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## IMPACT OF PHYSICAL ACTIVITY CHANGES IN THE BLOOD LYSOZYME OF ATHLETES

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## ВЛИЯНИЕ ФИЗИЧЕСКИХ НАГРУЗОК НА ИЗМЕНЕНИЯ ЛИЗОЦИМА КРОВИ СПОРТСМЕНОВ

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**Abstract.** *The influence of physical activity on the dynamics of blood lysozyme indicators in young athletes was determined. It was found that high physical activity negatively affects the factor of non-specific protection — the level of lysozyme in the blood serum of athletes.*

**Keywords:** *athletes, blood, lysozyme, training loads, non-specific protection factor.*

**Аннотация.** *Определено влияние физических нагрузок на динамику показателей лизоцима крови юных спортсменов. Установлено, что высокие физические нагрузки отрицательно сказываются на факторе неспецифической защиты — уровне лизоцима в сыворотке крови спортсменов.*

**Ключевые слова:** *спортсмены, кровь, лизоцим, тренировочные нагрузки, фактор неспецифической защиты.*

**Relevance.** The article deals with the main aspects of the main pedagogical problems of the influence of physical activity of various intensity on the dynamics of changes in the blood lysozyme of athletes. Based on the literature analysis, data are presented that reveal the essence and content of lysozyme in

the blood, which determines the bactericidal properties of blood serum. The materials of the proposed study are of theoretical and practical significance for determining the volume of training loads. It was found that the level of lysozyme in the blood depends on the sports qualification and specialization. Modern sports

are characterized by physical stresses that have a significant impact on the immunobiological reactivity of the body. In this regard, it seemed relevant to study the dependence of physical activity and the level of lysozyme in the blood of athletes of different specializations (Agadzhayan, 1997).

The aim of the study is to develop and determine the dependence of the level of lysozyme in the blood of athletes of different specializations during physical activity. In connection with the goal, the following tasks were solved:

1. Determine the level of lysozyme in the peripheral blood of athletes compared to non-athletes

2. Establish changes in blood lysozyme depending on sports qualifications.

#### **Materials and methods of research.**

20 athletes aged 19–20 years (gymnasts and swimmers) were examined. Studies were conducted in the spring during the training cycle. Evaluation of lysozyme parameters was performed when taking peripheral blood. Analysis of the obtained data showed that there were significant differences in the average blood lysozyme titers in athletes compared to similar data in the control group.

immunological reactivity and the development of pre-pathological and pathological conditions, but also for timely prevention measures.

The aim of our work was to study changes in the content of lysozyme in the blood of athletes depending on gender, age, sports classification and specialization, as well as the volume and intensity of training load. For this purpose, blood lysozyme was studied in 30 athletes (15 men and boys and 15 women and girls).

Out of the total number of people surveyed, there were athletes of II and III categories, I category, candidates for master of sports and master of sports. In accordance with the WHO recommendations (Geneva, 1980), all surveyed athletes were divided into 3 age groups (table 1).

The results of determining the blood lysozyme of athletes were compared with similar indicators in healthy individuals of the same sex and age who are not involved in sports. For 30 practically healthy patients (15 male and 15 female), a thorough examination

Among the factors of non-specific protection of the body that determine the bactericidal properties of blood serum, as is known, great importance is attached to lysozyme.

Various types of pathogenic and opportunistic microbes are sensitive to lysozyme. Many of the latter make up the autoflora of the human body. Lysozyme, which is an enzyme called muromidase, is found in high concentrations in a number of biological fluids (Dembo, 2005). Lysozyme is produced by macrophages and neutrophils (Snait Hammarström, 1980).

Changes in blood lysozyme under the influence of physical activity are devoted to a few works [1, 5, etc.].

**Research result.** It is noted that with modern training loads, the body's resistance to diseases, primarily of an infectious nature, decreases, and athletes often have foci of chronic infection. It was natural to assume that this was due to a decrease in non-specific protection factors. However, the study of serum lysozyme content may be important not only for detecting

was performed, including blood, urine, and chest x-rays.

The concentration of serum lysozyme was determined by the highest dilution (titer) of serum, which causes complete or 50% lysis of the daily agar culture of *Mikrocoecus lysodecticus* according to the method of Z.V. Ermoleva (Dembo, 2005) in the modification of V.M. Shubik (Agadzhayan, 2008).

For each group, the average lysozyme titers and the frequency of reactions of different intensity were calculated (titers from 1:50 to 1:120 were considered as average, over 1:120 — as high, below 1:50—as low).

As can be seen from table 1, there were significant differences in the average lysozyme titers in the blood of athletes compared to similar data in the control group. Both in the group of athletes and in the control group, the lowest lysozyme titers were observed in children under 14 years of age. With age in the experimental and control groups, lysozyme titers were observed in the experimental and control groups of young men older than 15 years.

