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The effect of aerobic and anaerobic interval training combined with yogic practices on selected physiological variables of high school male kabaddi players

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Abstract

The purpose of the study was to find out “The Effect of Aerobic and Anaerobic Interval Training Combined with Yogic Practices on Selected Physiological variables (Breath Holding Time, Cardiovascular Endurance) of High School male Kabaddi players.” The study was formulated as a true random group design, consisting of a pre-test and post-test. The subjects (n=90) were randomly assigned to three equal groups of thirty men high school kabaddi players. The groups were assigned as Experimental Groups-I, II and control group respectively. Pre-tests were conducted for all the subjects on selected physical and physiological variables, breath holding time, cardiovascular. The experimental groups participated in their respective aerobic interval training combined with yogic practices and anaerobic interval training combined with yogic practices for a period of 12 weeks. The post-tests were conducted on the above said dependent variables after a period of 12 weeks training on all the three groups, namely, experimental group-I, experimental group-II and control group. The differences between the initial and final scores on selected dependent variables were considered as the effect of selected experimental treatments. To test the statistical significance, the obtained data were subjected to statistical treatment using ANCOVA. In all cases 0.05 level was fixed to test the hypothesis.

Keywords: Aerobic, Anaerobic, Interval Training, Yogic, Breath Holding Time, Cardiovascular Endurance.

Introduction

Athletic performance has dramatically progressed over the past few years. Performance levels unimaginable before are now commonplace, and the number of athletes capable of outstanding results is increasing. One factor is that athletics is a challenging field, and intense motivation has encouraged long, hard hours of work. Also, coaching has become more sophisticated, partially from the assistance of sport specialists and scientists. A broader base of knowledge about athletes now exists, which is reflected in training methodology (Cassidy, Jones and Potrac, 2008).

Improving skill means that the performance of any motor task becomes more efficient thereby reducing the time taken to complete the task and the level of effort required. This increased level of skillfulness could also mean more enjoyment and satisfaction for the performer by increasing the ease with which the task can be completed or by allowing new, more complex skills to be attempted. If by understanding the processes that govern the control of movement we can show the way for all individuals to improve their ability to perform the myriad of motor tasks that they confront. Then researcher will claim to have made a real contribution to improving the quality of life within our society (Jones, Hughes and Kingston, 2007)

Game of Kabaddi: Kabaddi is basically a combative sport, with seven players on each side; played for a period of 40 minutes with a 5 minutes break (20-5-20). The core idea of the game is to score points by raiding into the opponent's court and touching as many defense players as possible without getting caught on a single breath.

One player, chanting Kabaddi!!! Kabaddi!!!! Kabaddi!!!! Charges into the opponent court and try to touch the opponent closest to him, while the seven opponents make maneuvers to catch the attacker. This is Kabaddi, the match of one against seven, known as the game of struggle.

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History of Kabaddi: The origin of the game dates back to pre-historic times played in different forms. The modern Kabaddi game was played all over India and some parts of South Asia from 1930. The first known framework of the rules of Kabaddi as an indigenous sport of India was prepared in Maharashtra in the year 1921 for Kabaddi competitions on the pattern of Sanjeevani and Gemini in a combined form. Thereafter a committee was constituted in the year 1923, which amended the rules framed in 1921. The amended rules were applied during the All India Kabaddi tournament organized in 1923 (kabaddiikf.com).

Sports Training: Most scientific knowledge, whether from experience or research, aims to understand and improve the effects of exercise on the body. Exercise is now the focus of sport science. Research from several sciences enriches the theory and methodology of training, which has become a branch of science. The athlete is the subject of the science of training. The athlete is the subject of the science of training. The athlete represents a vast source of information for the coach and sport scientist (Bompa, T. 1999).

Training is not a recent discovery. In ancient times, people systematically trained for military and Olympic endeavors. Today athletes prepare themselves for a goal through training.

Training represents a long-term endeavour. Athletes are not developed overnight and a coach cannot create miracles by cutting corners through overlooking scientific and methodical theories.

