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**Andi Herdinawaty Heril**  
Department of Sport Science,  
Faculty of Sport Science,  
Yogyakarta State University,  
Indonesia

**Rachmah Laksmi Ambardini**  
Department of Sport Science,  
Faculty of Sport Science,  
Yogyakarta State University,  
Indonesia

**Muh Fitrah Mubarak**  
Department of Sport Science,  
Faculty of Sport Science,  
Yogyakarta State University,  
Indonesia

**Corresponding Author:**  
**Andi Herdinawaty Heril**  
Department of Sport Science,  
Faculty of Sport Science,  
Yogyakarta State University,  
Indonesia

## Comparison of cardiovascular endurance in softball and basketball athletes in Bone district viewed from blood group

**Andi Herdinawaty Heril, Rachmah Laksmi Ambardini and Muh Fitrah Mubarak**

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### Abstract

Comparison of Cardiovascular Endurance in Softball and Basketball Athletes in Bone Regency in terms of Blood Group. This research is a type of descriptive research, the sample used in this research is 18 people. Consisting of 9 basketball athletes and 9 softball athletes, each of which 6 had blood type A, 6 people had blood type B, and 6 people had blood type O. The results of this study were that there were significant differences in the cardiovascular endurance of basketball athletes in Kab. Bones between blood groups A, O, and B blood group O in basketball athletes have a better level of cardiovascular endurance than other blood groups, with a mean value = 43.13. Likewise with district softball athletes. Bone where blood type O has a better level of cardiovascular endurance than other blood groups with a mean value = 41.56.

**Keywords:** Blood type, cardiovascular endurance, basketball and softball

### Introduction

Exercising properly and correctly can make the body healthy and strong, one of the most popular sports is sports that use the aerobic energy system such as basketball and softball, these sports are starting to be popular with the public. So human development through the field of sports should not be abandoned. This will give the importance of sports education to society.

On when on the field many aspects affect endurance, therefore the endurance of each athlete is different. Researchers want to compare cardiovascular endurance in these two sports. Does blood type also affect cardiovascular endurance.

Sport is an activity that has a specific purpose, such as training the body for physical and spiritual health. So that regular exercise can have benefits for maintaining a healthy body. Because the metabolism in the body can run smoothly. That way, the absorption and distribution of nutrients can work effectively and efficiently. So that the notion of sports in general is a form of physical activity that is planned and structured, which involves repeated body movements in order to get good results.

Exercising makes the heart strong, the function of the heart and the cardiovascular system work more effectively and can reduce plaque in the blood vessels which can narrow blood flow, so that the heart will pump blood better. The level of cardiovascular endurance in sports is very necessary because it can affect the quality of an athlete.

Cardiovascular endurance is the ability of the heart and lungs to supply oxygen throughout the body for a long time. Cardiovascular endurance is a major component of physical fitness. Cardiovascular endurance is one of the main elements of physical fitness. According to Muhajir and Jaja (2011) <sup>[12]</sup> that cardiovascular endurance is a person's ability to do work in a relatively long time. Other terms often used are respiratory-cardio-vascular-endurance, namely endurance related to breathing, heart and blood circulation.

Good endurance that an athlete has will affect the development of the athlete's own skills, because it will help an athlete in training and competition. For example, with good endurance, an athlete will be able to train for a longer time than an athlete with low physical fitness.

(Lutan, 2002) <sup>[10]</sup> states that cardiorespiratory endurance or in other terms cardiovascular fitness is considered the most basic component of physical fitness. Good cardiovascular fitness is an asset to show your appearance while in competition. Cardiovascular endurance or heart fitness means the efficiency of the circulatory system and respiratory system to supply oxygen to the muscles on an ongoing basis over a long period of time during activities.

Blood is a means of transportation in the human body. Blood grouping of an individual based on the presence or absence of inherited antigenic substances on the surface of the red blood cell membrane. This is due to the different types of carbohydrates and proteins on the surface of the red blood cell membrane. In other words, blood type is determined by the number of antigenic substances contained in red blood cells.

Blood group is the science of classifying blood from a group based on the presence or absence of a substance antigens inheritance on the membrane surface red blood cells. Matter this is due to the difference in types carbohydrate and proteins on the surface of the red blood cell membrane. The two most important blood types are the ABO and Rhesus (Rh factor) classifications. In this world actually known about 46 species antigens other than ABO and Rh antigens, it's just much less common (Andri & Hurmaly, 2013) <sup>[11]</sup>. Blood transfusion from an incompatible group can cause resulting immunological transfusion reaction hemolytic anemia, kidney failure, shock, and death.

