PHYSICAL ACTIVITY AND HEALTH

COMPARATIVE ANALYSIS OF BLOOD VARIABLES BETWEEN STUDENT ATHLETES AND NON-ATHLETES AMONG LIBYAN STUDENTS AT SERBIAN UNIVERSITIES

Dr Tawfiq Abdolkarim Hassan ALHDDAD

Faculty of Physical Education and Sports Sciences, Department of Injuries and Motor Rehabilitation
Benghazi University , Libya

Corresponding Author: Tawfiq Abdolkarim Hassan Alhaddad. Faculty of Physical Education and Sports Sciences, Department of Injuries and Motor Rehabilitation, Benghazi University Libya

Received: *October 22, 2024* ***Accepted:*** *November 30, 2024* ***Published:*** *January 30, 2025*

Citation: *Tawfiq Abdolkarim Hassan ALHDDAD. COMPARATIVE ANALYSIS OF BLOOD VARIABLES BETWEEN STUDENT ATHLETES AND NON-ATHLETES AMONG LIBYAN STUDENTS AT SERBIAN UNIVERSITIES* ***(2025). OLCIAS 2025 (1)***

ABSTRACT

Physical activity significantly influences blood composition, increasing blood volume, hemoglobin levels, and red blood cells (RBCs). Studies by Astrand and Rodahl confirm that trained individuals have greater blood and red cell volume than untrained individuals. While hemoglobin is critical for oxygen transport, its effect on oxygen consumption beyond normal levels remains debatable. Most research has focused on RBCs and hemoglobin due to their role in endurance and oxygen transport. However, white blood cells (WBCs) are also crucial for athletes, as they help resist diseases that could affect performance during competitive seasons.

Blood plays a vital role in maintaining the body's internal environment, serving as a medium for transporting nutrients, waste, and oxygen. Regular physical activity enhances blood volume, which is approximately 5 liters in females and 6 liters in males, constituting 8% of body weight.

This research highlights the importance of periodic medical examinations for Libyan students, emphasizing that irregularities in blood variables can affect both health and academic performance. An experimental study was conducted on 20 Libyan students aged 25-30 in Serbia, divided into two groups: 10 physically active and 10 inactive.

Samples were collected before breakfast over three months, and key blood variables (sugar, triglycerides, cholesterol, RBCs, and hemoglobin) were analyzed.
Results showed significant differences between the two groups. Physically active students exhibited normal sugar levels, lower triglycerides, and cholesterol, along with higher hemoglobin and RBC counts compared to inactive students. These findings suggest that physical activity positively impacts blood variables, reducing risks associated with sedentary lifestyles, such as elevated cholesterol and triglycerides.
In conclusion, physical activity plays a crucial role in maintaining optimal blood health, highlighting the need for regular exercise and tailored health programs for students.
Key Words: *Physical activity, blood variables, Libyan students, Serbia, experimental study*

INTRODUCTION

Physical activity leads to changes in the blood as it happens to any body organ. These changes include an increase in blood volume, hemoglobin volume and red balls. In the light of studies of both "Astrand" and "Rodahl", blood volume and red balls were found to increase in trained persons compared to untrained persons. Several studies have indicated that hemoglobin deficiency in the blood from the normal level leads to a lack of oxygen consumption, but this increase at the normal hemoglobin level remains controversial in terms of its effect on oxygen increase. Most studies have focused on the impact of sports training on red blood balls and hemoglobin due to its importance to the coach while not focusing on white balls. This may be due to a link between red balls and endurance and the hemoglobin element. Due to its role in transferring oxygen to working muscles, however, the role of white balls is important to the athlete for its important role in resisting the disease that the player often gets in the competition season and loses his fitness and therefore his athletic level ***(4).***

Blood forms the climate of the foetus, which is still intrauterine and is a key element in the formation of the internal environment of the body. In addition to the fluid between tissues and glands responsible for providing a life-friendly internal environment of body tissue. Thanks to relatively stable exchanges between it and fluids and between tissues and the remaining cells in the chemical medium. It helps them to the nature of their composition and characteristic properties that also help in the process of transition from one place to another in the body to serve as the delivery and transport between different cells in the body ***(8).***

Blood is a red sticky liquid that moves food to digest and rid cells of waste burning and oxidation. Blood volume in a person is estimated at five liters in the mirror and six liters per man in all parts of the body whether in blood vessels, the heart or the lung. It

constitutes eight percent of the body's weight. It should be noted that regular physical activity helps increase blood volume ***(9)***.