Aerobic Training: The word aerobic meaning with oxygen to represent idea. Even so the dynamics of the idea are more complicated than implied by the definition. Aerobic can be viewed as an intricate system of bodily supply and demand. That is the body needs energy for any kind of activity and the need is filled by burning off the foods that eat. Oxygen is the spark the fuel needs to burn regardless aerobics is the word in general use. The fact is that Cooper codified and organized what fitness means to many people. He is generally credited with being one of the main forces of the current fitness craze. The majority medical opinion is that aerobic programs strengthen heart muscle, increase the efficiency of lungs and offer other wonderful benefits (www.wikipedia.com).

Benefits of Aerobic Training: The major benefits of aerobic exercises are stronger and more efficiently operating heart and lungs. More energy physical flexibility, conditioned muscles, proper use of fats and effective burning of calories. The increased oxygen flow gained through aerobics re-energizes by giving any one more energy and a “re-awakening” of his senses (www.wikipedia.com).

Anaerobic Training: 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.

Aerobic exercise, on the other hand, includes lower intensity activities performed for longer periods of time. Activities like walking, running, swimming, and cycling require a great deal of oxygen to generate the energy needed for prolonged exercise.

Interval Training: In 1956, Olympic games at Melbourne, four athletes created a new Olympic record in 800 m and nine athletes in 1500m race (www.wikipedia.com). This record breaking effort in middle distance and many other events has been the recent trend in Olympics and World championships is the scientific training method which was then and is now being adopted as “interval training” specific to each sport / event.

Yoga: Yoga means the experience of oneness or unity with inner being. This unity comes after dissolving the duality of mind and matter into supreme reality. It is a science by which the individual approaches truth. The aim of all yoga practice is to achieve truth where the individual soul identifies itself with the supreme soul or God. Yoga has the surest remedies for man’s physical as well as psychological ailments. It makes the organs of the body active in their functioning and has good effect on internal functioning of the human body. Yoga is a re-education of one’s mental process, along with the physical.

Benefits of Yogic Practices: Many world class sportsmen have found that the practice of yoga helps them to achieve greater skills in their sports. This is because yoga not only works on the physical level but also has benefits for the mental, emotional and energy levels. It enables them to realize that ‘winning is not everything’ and that there is ‘more to life’ than sporting ‘high’ and ‘lows’.

Physiological Variables: For the physiological system of body to be fit, they must function well enough to support the specific activity the individual is performing. Moreover, different activities make different activities make different demands upon the organism with respect to circulatory, respiratory, metabolic and neurological process which are specific to the activities.

The lungs, heart and blood perform a vital function on the body’s supply system. They supply to the muscles with necessary fuels, oxygen and carry waters such as carbon dioxide and lactic acid. Consequently, the cardio respiratory system in the athlete needs to be developed.

The various physiological variables are resting heart rate, blood pressure, vital capacity, breath holding time anaerobic power etcetera. The pulse rate and anaerobic power were the two variables selected for this study (Morehouse and Miller, 1976).

Breath Holding Time: Breath holding time is defined as the duration of time through which one can hold his / her breath without inhaling and exhaling after a deep inhalation.

There are two types of breath hold time:

- Positive Breath holding time
- Negative Breath holding time

Endurance type of training will improve the breath holding time. Breath holding time also plays a vital role in the sports performance (Strukic, P.J. 1981).

Cardio-vascular Endurance: Cardio-Vascular Endurance is the ability of the heart, blood vessels, blood and respiratory system to supply oxygen and fuel to the muscles at a steady rate for a considerable length of time. (<http://www.teachnet.ie/coconnor/definition.html>)

Cardio-vascular endurance may be defined as the ability of lungs and heart to taken in a transport adequate amount of oxygen to the working muscles.

Importance of Cardiovascular Endurance: One's capacity of doing work for a prolonged period of different from another one can work far long period but other does not. Endurance is a term that denotes prolonged sustained or repetitive activity.

Cardio-vascular endurance is characterized by moderate contraction of large muscle groups for relatively long periods of time, during which maximal adjustment of the cardio respiratory system are necessary as in sustained swimming, swimming, climbing and the like. When the many muscles are worked hard, the circulatory and respiratory systems are heavily loaded because these two systems directly support the muscle work (Morehouse and Miller, 1976).

