A Comparative Study of some Variables of the Respiratory System Due to Power Systems of Badminton Players

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Abstract

Conducted the current study to nine players from the team Diyala University badminton underwent tests and measurements testing research by device (Fit mate pro) used in Ajraat research in order to identify the response functional for the respiratory system on according to energy systems working for the players and then compare them in Benaha in three cases system} is anaerobic work (ATB) system and work lactic (PC) and the oxygen system work (O2) {and then processing the data was obtained from the appropriate statistical tests and operations which were reached:

1.a discrepancy in the results of the respiration rate of the research groups and in favor of the working group energy system (anaerobic)

2.a discrepancy in the results of pulmonary ventilation (VE) for the benefit of the working group lactic energy system

3there is a difference in the outcome of the concentration of oxygen in the exhaled air (FEO2) for the benefit of the working group system (ATP-PC) and light that researchers recommended the need for diversity in the training of the numbers of players, badminton and the emphasis on training system energy anaerobic system work lactic (ATB-PC) the fact that these two systems are the most widely used in sports activity of badminton players.

Keywords: Variables, Power, Badminton, respiratory system

1. INTRODUCTION & IMPORTANCE OF THE STUDY:

Due to the great progress in the world lately in terms of the concept and importance of practicing sport for its great role in achieving the hoped goals of the individual and society's health and high achievement sports. In the late decades, high athletic level of individuals was a result of success in medical sciences and benefiting from them to raise the physical and health level of athletes. This was confirmed by literatures that sport training physiology became a pre condition for all processes of sport training. The progress of athletic level of individuals is nothing but a reflection of functional changes and responses in internal body systems. Due to these changes, functional abilities increase.

Badminton is a game which requires high efforts from its practitioners as it needs high speed and agility in performance despite the nature of its equipments and small size of the badminton playground. This has a great effect which causes internal pressures on functional systems, especially respiratory and circulatory systems.

The importance of the study lies in the comparative study about functional response of the respiratory system due to power systems of badminton players in order to identify power working system of players and then set proper programs and methods due to preparation periods of athletes and reach their achievement.

Problem of the Study:

Previous researches and literatures referred that the growth and safety of the biological systems of the body is related to the extent of practicing athletic activities. The physiological side is still representing the fertile research field especially after the technologic advance in medical appliances industry. This urged researchers being specialized and practitioners of this game to make this study to identify functional response of the respiratory system due to power systems of badminton players and compare them to determine the most proper due to preparation periods of players.

Goals of the Study:

1. Identify functional response of some variables of the respiratory system due to power systems of badminton players in Diala University's team.
2. Compare functional response of some variables of the respiratory system due to power systems of badminton players in Diala University's team.

2. METHODOLOGY:

Researchers used the empirical method with a single empirical group as it is proper for the study problem.

Population of the study was nine players representing Diala University's badminton team players chosen purposefully. The researchers measured functional responses in the respiratory system of the sample in each power system which is reflected by tests used by them.

Field Research Procedures

Measuring length and weight of the body of the sample's individuals using Medical Scale Detector

Measuring Respiration Indicators using Fitmate Pro

Respiratory system variables were measured using Fitmate Pro device (Zina Ibrahim, 2011, 55) as follows:

- Performing proper warming-up of the trainee with duration not less than (5) minutes to avoid injuries that may occur during implementing the test.
- The assistant team connects the device after entering trainee's data and then a trainee wears effort mask on his face and covers his nose and mouth. Next, the device is switched on noting that the trainee should take a posture that enables him to see the researchers all the proposed period of the test determined for each test.
- A trainee shall stand on a Trademill device and turn it in the specific speed determined for each test of the three study tests. The following table (1) shows the indicators measured by Fitmate Pro device:

Table (1) Indicators measured by Fitmate Pro device

Symbol	Reading	Measuring unit
T	Time	Min / s
VE	Pulmonary ventilation rate	Liter / m
Rf	Respiratory rate	Once / m
HR	Heart pulse rate	Pulse / m
FeO2	Oxygen concentration in exhale air rate	%

The Main Experiment

The main trial was made on 24, 27 and 31/03/2014 in Al Fasalga Lab in the Faculty of Physical Education, Diala University. In the first day, there was a test on the study sample to get respiration indicators using maximal effort for 15 second, which is called the non-oxygenic phosphagenic method. In day two, on 27/03/2014, maximal effort was used by the second group for 2 minutes to get get respiration indicators using the lactic method. In day three, on 31/03/2014, a test was made on the third group using less effort than the maximal for 5 minutes to get respiration indicators using the oxygenic method. Measurement results were saved and classified in schedules to be analyzed.