The importance of research:

The importance of the research is due to the identification of how to develop the best programs for periodic medical examinations for students studying at Libyan universities so that it is not limited to physical education colleges in particular. It is known that the increase or decrease in these variables negatively affects the health status of the student, which in turn affects his scientific attainment.

Research problem:

Through my visits to hospitals and clinics dedicated to the treatment of Libyan students in Serbia by virtue of my studies, I noticed that many Libyan students of 25 to 30 years of age suffer from some disorders in some blood variables such as sugar, hemoglobin deficiency, protein increase, as well as high lipids.

Research objectives:

1. A comparative study was conducted in some blood variables between students engaged in physical activity and students not engaged in physical activity from Libyan students studying at Serbian universities and knowledge of the impact of physical activity on some blood variables in the body.
2. Recognize the effect of physical activity on some blood variables in the body.

Research assumptions:

There are statistically significant differences in some blood variables between active students and students who are not physically active.

Physical activity affects some of the body's blood variables.

Theoretical studies:

Blood:

Blood is an essential ingredient in the body's internal environment along with a liquid between tissue and lymph, which is responsible for providing a suitable internal environment for the life of the body's tissue and thanks to exchanges between it and a liquid between the body so that the cells remain in a relatively stable chemical medium. Blood performs many important vital functions and helps it to generate some vital functions for the nature of its composition and characteristic characteristics ***(6).***

Blood volume is about 5 - 6 litres and it makes up about 9% of body weight and usually proves blood volume to body weight (ml/kg) which is called the relative size of men at 75 ml/kg and women at 65 ml/kg and children at 60 ml/kg. Blood volume in blood circulation is different from rest in case of physical activity. The spleen, liver, skin vessels and lungs can be held at about 40-50% of total blood volume and this blood is involved in several hypothermia and other oxygenation factors.

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It is dangerous for human life to have less than a third of the body's blood volume, either if a small amount is lost.(400 - 200)ml. This does not harm, but rather serves to stimulate the formation of blood in health ***(6)***

Blood ingredients:

Red pellets: The 40 - 50% of blood volume and its mission include the transfer of O2 from the lungs to different parts of the body. It contains the substance Hb hemoglobin and transfers Co2 from different parts of the body to the lungs. There are about 5.000.000 red pellets per millimeter.

Leukocytes: The body's defensive system against germs is between 4000 - 10.000 per millimeter.

Platelets: helps to coagulate blood 150.000-450.000 in mm3 and its lack leads to hemorrhagic diseases that can lead to death.

Plasma: is a yellow liquid that is found in blood cells in a solution and the plasma is 45-60% of blood volume or transports nutrients, vitamins, hormones, etc., and carries metabolic waste to the kidneys and lungs for placement abroad ***(1).***

Lipoproteins in the blood:

Lipoproteins are simply a number of lipid types associated with each other and added to other elements to facilitate their movement and transmission. Lipoproteins are generally cholesterol, triglycine phospholipids, and proteins. These varies depending on the protein ratio.

The primary function of lipoproteins is to transmit their fatty content in the blood, which are types-:

A. Very low-density lipoprotein. V.L.D.L

B-lipoprotein with medium density I.D.L

C. High-density lipoprotein H.D.L

D. Low-density lipoprotein L.D.L

Lipoproteins in the body are generally formed through diets through the absorption process ***(3).***

Uric acid

It is a component of the body's natural pool of carbon, oxygen, nitrogen and hydrogen, which is the ultimate product of human body metabolism of proteins, compounds found in foods at different rates. The one that secrets it in the blood is the liver, and it is produced by the kidneys in the urine. When its blood level increases, there is an imbalance in metabolism. It is also produced when protein intake is increased, or for other reasons, such as in gout disease. The normal level of uric acid in the blood in females is: 2,4-6,0 mg/dL. And in males: 3,4-7,0 mg/dL. The results vary from laboratory to laboratory. The result in high uric acid in the blood causes kidney stones and gout ***(2).***

Cholesterol:

Cholesterol is a semi-essential fatty substance in the construction of the human body and life. She is involved in the installation of the membrane of each of the body's cells. It helps in the bile material needed to digest nutrients, and is also involved in many key hormones and vitamin D factory.