Statement of the Problem: The purpose of the study was to find out "The Effect of Aerobic and Anaerobic Interval Training Combined with Yogic Practices on Selected Physiological variables (Breath Holding Time, Cardiovascular Endurance) of High School male Kabaddi players."

Objectives of the Study

The objective of the study was to make a status analysis of physiological variables breath holding time, cardiovascular endurance among high school kabaddi players.

The study was also to find out the effects of interval training of aerobic exercises with *yogasanas* and anaerobic exercises with *yogasanas* on selected physiological variables (Breath Holding Time, Cardiovascular Endurance) among high school kabaddi players.

Methodology: The purpose of the study was to find out whether there would be any significant improvement on selected physiological variables as a result of aerobic and anaerobic interval training combined with yogic practices. Selection of subjects, experimental variables, tester reliability, and instrument reliability, orientation of the subject, test administration anstatistical techniques were discussed.

Selection of Subjects: Ninety high school kabaddi players, who had represented their schools in the inter-school competitions were selected as subjects for this study at random. The school boys were from different school in Andhra Pradesh and their age group was between 14 and 16 years with ± 1.24 years. The kabaddi players had a similar academic work and regular activities in accordance with the requirements of their school curriculum and followed the schedule of training for preparation of the inter-school competitions.

The selected subjects were randomly divided into three groups and each groups contain thirty subjects. Group one acted as experimental group-one and group-two acted as experimental group-two and group-three acted as control group. Experimental group-I was given 12 weeks aerobic interval training combined with yogic practices, experimental group-II was given 12 weeks anaerobic interval training combined with yogic practices and the control group was not given any treatment except of their routine.

Selection of Variables: The investigator reviewed the available scientific literature pertaining to the study from

books, journals, periodicals, magazines and research papers. Taking into consideration of the feasibility variables the following variables were selected.

Independent Variables

1. Aerobic Interval Training with Yogic Practices
2. Anaerobic Interval Training with Yogic Practices

Dependent Variables

Physiological Variables

- 1) Breath Holding Time, 2) Cardiovascular Endurance

Experimental Design

The study was formulated as a true random group design, consisting of a pre-test and post-test. The subjects (n=90) were randomly assigned to three equal groups of thirty men high school kabaddi players. The groups were assigned as Experimental Groups-I, II and control group respectively. Pre-tests were conducted for all the subjects on selected physiological variables, such as breath holding time, cardiovascular endurance. The experimental groups participated in their respective aerobic interval training combined with yogic practices and anaerobic interval training combined with yogic practices for a period of 12 weeks.

The post-tests were conducted on the above said dependent variables after a period of 12 weeks training on all the three groups, namely, experimental group-I, experimental group-II and control group. The differences between the initial and final scores on selected dependent variables were considered as the effect of selected experimental treatments. To test the statistical significance, the obtained data were subjected to statistical treatment using ANCOVA. In all cases 0.05 level was fixed to test the hypothesis.

Breath Holding Time

Objective:-The purpose of this test was to measure the breath holding time.

Equipments: For recording the breath holding time, a stop watch (1/10th of second) and nose clip were used.

Administration: The subject was instructed to stand at ease and to inhale deeply after which he holds his breath for a length of time possible by him. A nose clip was placed on nose to avoid letting the air through nostrils. The duration from the time of holding his breath until the movement he let air out was clocked by using the stop watch to the nearest one tenth of a second as breath holding time. The co-operation of the subject to let out the air by opening the mouth was sought to clock the exact breath holding time.

Scoring: The time is recorded in seconds and the beset of two trials were recorded (Mathew, 1988).

Cardiovascular Endurance: (Cooper's 12 Minutes Run/Walk Test)

Purpose:-To measure endurance.

Equipment:-A 400 M track and stop watch.

