers and cricketers.

1. Circuit training improved the aerobic endurance but no effective in the anaerobic power.

2. Plyometric training is beneficial for the improvement of both aerobic endurance and anaerobic power.

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