Blood type is a special characteristic of the blood of an individual because of the different types of carbohydrates and proteins on the surface of the red blood cell membrane. Blood type is determined by the number of substances (later called antigens) contained in red blood cells (Fitri, 2007) <sup>[4]</sup>. The history of blood type development includes: since hundreds of years ago experts have argued that sufferers who lack blood such as people who experience heavy bleeding, such as accidents, wars, childbirth or bleeding diseases can be helped by adding blood into the patient's body.

According to experts, that blood type consists of several types and each has different characteristics and characteristics (Guyton & Hall, 2008) <sup>[6]</sup>. The currently dominant blood groups are blood groups A, B, AB, and blood group O. In this ABO blood group system, the principle applies that says that a person's serum will not precipitate the person's own red blood cells as well as other people's red blood cells. belong to the same class. So, blood serum from a person with blood group A will not agglutinate the red blood cells from a person with blood group A. The opposite also applies to serum from blood group B. Serum from a person with blood type AB cannot precipitate group AB red blood cells. nor can it agglutinate red blood cells of type A or group B. Type O red blood cells cannot agglutinate by serum from people with blood groups A, B, or AB (Sadikin, 2001) <sup>[16]</sup>. Many researchers and writers have revealed about the four blood groups about the character of each person who has a different blood type. Blood type is not only important to know for the benefit of blood transfusions. According to (Saraswati, 2015) <sup>[17]</sup> In addition to food, you are also required to exercise and it seems that every type of blood type has sports that are suitable for each type of training based on blood type, such as (a) Blood type O: it is more advisable to do sports that are draining, for example, aerobics or running or jogging. This

exercise is related to the endurance of the heart muscle, (b) Blood type A: Requires a more relaxed exercise, such as sports that reduce stress such as yoga, walking or tai chi, (c) Blood type B: Moderate exercise, for example climbing mountains, cycling, (d) AB blood type: Same as blood type A. Therefore, based on the background above, researchers feel interested in conducting research on "Comparison of cardiovascular endurance in basketball and softball athletes in Bone Regency in terms of blood type" with the hope that the results obtained in this study can be a good reference for coaches to provide training programs that match the endurance level of each athlete, as well as athletes can be a reference for choosing which sport is appropriate, as well as being a renewal research related to the effect of blood type on cardiovascular endurance.

## Materials and Method

This research is a type of comparative research, because in this study compares one variable with another variable. Comparative research is research that compares the presence of one or more variables in two or more different samples, or at different times (Nurhasan & Cholil, 2007) <sup>[14]</sup>. The population is the entire object of research or the object under study (Nursalam, n.d.) <sup>[15]</sup>. The population of this study were the basketball and softball athletes in Bone Regency.

The sample consists of an affordable part of the population that is used as a research subject through sampling. Sampling is the process of selecting a portion of the population that is representative of the existing population (Suherman, 2013) <sup>[19]</sup>. Sampling was carried out using the total sampling technique, namely the total population. Based on this theory, the sample to be used in this study is 18 people. Namely, consisting of 9 basketball athletes and 9 softball athletes, 6 each with blood type A, 6 people with blood type B, and 6 people with blood type O.

The implementation of the research begins with checking the blood group. Of the 18 samples, they were then divided into 3 groups which were differentiated based on blood type A, B, O. The physical activity given to the group is the bleep test.

The temporary answers to the research hypothesis are:

## Alternative Hypothesis

There is a comparison of cardiovascular endurance in basketball and softball athletes in Bone Regency in terms of blood type.

## Null hypothesis

There is no comparison of cardiovascular endurance in basketball and softball athletes in Bone Regency in terms of blood type.