Age and Sex:-School boys in the age group of 14 to 16 were administered of the tests

Precautions: Care was taken to remove the stones etc on the running path of the subjects. Trial runs were allowed before

the subjects perform running. Subjects were also instructed that if they could not run for twelve minutes continuously they can also walk for some time and then start running.

Procedure: Students could run individually or in groups of a dozen or more. When students ran in groups, they were paired. While 9 students ran the partners listened for the time to call out his partner’s time when he crossed the finish line, and then relay this time to the scorer. Students entered space running with periods of walking and were encouraged to pace themselves, when a group was running. The time was called out as each student crossed the finish line. The score was the time elapsed.

Scoring:-Record time in minutes and seconds.

Statistical Technique

To find out the significant effects of aerobic and anaerobic training combined with *yogasanas* on selected physiological variables and motor ability components, ANCOVA statistical technique was used. When the F-ratio was found to be significant, Scheffe’s post hoc test was applied to test which of the possible comparison among the mean is significant (www.stastsoft.com).

Results and Discussions

Results On Breath Holding Time: The statistical analysis comparing the initial and final means of Breath Holding Time due to Aerobic interval training with yogic practices and Anaerobic interval training with yogic practices among Kabaddi players is presented in Table-I.

Table 1: Computation of Analysis of Covariance of Breath Holding Time

	Aerobic Interval Training With Yogic Practices	Anaerobic Interval Training With Yogic Practices	Control Group	Source of Variance	Sum of Squares	Df	Mean Squares	Obtained F
Pre-Test Mean	32.90	29.90	32.70	Between	168.80	2	84.40	2.10
				Within	3495.70	87	40.18	
Post-Test Mean	36.67	32.80	32.83	Between	296.47	2	148.23	5.53*
				Within	2331.63	87	26.80	
Adjusted Post-Test Mean	35.91	34.17	32.22	Between	204.62	2	102.31	15.49*
				Within	568.10	86	6.61	
Mean Difference	3.77	2.90	0.13					

Table F-ratio at 0.05 level of confidence for 2 and 87 (df) =3.10, 2 and 86 (df) =3.10.

*Significant

As shown in Table-I, the obtained pretest means on Breath Holding Time on Aerobic interval training with yogic practices group was 32.90, Anaerobic interval training with yogic practices group was 29.90 and control group was 32.70. The obtained pre-test F-value was 2.10 and the required table F-value was 3.10, which proved that there was no significant difference among initial scores of the subjects. The obtained post-test means on Breath Holding Time on Aerobic interval training with yogic practices group was 36.67, Anaerobic interval training with yogic practices group was 32.80 and control group was 32.83. The obtained post-test F-value was 5.53 and the required table F-value was

3.10, which proved that there was significant difference among post-test scores of the subjects.

Taking into consideration of the pre-test means and post-test means adjusted post-test means were determined and analysis of covariance was done and the obtained F-value 15.49 was greater than the required value of 3.10 and hence, it was accepted that there was significant differences among the treated groups.

Since significant differences were recorded, the results were subjected to post-hoc analysis using Scheffe’s Confidence Interval test. The results were presented in Table-II

Table 2: Scheffe’s Confidence Interval Test Scores on Breath Holding Time

MEANS				Required C I
Aerobic interval training with yogic practices Group	Anaerobic interval training with yogic practices Group	Control Group	Mean Difference	
35.91	34.17		1.74*	1.65
35.91		32.22	3.69*	1.65
	34.17	32.22	1.96*	1.65

* Significant

The post-hoc analysis of obtained ordered adjusted means proved that there was significant differences existed between Aerobic interval training with yogic practices group and control group (MD: 3.69). There was significant difference between Anaerobic interval training with yogic practices group and control group (MD: 1.96). There was significant

difference between treatment groups, namely, Aerobic interval training with yogic practices group and Anaerobic interval training with yogic practices group. (MD: 1.74).

The ordered adjusted means were presented through bar diagram for better understanding of the results of this study in Figure-I.

