Blood Groups and their Correlation with Physical Traits Affecting 100-Meter Performance

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Abstracts

Background. Sport training has an impact on other sciences. Among these sciences is physiology, in which emerged to form what is called sports physiology. The recent development in the science of physical education is one of the important factors in measuring and determining the nature of athletes' physical, physiological and biochemical adaptations and responses. The blood circulatory system is important as manifested in finding the relationship between some blood groups and the basic physical characteristics and the completion of the 100-meter race. Objectives. The aim of this study is to identify the types of blood groups and their relationship to some physical traits, and the completion of the 100-meter race for some student athletes. Methods. the descriptive approach was used for its suitability to the research problem. The sample consisted of the students of second stage in the Department of Physical Education and Sports Sciences at Al-Mustaqbal University in Iraq. It was 143 students (35%) of the original research sample. With the a 143 sample size , the calculated confidence is 34.95 with standard deviation of ±3.87. Results. The study finds out a positive correlation between blood groups and some physical traits. There is also a positive correlation between blood groups and 100-meter sprint achievement as indicated from the statically data analysis and supported by the mean values 5.6 for O blood grouping. Conclusion. the blood group of athletes can take a role and impact on the speed and muscular strength tests. according to the results of this study the athletes who have AB and O blood group are more likely to win in 100 sprint races.

Keywords: Blood group, physical trait, Performance, physiology, athletics.

Introduction

Sports training is witnessing a tremendous development these years especially in its relationship with other sciences. one of these sciences comes under the name sports physiology. This science studies various physiological aspects related to sports training [1,2]. The collection and analysis of data of athletes regarding their physical fitness is a very important parameter provided to support the development of team sports. Athletic monitoring can also have developed their

training programs for different games, whether individual or groups [3, 4]. The recent development in the sciences of physical education is one of the important factors in measuring and determining the nature of athletes physical, physiological and biochemical adaptations and responses [5,6]. The sporting activity is characterized by high speed and maximum strength in a short time. The best athletes how can produce a superior performance during sport specific tasks. The high muscular strength makes the individual to perform faster and greater task [7-9]. Therefore, the different functional responses of metabolic adaptation, molecular adaptations, and cardiovascular adaptation to the efficacy is characterized by prolonged velocity for a long period of time [10]. The physiological responses of physical education students lead to raising the level of the athlete and reaching a higher level. The main goal of the athlete in competitions is knowing these responses and changes that occur within the athlete's body to produce the necessary energy. Performance is one of the important matters resulting from increasing the activities involved in metabolic processes to achieve physiological adaptations in the systems body's vital and organs [11]. In fact, there is a relationship between blood groups and the potential of physiological factors that occur inside the human body and that blood is the main mover for the muscles of the body [12]. The recent advances in biochemistry technology and genetics clarified of the human blood group highlighted its role on the physical correlation. The functional classifications has associated with antigens concerning the structure of the A, B, H. and the enzymes produce them. The association antigens blood group with disease risks is established. This is affecting the nature of the work of the organs whether in health or disease [13]. It has been pointed out that the ABO blood group status has an associated with running time, with O blood type athletes performing better than those with non-O blood groups [14]. The sport science has taken a new direction in the study of physical and physiological characteristics that can have an important role in detecting the effects, responses, and physiological adaptations that occur to athletes as a result of the implementation of physical exercises [15]. The different physical characteristics have a relationship in some of the body's systems, including the circulatory system. Therefore, the aim of this research is manifest in finding the relationship between some blood groups and basic physical characteristics and the completion of the 100-meter race for students, considering that these variables are affected by blood groups, the type of exercised effort, the type of food or the type of energy that blood groups are thus affected by. The purpose of this study has two parts: first, to examine the relationship of blood groups to some physical characteristics among some second-year students in the Department of Physical Education and Sports Sciences, Al-Mustaqbal University. Second, to Identify the types of blood groups and their relationship to some physical traits and the completion of the 100-meter race for some students of the second stage - on these two parts of the study, the following research to investigate if there any relationship of blood groups to some physical characteristics among some second-year students, and the types of blood groups and their relationship to some physical traits and the completion of the 100-meter race for some students of the second stage.

