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Sawsan Darweesh Jari
College of Applied Medical
Sciences, University of
Kerbala, Iraq

Measurement the level of some immunoglobulins IgG, IgM and IgA among women practicing aerobic exercises in fitness halls in the holy city of Kerbala

Sawsan Darweesh Jari

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Abstract

The current study aimed to measure the level of some immunological parameters (IgG, IgM, and IgA) among women trained in aerobic exercises in fitness halls in the holy city of Kerbala. The study was conducted for the period from 1/12/2021 to 1/3/2022. Blood was drawn from healthy women before the exercises and after completing the exercises prepared for the test in order to compare the results. The results showed that the studied levels of immunoglobulins increased in the serum significantly below the level of $P < 0.05$ after daily aerobic exercise. The value of IgG was (613.7000), IgM (5.95207), and IgA (123.1900) after it was before exercise (610.6920), (74.8600) and (120.9780) for the immunological standards IgG, IgM, and IgA, respectively. We conclude from the results of this study that exercise Moderate exercise on a daily basis has an effect in stimulating and increasing the activity of the immune system by increasing the level of immunoglobulins in the blood plasma, which enhances defenses against diseases by continuing daily sports activities.

Keywords: Aerobics, immunological parameters, IgG, IgM, IgA

Introduction

Immunity is the defense mechanism or resistance of a host against a foreign body. The immune system includes chemicals and proteins in the blood, such as antibodies, complement proteins, and interferons. Immunoglobulins, also called antibodies, are glycoprotein molecules that are produced by plasma cells in response to immunogenicity and that act as antibodies. IgG is an antibody isotype that is synthesized and secreted by B plasma cells and is the isotype of the most abundant antibody found in the circulation. (McComb *et al.* 2013) [16] Intense physical training alters the body's immunity, exposing athletes to infections and injuries. In the upper respiratory tract caused by antigens (such as viruses, bacteria or harmful substances produced by the body itself) that have a detrimental effect on training and performance. Control of such changes is necessary to avoid pathological adaptations that stimulate the immune system to produce immunoglobulins such as IgG, IgM, IgA) (Gleeson, 2006) [17].

Exercise can cause a change in the consistency of blood immunoglobulin levels (IgA, IgM, IgG) and the secretion of certain hormones. When athletes are under great stress, the amounts of their immunoglobulins and hormones change. Among these changes are significant differences in IgG, IgM, IgA, and the hormones cortisol. And testosterone hormones and that the amount of serum IgG, IgA, and IgM may increase during the first hours after (Tijardovic *et al.*, 2019) [18].

Aerobic exercise enhances changes in the immune response, such as white blood cells, the level of lymphatic changes, and the level of immunoglobulins. Many authors confirm the occurrence of such changes due to the performance of cardiorespiratory physical training. It was also mentioned that the characteristics of the studied samples such as gender, level of fitness, type of sports practiced, and training age affect significantly increasing the activity and effectiveness of the immune system (Barron *et al.*, 2015) [5].

Strenuous exercise is associated with tissue damage which activates the innate immune system and local inflammation. The interplay between innate and adaptive immunity is essential for maintaining health, suggesting that the adaptive immune system may also be altered by exercise (Hejazi *et al.*, 2012) [19]. And the study also occurred that the effects of acute and chronic exercise on immunoglobulins showed that moderate exercise acute bouts,

Corresponding Author:
Sawsan Darweesh Jari
College of Applied Medical
Sciences, University of
Kerbala, Iraq

such as a 45-minute bout of walking, were associated with an elevation of serum immunoglobulin levels although there was no change in plasma volume.

The three classes of antibodies under study are proteins consisting of chains of amino acids, and each of them has different properties, as the IgG antibody is the most abundant in the plasma, as it is present at a rate of - 7580% in the blood, and plays a major role in enhancing the process of phagocytosis of pathogens Bacterial and viral diseases and stimulation of the complement system. It is the only antibody that can cross the placental barrier and provides passive immunity to the fetus, and it has the ability to store information about the pathogen that entered the body previously and caused an infection. (Schroeder & Cavacini 2010) [2].

As for the IgM antibody, it is the first antibody that interacts with the bacteria that enters the body and is responsible for the initial immune response. It is called the natural antibody because it represents the first line of defense for the immune system and provides short-term protection. It is very effective in killing viruses and bacteria, and it forms (5-10% of blood plasma. While IgA is the most common antibody after IgG, it is found in blood, lymph, and body secretions such as saliva, tears, and milk. It can also be found in the lining of the respiratory tract and the lining of the intestines. It protects the body from bacterial growth and colonization, and represents about 10-15% of the total immunoglobulin in the blood and is called the secretory antibody because it contains a secretory component that protects it from enzymatic digestion (Christine, 2021) [7].

Therefore, the aim of this study was

Determining and comparing the results of the effect of aerobic exercise on immunoglobulins (IgG, IgA) and IgM before exercise and twelve weeks after exercise.

Materials and working methods

Sample collection

Blood samples were collected from the selected women (20) young women with an average age ranging between (28-33) years. The women under study were subjected to moderate-intensity aerobic exercises. Since blood was drawn before starting the application of the training program, and then after completing the application of the training program, blood samples were drawn again, and only healthy women were selected in this research.