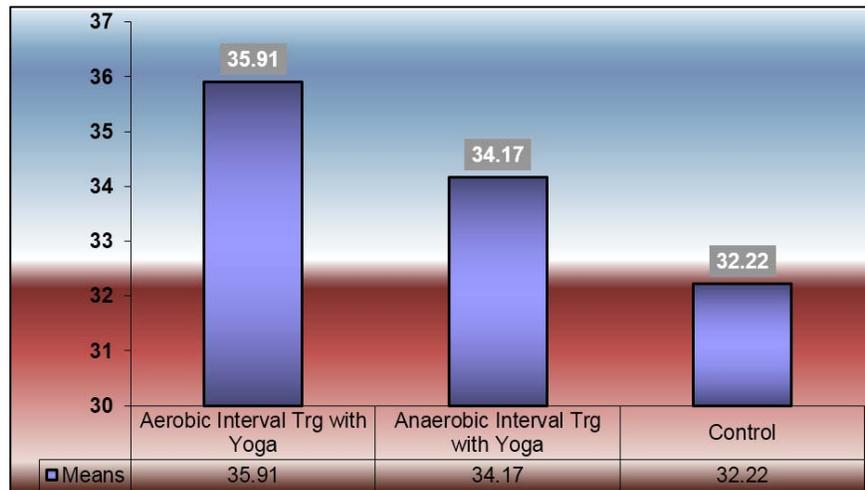


Fig 1: Bar Diagram on Ordered Adjusted Means on Breath Holding Time

Discussions on Findings on Breath Holding Time

The effect of Aerobic interval training with yogic practices and Anaerobic interval training with yogic practices on Breath Holding Time is presented in Table-I. The analysis of covariance proved that there was significant difference between the experimental group and control group as the obtained F-value 15.49 was greater than the required table F-value to be significant at 0.05 level.

Since significant F-value was obtained, the results were further subjected to post-hoc analysis and the results presented in Table-II proved that there was significant difference between Aerobic interval training with yogic practices group and control group (MD: 3.69) and Anaerobic interval training with yogic practices group and control group (MD: 1.96). Comparing between the treatment groups,

it was found that there was significant difference between Aerobic interval training with yogic practices and Anaerobic interval training with yogic practices group among kabaddi players.

Thus, it was found that Aerobic interval training with yogic practices was significantly better than anaerobic interval training with yogic practices and control group in improving Breath Holding Time of the kabaddi players.

Results on Cardiovascular Endurance

The statistical analysis comparing the initial and final means of Cardiovascular Endurance due to Aerobic interval training with yogic practices and Anaerobic interval training with yogic practices among kabaddi players is presented in Table-III

Table 3: Computation of Analysis of Covariance of Cardiovascular Endurance

	Aerobic Interval Training With Yogic Practices	Anaerobic Interval Training With Yogic Practices	Control Group	Source of Variance	Sum of Squares	Df	Mean Squares	Obtained F
Pre-Test Mean	1805.33	1835.67	1856.67	Between	39962.22	2	19981.11	1.46
				Within	1193700.00	87	13720.69	
Post-Test Mean	1878.00	1950.67	1843.33	Between	180026.67	2	90013.33	7.21*
				Within	1086733.33	87	12491.19	
Adjusted Post -Test Mean	1894.37	1948.80	1828.84	Between	215020.92	2	107510.46	14.11*
				Within	655175.40	86	7618.32	
Mean Diff	72.67	115.00	-13.33					

Table F-ratio at 0.05 level of confidence for 2 and 87 (df) =3.10, 2 and 86 (df) =3.10.

*Significant

As shown in Table-III, the obtained pre-test means on Cardiovascular Endurance on Aerobic interval training with yogic practices group was 1805.33, Anaerobic interval training with yogic practices group was 1835.67 and control group was 1856.67. The obtained pre-test F-value was 1.46 and the required table F-value was 3.10, which proved that there was no significant difference among initial scores of the subjects.

The obtained post-test means on Cardiovascular Endurance on Aerobic interval training with yogic practices group was 1878.00. Anaerobic interval training with yogic practices group was 1950.67, and control group was 1843.33. The

obtained post-test F-value was 7.21 and the required table F-value was 3.10, which proved that there was significant difference among post-test scores of the subjects.

