IDENTIFICATION AND EVALUATION OF THE AEROBIC CAPACITY OF ATHLETIC AND ROWING TEAM PLAYERS OF ISLAMABAD CITY (THE CAPITAL OF PAKISTAN)

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ABSTRACT

Aerobic capacity is dominant factor of every individual for attaining dominating performance in sports particularly to achieve optimum performance in the endurance sports. The aim of study was to assess the aerobic capacity of the players of Athletics and rowing team of Islamabad. Aerobic and anaerobic exercises can be beneficial for the fitness and depending on the intensity, duration and events. The mechanism of respiration and heart rate is differ in aerobic and anaerobic activities. Thirty athletes from middle and long distance events of track and field age group (23.9 ± 3.0) weight (64.13 ± 7.0) and thirty players of the rowing team age group (27.9 ± 4.1) weight (81.4 ± 8.7) from the Capital city Islamabad team were selected to investigate their aerobic capacity through the PACER (Progressive Aerobic Cardiovascular Endurance Run) test. The PACER test for both teams was conducted at the same time and in the same conditions. The data were recorded and tabulated in respect of both the teams. The SPSS version 21 was used to analyze the data by applying individual sample t- test. It is concluded that Peak values of VO2 max of athletics team (58.81% ± 3% l/min), were significantly higher (p<0,005) than rowing team players which had (55.29 % ± 3% l/min. Rowing players require higher degree of endurance for optimum achievements. The results indicated that peak values of VO2 max of athletics team is higher due to less body weight as compared to rowing team. Body weight has significant impact on aerobic capacity.

Keywords: *Athletes, Maximal Oxygen Uptake, PACER Test, Rowing, Track and Field*

Introduction

Aerobic capacity is a dominant factor in sports to achieve optimum performance in the field of endurance sports. Aerobic capacity of an athlete depends upon maximal oxygen uptake (VO_2max) which is considered the best gauge of endurance capacity (Ranković, et al., (2010). Aerobic capacity refers to the intensity of aerobic processes, and actually represents the physical capacity of the player to utilize at a certain amount of oxygen (Hoeger, et al., 2018; Hoff, 2005). Many authors concluded studies that aerobic capacity is a best

indicator of physical ability of the individual to achieve the optimum performance (Singh, 2016).

In aerobic workout the oxygen is the main source of energy. Mostly aerobic exercises includes on continuous running, swimming, cycling and rowing. According to exercise physiology Aerobic energy system continue the breakdown of glucose which was started by aerobic glycolysis. The energy is transported during aerobic activities to working body muscles from a substance called adenosine triphosphate (ATP) through Krebs cycle. The main purpose of the Krebs cycle is to generate hydrogen to transfer to the electron transport chain which enable the aerobic system to keep synthesizing ATP. An athlete can boost up aerobic capacity by daily aerobic exercise schedule. (Moghetti, et al, 2016).

Anaerobic means without oxygen, physical workout involves maximal intensity, the oxygen demand delivery ratio is imbalanced and thus the athlete depend on the reserves of glycogen and glucose. Anaerobic workout involves quick bursts of energy to perform at maximum effort for a short period of time such as jumping, sprinting and weight lifting (Saghiv & Sagiv, 2020). Aerobic capacity is determined by direct measuring of maximal oxygen uptake in laboratory tests on maximal physical effort on a treadmill, bicycle ergometer and through PACER (Progressive Aerobic Cardiovascular Endurance Run) test. The unit for assessing the maximal oxygen uptake is liters or milliliters of oxygen per minute. However, the value of VO_2 max is affected by body weight and age (Støren, et al., 2017). The assessment of aerobic capacity is helpful for coaches and trainers to understand the athlete's capability and valuable awareness for future planning. Athletics is the mother of sports and consists of different events which utilize all the components of physical fitness. On the other hand rowing is also endurance event which mainly depends on aerobic capacity.

It is documented that aerobic capacity and VO_2 max mostly depends upon age, weight, genetics and high intensity training (Vesterinen, et al., 2015). The hemoglobin level is a key factor of aerobic capacity and has positive relationship with VO_2 max of athletes (Steiner, Maier & Wehrlin, 2019). According to the Ame-

rican College of Sports Medicine, fitness tests are used to determine the fitness level and screening of heart diseases. The PACER test created by Leger and Lambert in 1982, used to determine aerobic capacity level of an individual (CAASI, 2018).

According to Lewis-Clark State College, aerobic capacity is the state in which body adapts to use oxygen with more efficiently during physical activities. The heart becomes stronger and pumps more blood to the working muscles as per requirement (Eksterowicz, Napierała & Żukow, 2016; Murray & Kenney, 2016). The studies reveal that aerobic exercises are valuable for improving cardiovascular fitness and quality of life. Due to lack of aerobic exercises the population suffers from approximately 17% of heart disease, 12% diabetes and 10% of breast cancer (Casla, et al., 2015).