Each of us rightly denies these essential substances and many people accuse the cause of diseases due to an association between increased cholesterol and atherosclerosis over time.

All the cells of the body have everything you need from cholesterol, regardless of the presence or not producing enough. And continue to get into the human body through the food we eat. It is always remembered that the factory cannot manufacture cholesterol while all animals have the ability to produce cholesterol. Rich foods in these are mentioned for example: meat that is independent organs of the body such as liver, kidney, tongue, bone, egg yolk, animal fats and dairy products such as butter and cheese ***(11).***

Blood sugar:

The concentration of chlucose in the blood is of the utmost importance for normal work in the human body and chlucose in the blood is routinely between 80-110 mg/100 ml.

Blood sugar must be kept steady.

Blood sugar must be kept as steady as possible and within these limits, since a person's lack of blood sugar leads to the injury of so-called Hgpoglucemia or so-called hypoglycemia. The sick person is traumatized by muscle shudder, feelings of weakness, weakness, skin whiteness, fainting, coma and death in some quarters.

Different tissue and body organs differ on the blood chlucose ratio. The central nervous system is the most chlucose-based organ because it is the main source of energy. The most important member of the central nervous system is the brain. The heart depends on the removal of lipid acids and lactic acids and their use as an energy source as a result of adaptation to work and the pattern of an individual's diet.***(10)***

Similar studies

Mohammed Jassim Mohammed al-Khalidi and Ali Mahdi Hassan's study

The study aimed to identify the values of some of the blood variables between mathematics and non-mathematics of the fourth-stage students of the Department of Life Sciences. The sample strength was 20 students from the original community of research who were chosen in a deliberate manner. Samples were conducted. The results resulted in statistically significant differences in the variables of hemoglobin, triglycerides and cholesterol ***(7).***

Landor Study 2002

The study aimed to identify the impact of physical activity on some of the blood variables of athletes. The study sample consisted of fifteen endurance athletes aged between ten and sixteen who underwent a twelve-week training programmer of three units per week. Measurements of some hemoglobin and hematocrit blood variables were taken and the results indicated an improvement of statistically significant differences of study variables. Hemoglobin increased and hematocrit decreased in blood as a result of training ***(4).***

RESEARCH METHODOLOGY

The researcher used the experimental curriculum due to its suitability for the research method, and the research samples were taken in a deliberate manner, The size of the

research sample consists of 20 students studying in universities in Serbia 10 students practicing physical activity **(Table 1)** and 10 students not engaged in activity aged from 25 to 30 years with homogeneous length and weight to be homogeneous and get the most accurate results **(Table 2).** The samples were taken in the morning before the basic breakfast after measuring the blood pressure and temperature of each member of the sample and I use the test T to calculate the differences.

Table No. 1 shows the sample of research for students engaged in physical activity

N	Age	Length	Weight	University

1	25years old	180	79	Belgrade
2	27years old	175	70	Belgrade
3	30years	174	75	Novi Sad
4	29years old	179	80	Yenyon
5	27years old	180	89	Aruba
6	25years old	177	77	We will
7	30years	183	37	Belgrade
8	28years old	174	81	We will
9	27years old	182	47	Novi Sad
10	30years	171	70	Maqitrand

Table No. 2 shows the sample of research for students not engaged in physical activity

N	Age	Length	Weight	University
11	29years old	181	85	Novi Sad
12	26years old	168	76	We will
13	30years	173	73	We will
14	25years old	177	70	European
15	28years old	180	81	Belgrade
16	27years old	184	78	Yenyon
17	25years old	183	82	European
18	28years old	175	73	Belgrade
19	30years	169	76	We will
20	26years old	179	81	Novi Sad