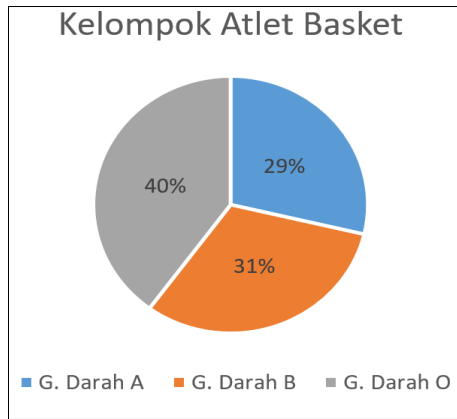
## Results and Discussion

In this study, data were obtained from the results of a comparison of cardiovascular endurance in softball and basketball athletes in bone district viewed from blood group, totaling 18 people who were divided into three groups, according to their blood type. In this case, namely the blood groups A, B, and O. The results of calculating the profile of the research subjects carried out can be seen in the following table.

**Table 1:** Summary of the results of a comparative descriptive analysis of cardiovascular endurance in softball and basketball athletes in Bone Regency in terms of blood type.

Variable	N	Means	SD	SUM	Min	max	Range
Blood type A basketball athlete	3	31.00	0.80	93.00	30.20	31.80	1.60
Blood type B basketball athlete	3	33.90	0.51	101.70	33.60	34.50	0.90
Blood type O basketball athlete	3	43.13	1.81	129.40	41.80	45.20	3.40
Blood type A Softball athlete	3	27.56	0.75	82.70	26.80	28.30	1.50
Blood type B softball athlete	3	35.70	1.85	107.10	33.60	37.10	3.50
Blood type O Softball athlete	3	41.56	0.97	124.70	40.50	42.40	1.90

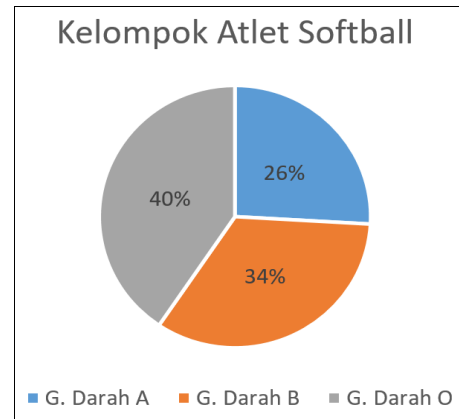
If it is displayed in the form of a bar chart on a group of basketball athletes, then the data is presented as follows:



**Fig 1:** Bar chart of the cardiovascular endurance of a basketball athlete

Based on Figure 1, it shows that the average cardiovascular endurance results in basketball athletes vary greatly, where blood type A has an average value of 31.00 = 29%. Blood type B 33.90 = 31% and blood type O 43.13 = 40%. Based on this description, it shows that blood group A has the lowest level of cardiovascular endurance, while blood type O is the blood group with the highest level of cardiovascular endurance for the basketball athlete group.

As for the softball athlete group, when displayed in the form of a bar chart, the data is presented as follows:



**Fig 2:** A bar chart of a softball athlete's cardiovascular endurance

Based on Figure 2, it shows that the average results of cardiovascular endurance in softball athletes vary, where blood type A has an average value of 27.56 = 26%. Blood group B 35.70 = 34% and blood type O 41.56 = 40%. Based on this description, it shows that blood group A has the lowest level of cardiovascular endurance, while blood type O is the blood group with the highest level of cardiovascular endurance for the basketball athlete group.

**Table 2:** Summary of the results of a comparative descriptive analysis of cardiovascular endurance in softball and basketball athletes in Bone Regency in terms of blood type.

Variable	Absolute	positive	Negative	KS-Z	asymp	Ket
Blood type A Basketball athlete	0.17	0.17	-0.17	0.30	1.00	Normal
Blood type B Athlete basketball	0.38	0.38	-0.28	0.66	0.76	Normal
Blood type O Basketball athlete	0.32	0.32	-0.23	0.56	0.91	Normal
Blood type A Softball athlete	0.18	0.18	-0.18	0.31	1.00	Normal
Blood type B softball athlete	0.31	0.22	-0.31	0.54	0.92	Normal
Blood type O Softball athlete	0.26	0.19	-0.26	0.45	0.98	Normal

Homogeneity test aimsto find out whether several groups of research data have the same variance or not.

**Table 3:** Homogeneity test results Summary of the results of the descriptive analysis of the comparison of cardiovascular endurance in softball and basketball athletes in Bone Regency in terms of blood type.

Levene Statistics	df1	df2	Sig.
3,671	2	6	0.91

Based on the results of the homogeneity test in table 3, the significance value is 0.91 > 0.05, so it can be said that the data is homogeneous.