Mendonca, et al, 2017 concluded that age-related changes contributed in various physical performance (exercise economy, anaerobic threshold, peak oxygen uptake, muscle strength, and power). Aerobic capacity is associated with age, gender and heredity. Various studies have shown that older adults show significant reductions in physical performance. The process of decline in aerobic capacity is particularly deceptive after the age of 30 years. The deterioration of functions can be maintained to some extent with proper exercise schedule and balance diet.

In 2017, study was conducted to determine the relationship between the weight status and the aerobic capacity among school boys in Mexico. Maximum oxygen consumption (Vo2 Max) was evaluated through 20 meter Shuttle Run Test. It was concluded that aerobic capacity could be affected due to overweight (Becerra-Malagon, et al, 2017).

Methodology

The sample Population consisted of male participants of Athletics and Rowing team of Islamabad. Thirty male athlete's age (23.9 ± 3.0) weight (64.13±7.0) and thirty rower's age (27.9 ± 4.1) weight (81.4 ± 8.7) were randomly selected for this study. The participants were informed not to engage in mild or heavy exercise and were advised to take complete rest for 24 hours before the pretest. The subjects were free of smoking, alcohol and drugs during the course of PACER

test. The pre-event warm-up is central to prepare the body for ensuing endurance activity. The PACE*R* test was applied to assess the aerobic capacity of both the teams of Islamabad. Mearing tape, marking cones, software of PACE*R* test with loud speakers were used to conduct the test as an instruments. Technical officials were engages to supervise the PACE*R* test. The PACE*R* test comprises continuous running between two lines a distance of 20m.

The participant started running from one line which is facing to the second line and instructed by the recorder. Preliminary speed was 8.5 km/ hour and increased to 0.5 km/hour in each minute. The participant continued the running process between the two lines. If the participant did not reach the line before the beep sound, the subject is given a warning and must continue running to catch the beeps. Otherwise the participant leaved the course. The test is stopped if the- subject fails to reach the line (within 2 meters) for two consecutive ends after a warning. Before starting the PACE*R* test, informed to the participants about the complete procedure as per protocol. Peak values of PACE*R* test scores were determined by performing the complete run course of each participant. The performance score of each participant was recorded on score sheet carefully. The collected data were analyzed by SPSS version 21 and used sample T-test for the identification of aerobic capacity of Athletics team and rowing team players.

Objectives of the study

Major objectives of the study are as under:

1. To identify and compare the Aerobic capacity of athletics and rowing team.
2. To assess the effects of age and body weight on aerobic capacity.
3. To investigate the relationship between age, weight and aerobic capacity

Hypotheses of the study

Following are the major assumed hypothesis of the study;

H_0 There is no significant effect of age and body weight on aerobic capacity.

H_1 There is positive effect of age and weight on aerobic capacity.

H_0 Rowers have low level of aerobic capacity than

Athletes.

H_1 Rowers have higher level of aerobic capacity than Athletes.

H_0 There is no significant relationship between age, weight and aerobic capacity.

H_1 There is positive relationship between age, weight and aerobic capacity.

Data Analysis and Results

The values of beep test and maximal oxygen uptake of both teams are compared to evaluate the degree of aerobic fitness. The assessment of maximal oxygen uptake plays the key role in sports performance and practically stands for aerobic capacity of athletes. The Descriptive Statistics analysis of age and weight of both team are presented in (Table 1)

Table-1
Descriptive Statistics of Age and weight of Athletics and Rowing Team

Team	Variable	N	Min	Max	Mean	Std. Deviation
Athletics	Age	30	19.0	33.0	23.967	3.0680
	Weight		50.0	76.0	64.133	7.0893
Rowing	Age	30	22	37	27.93	4.110
	Weight		68	100	81.43	8.709

Mean values of Age & Weight of Athletics team is less than rowing team

The recorded oxygen uptake ($VO_{2\ max}$) of athletics team is significantly higher than rowing team because rowers were elder and were having more body weight than athletes. The analysis of beep test score and VO_2 max of both teams is presented in (Table 2).

Table-2
Analysis of PACER test Score and VO_2 max of Athletics and Rowing team

Variable	Team	N	Mean	diff	Sig (2-tailed)
PACER test score	Athletics	30	13.5 ± 7.0	1.1	0.000
	Rowing		12.4 ± 3.0		
VO_2 max	Athletics	30	58.81% ± 4.1	3.61%	0.000
	Rowing		55.29% ± 8.7		

Mean values of PACER test score & VO_2 max of Athletics team is higher than rowing team.

Two means are statistically different, the Sig (2-tailed) value less than ($P<0.005$); the result indicates that athletics team is more aerobically fit than rowing team. So H_0 hypothesis is rejected because body weight has positive effect and strong relationship with aerobic capacity.