Discussing Results:

Results of RF test results:

Table (2): Arithmetic means and standard deviations of the sample of the RF test for respiratory rate.

Group	Sample size	Mean	S.D
Non-oxygenic	9	54.266	1.413
Lactic	9	49.055	5.462
Oxygenic	9	55.388	3.352

*** Significant at error level (0.05) if the level is less than (0.05)**

Table (3): Inter- group, intra-group Contrast and the F counted value for groups in the (RF) test:

Contrast source	Total Squares	Freedom degree	Average Squares	F Counted value		Significance
				Counted	Scheduled	
Inter-groups	205.57	2	102.78	7.159	3.40	.004
Intra-groups	344.57	24	14.35			
groups	550.15	26				

*** Significant at error level (0.05) if the level is less than (0.05)**

Table (4): Mean Differences, significance levels and difference significance for groups in the RF test:

Variables	Mean Differences	Significance levels	Difference significance
m2 x m3	-1.122	.536	Insignificant
m1 x m3	-6.333	.002	Significant
m2 x m1	6.333	.002	Significant

Results of the VE Test:

Table (5): the sample size, arithmetic means and standard deviations for the sample of the study in the (VE) test:

Group	Sample size	Mean	S.D
Non-oxygenic	9	65.088	2.957
Lactic	9	64.700	3.330
Oxygenic	9	72.844	25.120

Table (6) Inter- group, intra-group Contrast and the F counted value for groups in the (VE) test:

Contrast source	Total Squares	Freedom degree	Average Squares	F Counted value		Significance
				Counted	Scheduled	
Inter-groups	379.89	2	189.94	876.	3.40	.430
Intra-groups	5206.89	24	216.95			
groups	5586.78	26				

*** Significant at error level (0.05) if the level is less than (0.05)**

Table (6) shows statistical features of contrast analysis for the three groups of badminton in the test. The value of squares total inter-groups was 379.89 with a freedom degree (2), squares average 189.94 and the F counted value was .976 which is more than the F scheduled value 3.40 which shows the significant differences among the three groups in badminton. To determine the best group, the L.S.D method was used.

Table (7): Mean Differences, significance levels and difference significance for groups in the VE test:

Variables	Mean Differences	Significance levels	Difference significance
m2 x m3	-7.755	.275	Significant
m1 x m3	-8.144	.252	Significant
m2 x m1	8.144	.252	Significant

Results of the exhale air oxygen concentration rate Test (FEO_2):

Table (8): the sample size, arithmetic means and standard deviations for the sample of the study in the (FEO_2) test:

Group	Sample size	Mean	S.D
Non-oxygenic	9	15.277	.373
Lactic	9	15.496	.911
Oxygenic	9	16.566	1.186

Table (9) Inter- group, intra-group Contrast and the F counted value for groups in the (FEO_2) test:

Contrast source	Total Squares	Freedom degree	Average Squares	F Counted value		Significance
				Counted	Scheduled	
Inter-groups	8.562	2	4.281	5.402	3.40	.012
Intra-groups	19.018	24	.792			
groups	27.580	26				

*** Significant at error level (0.05) if the level is less than (0.05)**

Table (10) shows Mean Differences, significance levels and difference significance for groups in the FEO_2 test:

Variables	Mean Differences	Significance levels	Difference significance
m2 x m3	-1.288	.005	Significant
m1 x m3	-1.070	.018	Significant
m2 x m1	1.070	.018	Significant

3. Discussing Results:

Discussing results of the (RF) test:

Table (3) shows that:

There are insignificant differences between m2 and m3 as the difference of the two arithmetic means was (-1.122), while the LSD counted value was (0.214) and since the difference is more than the LSD counted value, this refers no significant differences at error level (0.05) noting that error level was (0.536). Researchers believe that the reason for insignificant differences between the respiratory system's responses in both systems is due to close period between performing both systems. Sampling in the second system was about 90 seconds with maximal efforts which led to high pulmonary ventilation rate in this system, while het same sample in the third system performed less physical effort than the maximal and with performance variable (240 seconds) which caused high pulmonary ventilation rate which was small during comparing means difference in both systems which led to insignificant differences between the work of both systems.

There are significant differences between m1 and m3 for the sake of the respiratory system's responses when working due to the first system as the difference between both arithmetic means was (-6.333), while the counted (LSD) value was (0.221) since difference of both means was bigger than the (LSD) counted value, this shows that there are significant differences at error level (0.05) noting that error level was (.002). Researchers believe that the cause of this is that practice due to the first system needs more ventilation than oxygenic training as the former depends in absorbing oxygen on oxygenic debt, especially after ending efforts directly. Respiration's depth and frequency increase to amend oxygen deficiency, while training due to oxygenic system is efficient with the oxygen extracted through respiration during effort.