Table No. 3 shows the results of the study for the first survey

Groups		N	Average	Value of T
White Cells	Practitioners	10	5.1070	874.
	Non-practitioners	10	5.9060	880.
Red Cells	Practitioners	10	5.6340	050.
	Non-practitioners	10	5.434	046.
Hemoglobin	Practitioners	10	5.6057	047.
	Non-practitioners	10	4.9986	048.
Sugar	Practitioners	10	5.6742	050.
	Non-practitioners	10	5.8786	049.
Urea	Practitioners	10	4.9720	666.
	Non-practitioners	10	4.8186	674.
Platelets	Practitioners	10	218.0006	140.
	Non-practitioners	10	229.7000	135.
Triglycerides	Practitioners	10	1.5090	050.
	Non-practitioners	10	1.5177	047.
Cholesterol	Practitioners	10	4.7870	049.
	Non-practitioners	10	4.7961	050

The first survey was conducted in the period from January 15 th, 2015where samples were taken from members of the sample of 20 students 10 students practicing physical activity 10 students not engaged in physical activity and conducting medical analyses. Through the preliminary results of the analyses **(Table 3).** , it became clear that there were differences in the variables of red cells, hemoglobin, diabetes, thioglycolic between the two groups.

DISCUSSION OF RESEARCH RESULTS

It became clear from statistical analysis that there were significant differences in some blood variables where there were differences in sugar, triglycerides, cholesterol, hemoglobin and red blood balls**(Tables 4 and 5).** . Sugar was at the normal rate for physical activity practitioners, with a small rise in the samples of non-physical activity individuals. Triglycerides were higher in the samples of non-physical activity individuals, as well as cholesterol, which was higher in the hypertrophic activity Variables and perhaps this is due to the environment or food consumed by the person or genetic worker associated with genetic genes. And so we can say that physical activity has a clear effect on most variables within the human body.

By discussing the results, the research assumptions can be answered:

There are statistically significant differences in some blood variables, namely cholesterol, hemoglobin, red balls, blood sugar and triglycerides, among students engaged in physical and non-physical activity**(Tables 6 and 7).** .

There is a positive effect of physical activity on some of the body's blood variables.

Table No. 4 showing students' grades for physical activity in all variables

	Cholesterol	Triglycerides	Platelets	Urea	Sugar	Hemoglobin	Red Cells	White Cells
	3.55	1.8	190	3.02	5.63	143	4.74	5.88
	4.66	1.42	292	6.01	5.05	161	6.37	5.04
	4.56	0.42	294	4.01	5.26	137	4.55	8.13
	4.44	1.11	270	4.22	5.13	150	5.06	6.07
	4.51	1.05	180	5.15	5.77	144	4.70	5.06
	3.27	1.23	266	6.07	5.01	135	6.09	4.03
	3.89	0.99	220	4.36	5.02	155	5.33	5.51
	4.46	0.72	170	3.35	5.32	142	5.19	6.07
	3.19	0.56	190	3.99	5.22	158	4.90	5.62
	3.77	1.56	225	4.89	5.07	133	4.86	6.35

Table No. 5 shows the grades of students not engaged in physical activity in all variables

	Cholesterol	Triglycerides	Platelets	Urea	Sugar	Hemoglobin	Red Cells	White Cells
1	5.36	1.09	246	2.07	5.05	147	5.42	4.04
2	4.41	1.84	180	4.045	5.88	174	5.24	7.05
3	5.42	1.95	210	4.09	5.26	149	5.25	6.21
4	5.66	1.04	236	5.33	5.02	177	4.27	6.33
5	5.78	1.05	179	5.15	5.36	156	9.96	4.33
6	6.01	1.23	201	6.07	5.22	189	5.09	5.25
7	3.89	1.55	225	5.49	6.03	145	3.99	7.71
8	4.46	1.75	177	5.24	5.92	136	5.88	6.07
9	3.19	1.96	186	5.09	5.22	196	6.18	5.48
10	3.77	1.56	190	4.89	5.07	188	6.85	4.44

Table No. 6 shows results of research samples and differences between the two groups