Graph of PACER test score of Athletics and rowing team

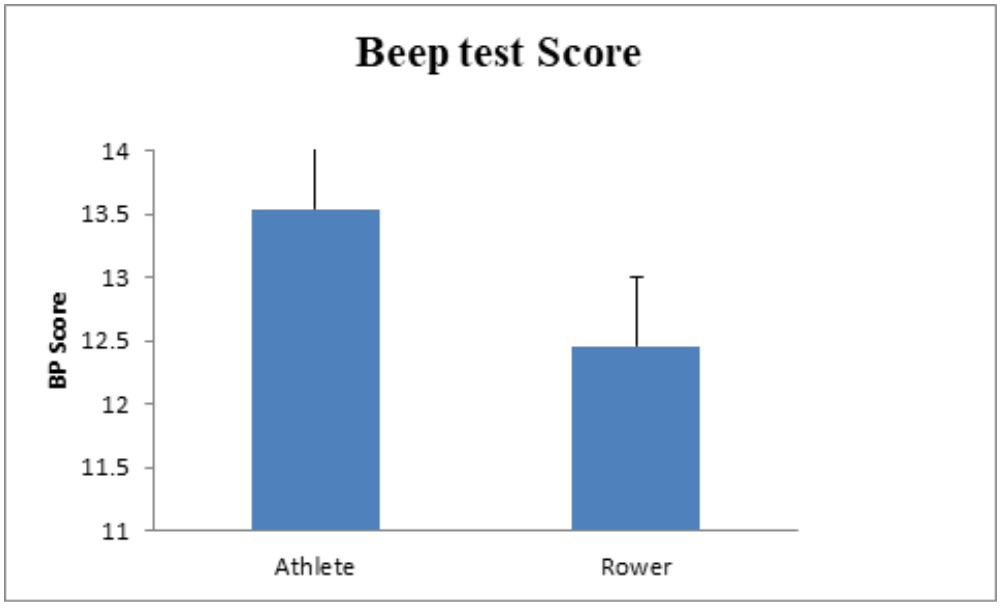

Figure 1: Mean of PACER test score of Athletics team is greater than Rowing team

Graph of VO_2 max of Athletics and rowing team

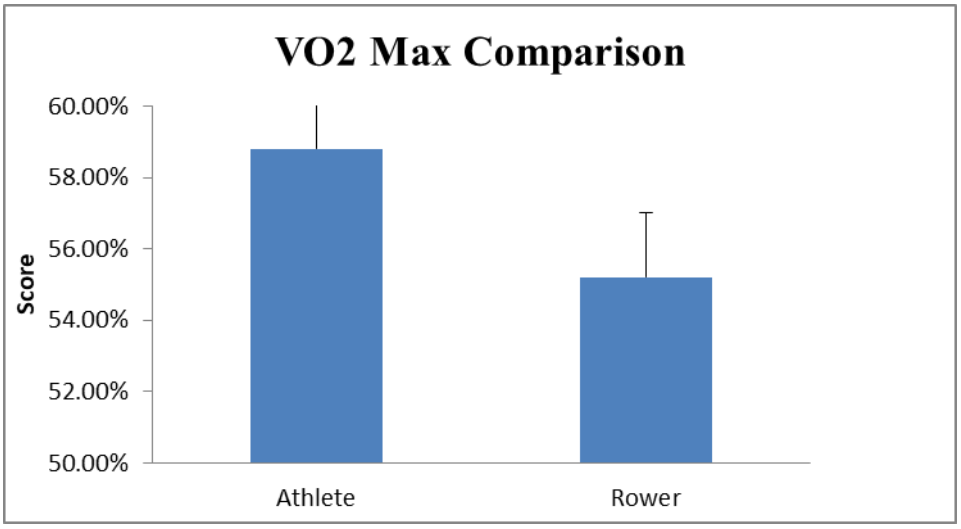

Figure-2: Mean of VO_2 max of Athletics team is greater than Rowing team

Discussion

This study was designed to assess the aerobic capacity and VO_2 max of athletics and rowing team of Islamabad. The results reflected that the significantly VO_2 max percentage of athletics team was higher than Rowing team because Rowing team had more body weight as compared to athletics team. The value of VO_2 max is affected by the body weight. Athletics team consisted of middle and long distance runners whenever Rowers were also belonged to endurance events. Both group of athletes have high demand of aerobic capacity to achieve optimum performance in their events. Due to low body weight athletics team members perform very well and score high rank in PACER test, to evaluate the VO_2 max.

Conclusion

It was concluded that significant differences in the aerobic capacity and VO_2 max between the athletics team and rowing team. Athletics team showed higher VO_2max value during the assessment of aerobic capacity. It is recognizable that athlete of endurance events have different

physical and physiological capabilities. Qualified coaches can use this identification for optimum endurance performance in future planning.

Recommendations

Following are the major recommendations of the study:

1. It is recommended that aerobic capacity of the teams may be tested to evaluate the fitness level health status on regular bases.
2. In order to plan training schedule, the coaches and team managers should conduct PACER test in the beginning of training camps and then impart training accordingly.
3. Similar studies may be carried out on girl's players of different teams and regions for testing the aerobic capacity.

It is also recommended that evaluation of the aerobic capacity of various teams of different levels which may be used to evaluate the fitness level of the sports persons at the early stage of the future career.

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