There are significant differences between m2 and m1 for the sake of the sample practicing training due to lactic system. The difference between means was (6.333) while the LSD counted value was (0.063). Since the difference of means was more than the LSD counted value, this shows significant differences at error level (0.05) noting that error level was (.002). Researchers found that the cause of this is that training due to lactic system needs more pulmonary ventilation than using the non-oxygenic phosphagenic training as it depends on oxygenic debt to remunerate oxygen deficiency, while training due to oxygenic systems only uses oxygen inhaled via respiration during effort.

Discussing results of the (VE) test:

Results of table (6) show that:

There are significant differences between all various power systems. Researchers believe that the reason is that the body's need for oxygen differs with different efforts by the study sample. Each power producing system matches its proper need for the body. When a man exerts muscular efforts, the CO2 amounts added to the blood increases from muscles so blood pressure will raise partially which leads to alert nervous respiratory points, especially the inhaling nerve point which sends nerve impulses to respiration muscles which leads to increase respiration movements speed. As a result of this increase, the body disposes CO2 quickly with inhalation which leads to reduce partial blood pressure and respiration movements return to their normal speed. The increase of CO2 amount in blood is the important factor in normal cases. As for the reason for the excel of the CO2 system, this is because this group exerts high effort and for a relatively long period causing an increase in respiration rates in order to remunerate the body's increasing need for oxygen. Training and events that work using the second power system cause high and accumulative amount of lactic acid in blood. In order to get rid of it, oxygen deficiency should be remunerated and we can get it through pulmonary ventilation rates which were asserted by (Jabbar Rahima Al Kaaby) saying that during rest periods the lactic acid in blood is more than 15 – 20 ml per 100 cm^3 of blood. As a result of training, especially oxygen deficiency training (non-oxygenic training using lactic acid system reach more than 160 ml per 100 cm^3 of blood and in games in which the non-oxygenic power system (lactic acid system) is the main system in the game. In medium distance running (800 m, 1500 m and 3000 m), lactic acid reaches more than 200 ml per 100 cm^3 in blood (Jabbar Rahima Al Kaaby, 2013).

Results of Oxygen Concentration Rate in Exhalation Air (FEO_2):

Results in table (10) show that there are significant differences between all groups. The researchers found that the reason for that is that the body's need for oxygen varies by variation of efforts exerted by the study sample. Thus, each power production system matches its actual need of the body. This was clear from results that showed excelled of non-oxygenic systems over oxygenic ones. Reduction in exhaling oxygen shows that oxygen can be used in power production process. Since the respiratory process and power production in the first and second systems were made in the absence of oxygen, this means an increase in oxygen demand in the period right after the end of efforts that remunerate oxygenic debt required by power production processes, so performing athletic training, especially harder ones, leads to increase the rate and depth of respiratory movements, pulmonary ventilation and chemical catalysts of respiratory centers as a result of metabolism resulting from muscle strain. Oxygen concentration or partial pressure cannot be considered an important factor in normal conditions in organizing respiration process as even if partial oxygen pressure decreased in vesicles' air to 60 ml/mercury, great amounts of oxygen still attached to hemoglobin in the form of oxy-hemoglobin. Through physical efforts, especially in implementing physical tasks of the first and second systems, an incomplete oxidation occurs resulting in certain materials including the lactic acid with increased percentage in blood. In the aortic arch and internal carotid walls, there are chemical receivers that are affected by the reduction of oxygen or increase of lactic acid. These receivers send nerve impulses to respiration nerve centers to alert them in order to increase respiratory movements and ventilation amount reaching eight or nine liters per minute. This increase cannot be compared in the amount of ventilation with the increase resulting from the increase of CO_2.

4. Conclusions:

Through the results of the study, the researchers found the following:

- There is a contrast in the RF rates results among groups of the study showing an increase in respiration rates for the non-oxygenic group.
- There is a contrast in FEO^2 among groups of the study showing an increase in respiration rates for non-oxygenic groups and a clear excel for the sake of the first group which operates with the ATP-PC system.

5. Recommendations:

Researchers recommend the following:

- It is necessary to have various training while preparing athletic teams and to assert the training by oxygenic power to build a strong physiological base during the general preparation stage and then moving to special training and due to the power system of the game.
- Redoing the experiment on various samples, each one works by a certain system and comparing them.
- Maximal benefit from the Fitmate Pro device in performing research experiments and preparing athletic teams on the light of the results.

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