METHODOLOGY

This research used a descriptive approach to suit the nature of the research and to achieve the objectives of the goal. The population size n is calculated using the following formula, equation 1.

$$n = \frac{z^2.p'(1-p')}{\varepsilon^2} \qquad 1$$

z : z score; p is ration 50/143; ε = 3.87 is the margin error calculated from the above equation by taking n=143. The confidence cl calculated (34.95±3.87) using equation 2.

$$Cl = p' \pm z.\sqrt{\frac{p'(1-p')}{n}} \qquad 2$$

The participants consisted of students of the second stage of the morning study in the Department of Physical Education and Sports Sciences - Al-Mustaqbal University. This study's participants were 143 students. The sample of the research was chosen by lottery, which consisted of students of the second stage by 50 students and their percentage was 35% of the students and the blood grouping distribution is A+12, AB+ 9, B+11 and O+ 18. The original research community. The descriptive statistics of the respondents' Blood types and anthropometric measurements are presented in Table 1.

Table 1. Blood types and anthropometric measurements for each player.

No	Blood Groups	Height Cm	Wight Kg	Age Year
1	A+	180	70	20
2	B+	175	61	21
3	B+	175	60	17
4	B+	180	60	20
5	AB+	167	75	23
6	AB+	175	65	23
7	A+	196	65	22
8	O+	176	80	19
9	O+	165	73	19
10	O+	178	85	22
11	AB+	170	63	20
12	B+	170	70	22
13	A+	175	64	23
14	O+	180	67	20
15	A+	173	65	20
16	O+	160	65	23
17	B+	176	56	23
18	O+	160	70	21
19	A+	175	65	19
20	B+	175	65	22
21	A+	174	72	20
22	O+	180	75	22
23	O+	181	74	20
24	A+	177	63	22
25	O+	180	65	19
26	O+	178	64	20
27	B+	180	70	22
28	A+	175	73	18
29	O+	170	75	22
30	O+	170	68	21
31	O+	178	67	22
32	A+	176	69	19
33	AB+	156	55	19
34	O+	176	71	20

35	O+	173	66	21
36	AB+	172	56	20
37	AB+	165	75	20
38	A+	181	80	20
39	AB+	175	67	20
40	AB+	156	60	19
41	O+	167	68	21
42	O+	165	68	21
43	B+	199	100	19
44	B+	179	66	20
45	A+	179	72	18
46	O+	176	56	20
47	B+	190	75	19
48	B+	180	70	22
49	A+	175	73	19
50	AB+	166	60	19

Exploratory experience

An exploratory experiment was conducted on 22th January 2024 on a sample of students of the second stage, with a total of 8 students who were randomly selected for the purpose of identifying: (1) Validity of tools and devices used in the research; (2) the time required for the necessary research procedures, and ;(3) to identify the blood groups that are equivalent or not.

Identify the four blood groups of the research sample

The blood groups were taken for the random research sample for each student, as the students' data was recorded in a special form, and after identifying the blood groups the blood groups were sorted according to the type like the others to integrate the number for each group.

MEASUREMENTS

Speed Test

The purpose of the test is to measure the speed of the students, the tools used in this research, a stopwatch, three parallel lines drawn on the ground, the distance between the first and second lines 10 meters, and between the second and third 30 meters.

Description of the test performance

The participant stands behind the first line, when hears the start signal, counts until crosses the third line. The time tested is calculated from the second line until the arrival of the third line 30 meter [16]. The conditions of the test: a) All contestants perform the test together to ensure the availability of the competition factor,; b) Every student must run in the lane designated for it; c) The student takes the high starting position at the first starting line. The registration was performed for the time record which takes to cut 30 meters from the second to the third line.

The muscle strength is considered a main part of the performance. It is an important component of the physical exam which can provide information about the fitness. Its evaluation can be indicative on differentiate the real weakness of lack of endurance or imbalance [17].

Description of the test performance:

The participant stands facing the two bars at one end of the parallelepiped, and when giving the start signal, the student jumps on the parallelepiped at the end so that rests on the hands, in a position where both arms are extending.

- The student begins by lowering his body down until the student bends the arms at a right angle, then starts pushing to extend the arms again.