Groups		N	Average	Value of T	Indicative level
White Cells	Practitioners	10	5.6910	-1.67	869.
	Non-practitioners	10	5.7760	-1.67	869.
Red Cells	Practitioners	10	5.9430	1.008	050.
	Non-practitioners	10	5.1790	1.008	046.
Hemoglobin	Practitioners	10	4.2200	-1.256	047.
	Non-practitioners	10	5.8000	-1.256	043.
Sugar	Practitioners	10	5.4030	1.046	050.
	Non-practitioners	10	5.2480	1.046	048.
Urea	Practitioners	10	4.7470	0.500	623.
	Non-practitioners	10	4.5070	0.500	623.
Platelets	Practitioners	10	203.0000	-1.572	133.
	Non-practitioners	10	229.7000	-1.572	139.
Triglycerides	Practitioners	10	1.5020	2.284	035.
	Non-practitioners	10	1.0860	2.284	048.
Cholesterol	Practitioners	10	4.7950	2.143	046.
	Non-practitioners	10	4.0300	2.143	050.

Groups N Difference Level Measurement Error Moral difference level at 95%

Table No. 7 shows the level of moral difference and measurement error

Groups			Difference Level	Measurement Error	Moral difference level at 95%	
					lesser	**Above**
White Cells	Practitioners	10	0.08500	0.50967	-1.15579	0.98579
	Non-practitioners	10	0.08500	0.50967	-1.15695	0.98695
Red Cells	Practitioners	10	50.75500	50.34189	-55.00938	156.51938
	Non-practitioners	10	50.75500	50.34189	-63.12576	164.63576
Hemoglobin	Practitioners	10	-31.58000	25.14618	-8421.25017	-41017
	Non-practitioners	10	-31.58000	25.14618	-88.20590	25.04590
Sugar	Practitioners	10	0.15500	0.14823	-0.15641	0.46641
	Non-practitioners	10	0.15500	0.14823	-0.15958	0.46958
Urea	Practitioners	10	0.24000	0.47958	-0.76756	1.24756
	Non-practitioners	10	0.24000	0.47958	-0.76813	1.24813
Platelets	Practitioners	10	-26.70000	16.98826	-62.39102	8.99102
	Non-practitioners	10	-26.70000	16.98826	-63.21055	9.81055
Triglycerides	Practitioners	10	0.41600	0.18213	0.03336	0.79864
	Non-practitioners	10	0.41600	0.18213	0.03265	0.79935
Cholesterol	Practitioners	10	0.76500	0.35703	0.014901	1.51510.
	Non-practitioners	10	0.76500	0.35703	0.00117	1.52883

RECOMMENDATIONS

1. Increase cultural awareness among students of the importance of physical activity to eliminate diseases that are in keeping with today's times and technology.
2. Increase health awareness for periodic medical examinations and clarify food items of high nutritional value that benefit the body in the food distribution process, which are reflected in blood variables.
3. Work on establishing medical centers in universities concerned with conducting periodic medical examinations. Preferably, the conduct of tests and tests is compulsory after a period under the supervision of the Ministry of Health.
4. Work on the need to establish sports centers and arenas away from the private sector to make students accessible in general.
5. Further research on physiological processes in blood variables in the body to find out what is new in the development of the work of the body's organs during sports activity.

CONCLUSION :

This study highlights the significant impact of physical activity on various blood variables in Libyan students studying at Serbian universities. The comparison between student-athletes and non-athletes revealed that physical activity has positive effects on several blood parameters, including hemoglobin, red blood cells (RBCs), triglycerides, cholesterol, and blood sugar levels. Specifically, physically active students exhibited healthier blood profiles, with normal sugar levels, lower triglycerides and cholesterol, and higher hemoglobin and RBC counts compared to their sedentary counterparts.

The findings suggest that regular physical activity plays a crucial role in maintaining optimal blood health, which can help reduce the risks associated with sedentary lifestyles, such as elevated cholesterol and triglycerides. The results also underscore the importance of incorporating physical activity into daily routines to improve overall health and prevent chronic conditions.

Additionally, the study supports the need for regular medical checkups to monitor blood variables, especially among students, as imbalances in these variables could potentially affect both their health and academic performance. These results call for the development of health programs that encourage physical activity and periodic medical examinations to enhance the well-being of students.

In conclusion, promoting physical activity among students is not only beneficial for physical fitness but also plays a vital role in optimizing blood health and preventing metabolic disturbances, thereby improving their overall quality of life.

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