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## INFLUENCE OF AEROBIC AND ANAEROBIC TRAINING ON IMMUNE VARIABLES AMONG LONG AND SHORT DISTANCES PLAYERS

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### Abstract

*Aim.* Exercise as it relates to immunity is a mixed message. Regular, moderate-intensity physical activity been shown to help protect people against some diseases, particularly those that involve the upper respiratory track (like colds). However, too much exercise can have the opposite effect and reduce immunity. The aim of this study was to investigate influence of aerobic and anaerobic training on immune variables among long and short distances players.

*Methods.* Fourteen male college player from Mansoura University Athletics (long distances - short distances), divided into (7) players long distances and (7) players short distances. As well as (4) players to the survey from outside the core sample for the study. Subjects were required to read and complete a health questionnaire and informed consent document; there was no history of injuries, diabetes or recent surgery.

*Results.* The results revealed statistically significant differences between the two ranking measurements between pre and posttests (aerobic exercise) in Red blood cells, Hemoglobin, White blood cells, Lymphocytes, Neutrophils, IgA, IgE and IgG. In addition, no significant differences between the two ranking measurements between pre and posttests in platelets and Basophiles. There were statistically significant differences between the two ranking measurements between pre and posttests (aerobic exercise) in Red blood cells, Hemoglobin, White blood cells, IgA. And no significant differences between the two ranking measurements between pre and posttests in platelets, Lymphocytes, Neutrophils, Basophiles, IgE and IgG

*Conclusion:* our suggestion is that male athletics can improvement the immune variables via training; the rate of change between the two groups is from 13.75% to 85.62%.

*Key words:* Hemoglobin, Platelets, Lymphocytes, Neutrophils, Aerobic, Anaerobic

### Introduction

The coaches Players sports scientists looking continuously on the roads of modern training with the aim of improving the sport performance and to gain a competitive advantage.

The modern era with the beginning of the third millennium distinguishes that continuous competition between individuals and nations in order to develop progress in various spheres of life. In addition, physical education considered many scientists and researchers conducted many research studies that aim to find many solutions to important problems.

Saad (1994) indicated that sports training science is closely linked to the other sciences specially physiology where it became important to recognize and understand the sports training. Through what happening inside the body of the functions and operations carried out by the various organs of the body. adapted the muscular action sports in order to face the player fatigue and acquires recipe endurance and achieve artistic excellence and skill, these physiological changes that occur in the body are important foundations of the legalization of sports

training load.

Bastawisi (1997) explain that the track and field competitions one of the sports activities in which benefit from this scientific progress. Dramatically shows this progress through to break records, as the country in sports activities offered is only clear evidence of their scientific and under scientific progress and technological stunning headed the attention of the developed countries to new heights of challenges among the sports field as a means to reflect on the progress and sovereignty challenges. Moreover, considered field competitions track and physical activities distinct because of it involves the skills and abilities variety, which mainly depends on the individual characteristics of the contestants and their abilities to defy the elements of time, distance.

And refers (Mohammad, 1999) that practice of track and field competitions, players run, jump or throw lead to physiological changes in all organs of the body almost as lead regularity in training which called adaptation resulting from the use of physical load. As lead regularity process training to chemical changes in the cells and tissues of the body, and divided these

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changes to the (aerobic and anaerobic). Targeting of aerobic and anaerobic changes to improve the ability to muscle work in the case of the availability of oxygen, as in the training of long-distance, and in the absence of oxygen, as in the distances short.

In addition, (Mohammad, 2000) indicated that the physical preparation is the primary entrance to get the player to the high levels of sports. Moreover, through the development of physical and functional characteristics of the player numbers are physical means all procedures and exercises sets by the coach and determines its volume, intensity and time of performance. in accordance with the programs drawn up which will be based implemented daily, weekly, he is working to raise the physical performance level of the individual athlete to the fullest extent of his abilities through give individual sports fitness.