**Table 4:** Results of the ANOVA test to see the comparison of bleep test athletes in Bone Regency softball and basketball athletes in terms of blood type.

Basketball athlete blood type			N	F	Sig
A	B	O	3	85.96	0.00

The results of ANOVA are used to determine the effect of the independent variables simultaneously and simultaneously on the dependent variable. From these results it can be seen that the significance value is 0.00, the value when compared with the alpha level is 0.05 which is smaller (0.00 < 0.05), so it can be concluded that there is a significant effect of blood groups A, B, and O on cardiovascular endurance.

The implementation of the research begins with checking the blood group. Of the 18 samples, they were then divided into 3 groups which were differentiated based on blood type A, B, O. The physical activity given to the group is the bleep test. The results of research conducted in the field show that these two sports, namely basketball and softball, both get different results between blood group comparisons where if seen statistically blood type O has better results in VO<sub>2</sub>Max measurements compared to blood group A and blood group B. Blood type O contains cellsmore red bloodcompared to blood group A and blood group B, shaped like a disc and has no core. Measures approx. 7.7 units (0.007 mm) in diameter, immovable. The amount is approximately 5 million in 1 mm<sup>3</sup> (41/2 million). The color is reddish yellow, because it contains a substance called hemoglobin, this color will increase red if it contains a lot of oxygen. Goes along with it (Gregory *et al.*, 2006) <sup>[5]</sup> Blood is a liquid cell consisting of two parts, namely blood plasma and blood cells. Blood cells are of three types namely erythrocytes, leukocytes and platelets. The ratio of blood volume to body weight is 1:12, or about 5 liters. Blood consists of several types of corpuscles that make up 45% of the blood. The other 55% is a yellowish liquid which forms the liquid blood medium called blood plasma.

The function of red blood cells is to bind oxygen from the lungs to be circulated throughout the body's tissues and binds carbon dioxide from body tissues to be excreted through the lungs. Oxygen binding and This carbon dioxide is carried out by hemoglobin which has been combined with oxygen called oxyhemoglobin (hb + oxygen 4 hb-oxygen) so oxygen is transported from all over the body as oxyhemoglobin which will be released after arriving in the tissues: hb-oxygen hb + oxygen, and so on. The Hb will combine with carbon dioxide and called hemoglobin carbon dioxide (hb + carbon dioxide hb-carbon dioxide) which carbon dioxide will be excreted in the lungs.Red blood cells (erythrocytes) are produced in the red bone marrow, spleen and heart.

From the data above, it can be concluded that the VO<sub>2</sub>Max level in terms of blood groups, namely blood groups A, B, and O, there are significant differences between the three blood groups where blood type O has a higher VO<sub>2</sub>Max level than other blood groups in both sports, namely basketball and softball.

The results of this study are in accordance with the theory put forward by (Saraswati, 2015) <sup>[17]</sup> namely sports that match blood type O are aerobic sports, namely those related to endurance, one of which is gymnastics. Meanwhile, students with blood type B have poor endurance, sports that are compatible with this blood are balanced, this means that it is advisable to do a little exercise that involves breathing and reducing stress such as futsal, tennis, basketball, volly ball, cycling, climbing mountains, badminton and swimming but also need to do weight training (Saraswati, 2015) <sup>[17]</sup>.

### Conclusion

Blood type O is stronger than other blood types, because blood type O has more platelets than other blood types so it can bind more oxygen Based on the results of data analysis, it can be concluded that:

There is a significant difference in the cardiovascular endurance of basketball and softball athletes in Kab. Bones between blood groups A, O, and B blood group O in basketball athletes have a better level of cardiovascular endurance than other blood groups, with a mean value = 43.13.

### Suggestion

So that the results of this study can be useful, the authors provide advice to readers. The author's suggestions as follows:

- It is expected that athletes will increase their knowledge about cardiovascular endurance by seeing or reviewing blood type activity.
- It is hoped that it can provide students with knowledge about cardiovascular endurance, this will greatly affect one's cognitive development
- The results of this study can provide input for teachers, coaches, to provide information to their students or athletes so that they should carry out activities to increase cardiovascular endurance.
- For readers, it is hoped that the results of this study can add insight into knowledge related to comparisons of cardiovascular endurance in terms of blood type.

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