Table 1. **Athletes Control Confidence of differences**

**Blood lysozyme in athletes of different gender and age (by the arithmetic mean of the reverse titer)**

Floor	Groups surveyed	10–14 Years	15–19 Years	20 years and older	Just
		Reverse caption	Reverse caption	Reverse caption	Reverse caption
		<i>M±m</i>	<i>M±m</i>	<i>M±m</i>	<i>M±m</i>
Men	Athletes	37,6±2,59	99,5±6,02	140,0±9,74	102,7±4,43
	Control	50,3±4,51	135,2±9,38	198,0±25,03	139,1±13,04
	Confidence of differences	p<0,05	p<0,01	p<0,05	p<0,01
Women	Athletes	45,7±1,99	57,4±5,9	76,0±13,3	50,6±3,56
	Control	76,2±10,98	89,0±13,38	133,7±14,16	91,4±6,47
	Confidence of differences	p<0,01	p<0,05	p<0,01	p<0,01
	Confidence of differences in athletes — men and women	p<0,02	p<0,01	p<0,05	p<0,01

**Table 2. Lysozym serum in athletes of various sports qualifications (on medium-arithmetic reverse titer)**

Sports qualification	Men		Women	
	Reverse caption	The credibility of differences	Reverse caption	The credibility of differences
	<i>M±m</i>	p	<i>M±m</i>	p
Ms. Cms I c. II–III c.	100,9±14,95	<0,05 >0,1	35,3±5,50	0,01 0,01
	115,2±9,72	<0,05 <0,01	56,8±10,33	0,01 0,01
	105,6±7,71		51,2±2,53	
	96,9±7,43		53,5±4,68	

**Table 3. Sports specialization and titre of lysozyme in the blood**

Specialization	Men, 10–14 years		Women, 10–14 years	
	Reverse titre	<i>M±m</i>	Reverse titre	<i>M±m</i>
Gymnastics	43,5±3,20		36,4±2,23	
swimming	36,4±4,19		38,7±3,38	

Statistically significantly lower lysozyme titers were found in athletes and sportswomen in all age groups than in the control group.

Statistically significant differences were also found when determining the number of reactions of different intensity. Reactions with a high content of lysozyme were more than 2 times less common in athletes than in the control group, and in athletes compared to the control, this difference was even more pronounced: high lysozyme titers were 6 times less common. A decrease in the level of high-intensity reactions was clearly observed in each age group.

Sports qualification did not significantly affect the lysozyme titer in both athletes and female athletes (table 2). The only Exceptions were female masters of sports, and this indicator was significantly lower in comparison with lower — qualified athletes. A previously established pattern can be traced: lower blood lysozyme values in women than in men.

Comparison of the level of blood lysozyme depending on the direction of the training process is presented in table 3 on the example of gymnasts and swimmers.

From the above data, it follows that sports specialization in these sports does not significantly affect the level of blood lysozyme.

In this regard, it was important to study serum lysozyme in athletes depending on the volume and intensity of physical activity. For comparison, athletes of various specializations were taken, divided into 2 groups. The first group included athletes who used significant physical activity, the second-moderate loads.

From the data presented in table 4, it can be seen that athletes with significant physical activity have significantly lower blood lysozyme values than athletes who train with moderate loads. Moreover, this pattern persists in both athletes and female athletes, regardless of their sports qualifications.

High-intensity reactions were 61.7 % for men in the control group, 35.3 % for those training with moderate loads, and -0.8 % for those with significant loads; in the control group, high — titer reactions were found in 41.9% of cases, in those who used moderate loads-in 16.1 %, and in those with significant loads they did not occur at all.

Thus, high physical activity negatively affected this factor of non-specific protection.

Table 4

**Lysozyme of athletes' blood at different volume and intensity of training load (according to the arithmetic mean of the reverse titer)**

Gr ou ps	loads	Men				Women			
		Mc and cms	I c.	II–III c.	Total	Mc and cms	I c.	II–III c.	Total
		M±m	M±m	M±m	M±m	M±m	M±m	M±m	M±m
I II	Signific ant	31,8±5,5 9	42,3±5,6 3	33,9±2,4 5	35,8±2,3 6	37,1±3,2 2	45,9±3, 84	37,8± 1,75	39,2±1,6 8
	Moderate	136,7±9, 62	118,2±8, 65	126,±9,5 1	124,5±5, 19	62,2±12, 8	57,7±3, 34	78,8± 9,03	67,5±6,5 1
	Confidence of differences	<0,01	<0,01	<0,01	<0,01	<0,05	<0,02	<0,01	<0,01

**Conclusions:**

1. Lysozyme blood as a factor of nonspecific protection of athletes is reduced compared to the control group.

2. The Volume of training loads significantly reduces the level of lysozyme in the blood of athletes, especially in women.

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