It is noteworthy (Abou El Ela, 2003) that the immunology now of the most important contemporary science as it relates to various health problems became the face of human in two basic directions. one of them is linked to the achievement of sporting events through various competitions and other associated Exercise and Sport. That the immune response is associated also in both directions. The immune functional device consists of several billions of lymphocytes, and these cells are resistant to foreign bodies that attack the human body. The immune considered important mechanisms of internal equilibrium Homeostatic mechanisms in the body, and invalidate the work of pathogens it protects us from bacteria, viruses and cells cancer.

In addition, (Farha, Medhat, 2002) noted that there is a thin line separates the physical load of regular building on scientific grounds that lead to raise of the body efficiently. Including the immune system and the high physical load intensity, which is an attack on the various organs of the body relative to land on the condition that he so it restored healing.

Sports activities one of the most important factors that help to stimulate the immune system, where studies and research has shown that individuals who engage in physical exercise increases resistance to environmental toxins and harmful rays and contrast the lack of physical activity and lack of physical activity leads to the accumulation of metabolites and harmful bacteria and viruses.

It is noteworthy (Amir, 2008) that the sports training a significant impact on all of the different organs of the body is the most important immune system. Sports training is a state of physical activity that causes many forms of pressure complex on the player. especially the immune system body which it represents the primary line of defense for the body against any hostile foreign objects, including bacterial

and viral infections, where the pressure is due to the intensity of training and the term environmental surrounding him and his condition.

And emphasizes the (Farha, Medhat, 2002) the sports training legalized improves and grown and increases the activation of the immune system cells. and have a line of defense strong for the prevention of pathological injuries that can be exposed to the player , and continue training using the training loads are high intensity for a long period leads to lower activity of white blood cells and lower the body's defense functions. Thus the possibility of the emergence of diseases and the large number of casualties and prolong the duration of treatment.

It has now become the modern perception of the operations to improve athletic performance, as the basis of the production of the impact loads physical on the possibility of the body physiological, morphological, and under the influence of these training loads occur in the body in large groups and different physiological and morphological changes. As a result of the continuity of training and recurrence, and different trends of the impact of the training loads accordingly the method of formation of the size and intensity and rest periods interfaces.

Immunoglobulins are an antibody that plays a crucial role in the immune function of mucous membranes. The amount of IgA produced in association with mucosal membranes is greater than all other types of antibody combined. Between three for five grams secreted into the intestinal lumen each day. This represents up to 15% of total immunoglobulins produced throughout the body.

Based on the foregoing, the aim of this study was to investigate that:

- Effect of aerobic exercise on some blood variables and immune proteins (IgA- IgE-IgG) among players' long distances.
- Effect of anaerobic exercise on some blood variables and immune proteins (IgA- IgE-IgG) among players' short distances.
- Comparing change between aerobic workouts for players in the long-distance, and between anaerobic workouts for players short distances in the blood and immune proteins variables.

#### **Methods**

##### **Samples**

Fourteen male college player from Mansoura University Athletics (long distances - short distances), divided into (7) players long distances and (7) players short distances. As well as (4) players to the survey from outside the core sample for the study.



Subjects were required to read and complete a health questionnaire and informed consent document; there was no history of injuries, diabetes or recent surgery.

#### Sample conditions.

- The approval of the players' coach to hold study them.
- The approval of the players to draw blood sample.
- Functional safety devices for the players after the initial examination by a competent physician signature.
- Lack of sample members participate in other research requiring the performance of physical exertion may affect their response during the primary experience.

#### Blood sample Conditions.

- Not to do any physical exertion before the experiment.
- Relax while taking a blood sample and not to tighten the muscles during a blood draw.
- Speed in the transfer of blood samples to the laboratory to ensure the integrity of the results.
- The presence of a specialist to draw blood samples.

#### Blood Measurements.

- Red blood cells
- Hemoglobin
- Platelets
- White blood cells
- Lymphocytes
- Neutrophils
- Basophils
- IgA
- IgE
- IgG

#### Instruments.

- A medical thermometer to measure the weight in kg.
- Restameter device for measuring height rise.
- Sphygmomanometer and stethoscope device for measuring blood pressure.
- Device (Immuolite) to measure (IgE).
- (radial immunodiffusion) Device to measure (IgA- IgG).
- Centrifuge to separate the plasma from the blood components and speed up to about 4000 rpm.
- Special tubes to collect samples sealed contain (EDTA) to save the blood of the pending analysis.