Taking into consideration of the pre-test means and post-test means adjusted post-test means were determined and analysis of covariance was done and the obtained F-value 14.11 was greater than the required value of 3.10 and hence, it was accepted that there was significant differences among the treated groups.

Since significant differences were recorded, the results were subjected to post-hoc analysis using Scheffe's Confidence Interval test. The results were presented in Table-IV.

Table 4: Scheffe’s Confidence Interval Test Scores on Cardiovascular Endurance

MEANS				Required C.I.
Aerobic interval training with yogic practices Group	Anaerobic interval training with yogic practices Group	Control Group	Mean Difference	
1894.37	1948.80		54.43	56.12
1894.37		1828.84	65.53*	56.12
	1948.80	1828.84	119.96*	56.12

* Significant

The post-hoc analysis of obtained ordered adjusted means proved that there was significant differences existed between Aerobic interval training with yogic practices group and control group (MD: 65.53). There was significant difference between Anaerobic interval training with yogic practices group and control group (MD: 119.96). There was no significant difference between treatment groups, namely,

Aerobic interval training with yogic practices group and Anaerobic interval training with yogic practices group (MD: 54.43).

The ordered adjusted means were presented through bar diagram for better understanding of the results of this study in Figure-II.



Fig 2: Bar Diagram on Ordered Adjusted Means on Cardiovascular Endurance

Discussions on Findings on Cardiovascular Endurance

The effect of Aerobic interval training with yogic practices and Anaerobic interval training with yogic practices on Cardiovascular Endurance is presented in Table-III. The analysis of covariance proved that there was significant difference between the experimental group and control group as the obtained F-value 14.11 was greater than the required table F-value to be significant at 0.05 level.

Since significant F-value was obtained, the results were further subjected to post-hoc analysis and the results presented in Table-IV proved that there was significant difference between Aerobic interval training with yogic practices group and control group (MD: 65.53) and Anaerobic interval training with yogic practices group and control group (MD: 119.96). Comparing between the treatment groups, it was found that there was no significant difference between Aerobic interval training with yogic practices and Anaerobic interval training with yogic practices group among kabaddi players.

Thus, it was found that though anaerobic interval training with yogic practices was better than aerobic interval training with yogic practices and control group in improving Cardiovascular Endurance of the kabaddi players, the differences were not significant.

Discussions on Hypotheses

It was hypothesized that there may be a significant improvement in selected physiological variables, breath holding time, cardiovascular endurance due to the result of

aerobic and anaerobic interval training with Yogic practices when compared to Control group.

The formulated hypothesis stated that there would be a significant improvement in selected physiological variables, breath holding time, cardiovascular endurance as a result of aerobic and anaerobic interval training with Yogic practices when compared to Control group. The results presented in Tables-I and III showed the results of ANCOVA on physiological variables breath holding time, cardiovascular endurance and Tables-II and IV showed the post hoc analysis of the results. The results proved that comparing to control group, the aerobic and anaerobic interval training combined with yogic practices significantly contributed for the improvement of breath holding time, cardiovascular endurance of high school level kabaddi players and the formulated hypothesis was accepted at 0.05 level.

The post-hoc analysis results were presented in Tables- II, IV and breath holding time, cardiovascular endurance respectively. The results proved that there were significant differences between treatment groups aerobic and anaerobic interval training combined with yogic practices on breath holding time, and the formulated null hypothesis was rejected at 0.05 level. However, as there was no significant difference between the treatment groups on cardiovascular endurance, the null hypothesis was accepted at 0.05 level for this variable.

Conclusions: The aerobic interval training combined with yogic practices and anaerobic interval training combined

with yogic practices significantly improved physiological variable such as, breath holding time of high school kabaddi players. And considering between the treatment groups, it was found that aerobic interval training with yogic practices was significantly better than anaerobic interval training with yogic practices in improving breath holding time.

The aerobic interval training combined with yogic practices and anaerobic interval training combined with yogic practices significantly improved physiological variable such as, cardiovascular endurance of high school kabaddi players. And there was no significant between the treatment groups in altering cardiovascular endurance.

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