Training program

Aerobic exercises were applied within the training program consisting of 12 weeks, starting from 1/12/2021 until 1/3/2022, with 36 training units divided into three units each week, and the aerobic exercises were of medium and light intensity, depending on the maximum consumption oxygen.

Equipment and tools used

In this study, various sports equipment and tools were used in the agility halls, which are specific for performing aerobic exercises.

Determination of the concentration of immunoglobulins IgG and IgM by a monocular SRID assay

Several gel agar plates were used in testing the concentration of immunoglobulins, namely (IgG, IgM, and IgA), as each immunoglobulin has a special color (IgG

green, IgA pink, IgM light blue). Each plate contains 12 holes, each with a capacity of 5 microliters, according to the method. The gel sheets were removed from the refrigerator and left for 5 minutes. At the same time, the previously prepared blood serum was removed from the refrigerator and left at the laboratory temperature until the frozen serum melted, and then 5 microliters were placed in each hole using the micro-pipette from each sample. serum, then left for 10 minutes until the serum is completely absorbed, then the plates are closed with their special cover tightly, then they were placed in a container containing wet cotton and left for 48 hours In a dark place, then the extent of antibody spread radially in a circular shape is observed, as the larger the diameter of the circle, the greater the concentration of antibody in the sample, and then the diameter of the ring formed in the gelatinous agar plate was measured using an ocular lens graduated from (1-20) millimeters, and the resulting measurements were compared In the scale with the concentrations of immunoglobulins fixed in the tables attached to the test kit.

Statistical means

The spss statistical bag was used in the subjects to determine the values of relative importance, percentage, median, standard deviation and Well Coxen test.

Results and Discussion

Presenting the results of the effect of medium-intensity aerobic exercises on the immune variables of the body for women trained in fitness halls before and after the test.

Table 1: shows the results of immunological variables:

| Variants | Test | Mean | standard deviation | The calculated T value | Sig level | Sig type |
|----------|--------|----------|--------------------|------------------------|-----------|----------|
| ImG | Before | 74.8600 | 2.19526 | - 5.889 | .000 | Sig |
| | After | 75.9520 | 2.07385 | | | |
| IgG | before | 610.6920 | 4.30808 | - 6.332 | .000 | Sig |
| | After | 613.7000 | 4.00903 | | | |
| IgA | Before | 120.9780 | 4.57081 | - 4.590 | .001 | Sig |
| | After | 123.1900 | 3.65368 | | | |

Discussion

The results shown in Table (1) indicated that there was a significant increase in the values of immunological criteria (IgG, IgM, IgA) for the studied research sample after practicing aerobic exercises, as the value of IgG (613.7000), IgM (5.95207) and IgA (123.1900) after Before exercise, they were (610.6920), (74.8600) and (120.9780) for the immunological parameters IgG, IgM and IgA, respectively. This is due to the fact that moderate exercise enhances the humoral immune parameters of IgA, IgG and IgG, while extreme exercise inhibits these parameters. The present results of increased serum IgA and IgG values after moderate-intensity aerobic exercise are consistent with the scientific notion that moderate and continuous exercise can enhance the immune system of athletes (Hanns *et al.*, 2002) [11].

A study found by Saygin *et al.*, Changes in the level of immunoglobulins depend on the type of physical exercise. Its roots and natural causes are explained by Balogh *et al.* (2022) [6] atmospheric distributions in the distributions in the internal distributions of immune cells and changes in immunogenicity and change in immunogenicity and cells in T-Cell which improves the immune system by increasing

the proportions of immunoglobulins and regulatory T cells only. Onuegh *et al.* (2015) ^[14] reported that moderate aerobic exercise led to a non-significant increase in the level of immunoglobulins IgG below the level of significance $p < 0.05$, while globulin IgM increased significantly after moderate aerobic exercise below the level of significance $p < 0.05$ compared to the results before moderate aerobic exercise and from The researchers concluded that moderate, regular, continuous exercises led to the enhancement and stimulation of the immune response.

Regular moderate aerobic exercise improves immunity compared to vigorous exercise, as the results of the Mohamed & Morn (2015) ^[4] study confirmed that the level of globulins, IgG and IgM, increased significantly after regular moderate aerobic exercise.

Many researchers concluded in their study on the effect of aerobic exercise for a period of 8 weeks that there were significant changes in the level of immunoglobulins (IgA, IgE, IgG, IgM), which led to an improvement and activation of the immune system of these people who practice aerobic exercise (Ali khazaei *et al.*, 2018) ^[1].

Yan *et al.*, (2017) ^[15] reported that the values of immunological parameters IgA, IgG, IgM, and C3 were increased and changed adaptively, which helps to improve the body's immune system.

It should also be noted that good training and the correct balance between periods of exercise and rest may lead to reducing the risk of adverse changes in the immune system and the level of immunoglobulins, especially IgA, and reducing the incidence of upper respiratory tract diseases (Alexander, 2010) ^[13].

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Author's Contribution

Not available

Conflict of Interest

Not available

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