- (Kits) to detect the level of immune proteins IgA- IgG -IgE.
- Automatic pipette to take blood samples and blood samples.
- (Ice Box) to save the blood samples until they are transported to the lab.
- Plastic syringes for use only once, medical cotton, and medical patches.

The scientific basis of the training program in a way is high intensity interval:

- Aerobic and anaerobic exercise program

The researcher built a research program (aerobic exercise and anaerobic), according to the foundations of sports training and after taking note of the specialized scientific literature. The researcher to choose a set of aerobic and anaerobic training commensurate with the sample of the research and the possibilities available properties. so the researcher designed a special antenna program long distances and program anaerobic special short distances.

- The goal of the research program:

Is to know the effect of aerobic exercise on anaerobic some blood variables and immune proteins ambition short- and long-distance players from the team Mansoura Athletics.

The program designed according to the following principles:

- Identify the most important duties of training and rearranged.
- Taking into account the principles of training.
- Set targets for each group to be realistic and appropriate to the capabilities of the players.
- Loads proposed to be suitable for the capabilities of the players.
- Loads proposed (ways and means) to be achieving the objectives of the program.
- Flexibility of the program and acceptance for practical application.

- The content of the program:

To achieve the objective of the research programs was the content of each program in a series of training modules aimed at improving the physical and physiological aspects and maintain the functional efficiency of various body organs to develop, and has been the division of the content of each training module as follows:

#### Primer Part (warm-up):

Which aims to:

- The preparation and the creation of the body physically to accept work in the next stage.
- Good preparation to avoid injuries that may be exposed to during practice motor performance.
- The warm-up exercises in the following formats:



- Mild exercise (walking-running-jump jump).
  - Lengthening exercises.
- A.B.C. exercises is an exercise which is used before the start of training speed.
- Ranges from introductory part time (warm-up) between 10:15 minutes to be a gradual increase in the length of time throughout the duration of the program.

The main part: Which aims to:

- The application of aerobic exercise program on the players long distances.
- The application of anaerobic training program on the players short distances.

The main part exercises in the following formats:

- Aerobic exercise and anaerobic represented in (antenna-bearing endurance speed - bearing strength - speed -power).
  - Training loads.
  - Plyometrics exercises.
  - The time of this part and ranges between (45: 120) minutes to be a gradual increase in the length of time throughout the duration of the program.

Concluding part (the truce):

Patron researcher may be the final part calm graded using a walking, running and swings.

This section aims to:

- Access heart rate to what it was in the progressive state of comfort.
- The time of this part and ranges between (5:10) minutes
- First / training program:
- The training program took antenna application period (12 weeks) by (four units) training per week. Divided as follows:
  - Number (Unit 3) aerobic exercise per week.
  - The number of (training unit) (anaerobic exercise) a week.
  - Unity and include (bearing antenna - carrying speed - carrying power).
  - Module time ranges between (75-120 s).

- Second / anaerobic exercise program:
  - The application of anaerobic training program took a period of (12 weeks) by (four units) training per week.

Divided as follows:

- Number (three units) for anaerobic exercise per week.
- The number of (training unit) (training capability) (strength - speed - ability - speed der verb) a week.
- Module time ranges between (75-120 s).

The application of the program:

It included each of the research programs (48) and a training unit rose four training units per week, for a period of (12) a week, and each unit training time took from (75: 120) minutes to be a gradual increase throughout the period of implementation of the program.

Steps to implement Search:

- After selecting the key variables, tools and devices used, the researcher conducting physical measurements and the level of performance of Jump Shoot in light of the following procedures.
- Tribal measurements of the physical tests and lasted two days.
- Start implementation of training program where the implementation of the program took (10) weeks and consists of (48) by a training unit (4) training units per week
- A posteriori measurements directly after the completion of the application of the basic experience will held on as the same tribal m measurements sequence.

Statistical analysis

All statistical analyses were calculated by the SPSS statistical package. The results are reported as means and standard deviations (SD). Wilcoxon (nonparametric test) used to determine the differences in fitness& blood parameters between the two groups. The  $p < 0.05$  was considered as statistically significant.

## Results

**Table 1.** Anthropometric Characteristics Training experience of the Groups (Mean  $\pm$  SD)

Group	N	Age [years]	Weight [kg]	Height [cm]
<b>Aerobic group</b>	7	19.17 $\pm$ 0.4	69 $\pm$ 2.87	175 $\pm$ 3.67
<b>Anaerobic group</b>	7	12.09 $\pm$ 0.6	68 $\pm$ 3.43	174 $\pm$ 4.11

Table 1 shows the age and anthropometric characteristics of the subjects. There were no significant differences observed in the anthropometric characteristics for the subjects in the different groups.



**Table 2.** Mean  $\pm$  SD and "Wilcoxon" Test between the pre and posttestsfor aerobic group

Variables	Count	Mean rank	Sum ranks	of Z score	Sign.
<b>Red blood cells</b>	MI	3.5	21.00	2.201	S
<b>Hemoglobin</b>	g/dl	3.5	21.00	2.201	S
<b>Platelets</b>	MI	4.5	18.00	1.572	NS
<b>White blood cells</b>	MI	3.5	21.00	2.201	S
<b>Lymphocytes</b>	%	4.00	20.00	1.992	S
<b>Neutrophils</b>	%	4.00	20.00	1.992	S
<b>Basophils</b>	%	4.00	16.00	1.156	NS
<b>IgA</b>	g/dl	4.00	20.00	1.992	S
<b>IgE</b>	kIU/m	4.00	20.00	1.997	S
<b>IgG</b>	g/dl	3.5	21.00	2.201	S

Table 2 shows thatstatistically significant differences between the two ranking measurements between pre and posttests (aerobic exercise) in Red blood cells, Hemoglobin, White blood cells,Lymphocytes, Neutrophils, IgA, IgE and IgG. And no significant differences between the two ranking measurements between pre and posttests in platelets and Basophiles.

**Table 3.** Mean  $\pm$  SD and "Wilcoxon" Test between the pre and posttestsfor anaerobic group

Variables	Count	Mean rank	Sum ranks	of Z score	Sign.
<b>Red blood cells</b>	MI	4.00	22.00	1.992	S
<b>Hemoglobin</b>	g/dl	3.50	21.00	2.201	S
<b>Platelets</b>	MI	5.00	15.00	0.946	NS
<b>White blood cells</b>	MI	3.50	21.00	2.201	S
<b>Lymphocytes</b>	%	3.60	18.00	1.572	NS
<b>Neutrophils</b>	%	4.50	18.00	1.572	NS
<b>Basophils</b>	%	4.25	17.00	1.378	NS
<b>IgA</b>	g/dl	3.50	21.00	2.201	S
<b>IgE</b>	kIU/m	4.50	18.00	1.572	NS
<b>IgG</b>	g/dl	4.50	18.00	1.572	NS

Table 3 shows thatstatistically significant differences between the two ranking measurements between pre and posttests (aerobic exercise) in Red blood cells, Hemoglobin, White blood cells,IgA. And no significant differences between the two ranking measurements between pre and posttests in platelets,Lymphocytes, Neutrophils,Basophiles, IgE and IgG

**Table 4.** The rate of change between the two groups

Variables	Count	Aerobic Average	Anaerobic Average	Change rate %
<b>Red blood cells</b>	MI	5.29	5.14	2.92
<b>Hemoglobin</b>	g/dl	14.07	13.42	4.84
<b>Platelets</b>	MI	254.83	244.83	4.08
<b>White blood cells</b>	MI	6.93	6.27	10.64
<b>Lymphocytes</b>	%	31.57	25.90	21.87
<b>Neutrophils</b>	%	57.62	40.62	41.85
<b>Basophils</b>	%	9.15	8.25	10.9
<b>IgA</b>	g/dl	246.33	248.17	0.75
<b>IgE</b>	kIU/m	20.67	19.17	7.82
<b>IgG</b>	g/dl	1452.83	1307.83	11.08

Table 4 shows thatthe rate of change between the two groups is from 13.75% to 85.62%.



## Discussion

The main findings from this study were the significant improvement in the immune variables that proved the aerobic and anaerobic training efficacy.

The results of this study agreed with (Bastawisi, 1997; Bent, 2002; Bente & Anders, 2000; Daniel, et al., 2012) which constant of these studies to blood changes after the physical effort. This is consistent with the results of (Dressendorfer, et al., 2002) which aims to identify the immune system's responses to aerobic and anaerobic exercises, where results showed an increase in the kidney of White blood cells, Lymphocytes, Neutrophils are a function of aerobic exercises.

Researcher explains these results that showed an increase in the proportion of red blood cells and the proportion of blood hemoglobin can be traced to the aerobic exercises help to increase the concentration of red blood cells, thereby increasing the concentration of hemoglobin. Which helps to increase the rate of oxygen consumption and increase in the period, platelet ratio that the results of this study showed no significant results in platelets and agreed the results of this study with the results of (Kennedy, et al., 2005)

In addition, indicates the researcher that some studies have reported changes in the kidney of white blood cells number after the effort worse was after exercise in direct response or after a full training module. The results of this study showed a change in the total number of white blood cells with the grounds that the measurement in this study after the last training module in the training stage, sufficiently in advance, these findings suggest that training sports regular period affect the total number of white blood cells differed. Results of this study with (Dressendorfer, et al., 2002) where he showed the results of these studies lack blood change in the white blood cells.

The consistent results of this study with what was said (Abou El Ela, 2003) that he had observed that the racers were the long distances they have an increase in the concentration (IgG) in comfort during the training season and the same observations were observed for protein) IgE) and protein (IgA). it agreed with the results of this study (Marwa, 2003; Gleeson, et al., 2012) which results of these studies to an increase in immune proteins as a result of regular sports training.

This is also consistent with what he referred to (Daniel, et al., 2012) to the effect of physical high load on the concentration of immune proteins ratio in the blood serum with gladiators where yielded results that there are significant differences between the two measurements prior and subsequent to the

concentration of immune proteins ratio (IgA, IgE, IgG) (12)

Wherein said (Bent, 2002) the lengthy periods of hard training may lead to weakness in the immune variables such as Basophils cells and levels of immune globulin in the mucus and focus plasma, On the contrary, the moderate training may not have an effect on these variables, or be catalyst impact.

The results of this study did not agree with (Bente, Anders, 2000) which resulted in his findings that the training change in immune proteins that did not happen.

(Kennedy, et al., 2005) found that moderate sports practice has contributed to increasing the proportion of antibodies and cytokine secretion against the Basophils in athletes compare with non-athletes.

Also (Kennedy, et al., 2005) found in his study that the free-running (aerobic exercise) works to raise the proportion of lymphocytes simple increase in the red and white cells, and concluded that the Free Streaming provides a favorable climate for some physiological adaptations associated with training.

It notes the researcher through access to the results of many studies about the existence of substantial changes in the immune response with physical exertion and sports activities of them, Red blood cells, Hemoglobin, Platelets, White blood cells, Lymphocytes, Neutrophils, Basophils, IgA, IgE, and IgG. Activity after a long-distance run with the continued increase up to 24 hours.

The researcher suggests that the results reached in this study in terms of an increase in the concentration of antibodies (IgA, IgE, IgG) in aerobic exercises perhaps to adapt to the physical and physiological quality of the physical loads associated with aerobic exercises and lower neurological and psychological arousal.

## Conclusion

Our suggestion is that male athletics can improvement the immune variables via training; the rate of change between the two groups is from 13.75% to 85.62%.

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