- The student repeats bending and pushing as many times as possible without stopping until tired.

The conditions

- Do not stop while performing or swing the body while pushing up.

- Do not kick or bend the knees while pushing up.

- Only one attempt is allowed to the student.

Registration

- One extends is calculated for each correct and complete pushing.

- Gives half a degree if the bend reaches half the distance, and it is not allowed to calculate more than four halves.

Run Test 350 m Endurance.

The purpose of the test is to perform a General Endurance measurement using stopwatch, whistle measurement. The performance was indicated that the player stands behind the starting line and when the referee's whistle is heard, the players start running for 350 meters. The time taken for this test is calculated by the timer. The performance registration was conducted by measuring the time of each test through accrediting jury by the Iraqi Athletics Federation [18].

100-meter achievement test.

The goal of the test was to get an achievement for each athlete, using tools of playground athletics, manual stopwatches, registration forms, and support staff. The athletes start running for 100 meters after hearing the whistle from the referee. After that, the timer starts with the timing until reaching the finish line. The test is conducted collectively and only once. The recorder records the time of each player in a recording form prepared for this purpose in minutes and seconds to the nearest tenth of a second [19].

Ethical Considerations

At the beginning of data collection, all the patients were informed about the purpose of the study and the protection of their information, which was used only for the study (data whether in the public domain), data was collected with participant’s consent. The IBM SPSS software package for Windows, version 20 was used for the statistical analysis. The mean and standard deviation data were used to compare the continuous variables.

Statistical Analysis

The Statistical Package for Social Sciences (SPSS) software is widely used for statistical analysis, especially in education and research. The data were analyzed using SPSS version 22.0, IBM. The descriptive analysis of data was analyzed using means and standard deviations for the blood groups and 100-meter achievement scores with the test's total score.

RESULTS

The description analysis for information elements is shown in Table 1, each type of blood group in terms of A, B, O, AB for speed test was recorded. Table 1 tabulates the results of the blood group of speed test among students. The highest mean score and standard deviations of each blood group is an indication made by athletes during the speed tests.

The speed test was performed for all the participant as highlighted in Table 2 in which presenting the individual details. The results collected from the descriptive statistical analysis of the blood group in the speed test of athletics student revealed the A blood type came the first due to its score of (M = 5.8, SD = 0.79), followed by O blood type with (M = 5.6, SD = 0.86), and is B blood type (M = 5, SD = 0.63), and the last AB blood type (M = 4.6, SD = 0.86).

Table 2. Shows the mean and standard deviation of blood groups in the speed test.

No. of Participant	Blood types	Mean	SD
12	A	5.8	0.79
11	B	5	0.63
18	O	5.6	0.89
9	AB	4.6	0.86

Table 3 shows the results of the mean score and standard deviation of blood groups in the strength test to measure the arms and shoulders muscles. The results in this table show of the descriptive statistical analysis of the blood group in the strength test to measure the arms and shoulders muscles of the athletics student, the O blood type came the first due to its score of (M = 31.1, SD = 2.1), followed by A blood type with (M = 29.8, SD = 1.58), and the B blood type (M = 29, SD = 1.55), and the last AB blood type (M = 28, SD = 1.66).

Table 3. Mean and SD for blood groups in the strength test of the muscles of the arms and shoulders.

No. of Participant	Blood types	Mean	SD
12	A	29.8	1.58
11	B	29	1.55
18	O	31.1	2.1
9	AB	28	1.66

Table 4 displays the arithmetic mean and standard deviation of blood groups A, B, O and AB in the endurance test. It shows the results of the descriptive statistical analysis of the blood group in the endurance test of athletics student. The O blood type came the first due to its score of (M = 1.99, SD = 0.61), followed by B blood type with (M = 2.05, SD = 0.63), and the AB blood type (M = 2.45, SD = 0.69), and the last A blood type (M = 2.80, SD = 0.66).

Table 4. Mean and SD of blood groups in the endurance test.

No. of Participant	Blood types	Mean	SD
12	A	2.80	0.66

11	B	2.05	0.63
18	O	1.99	0.61
9	AB	2.45	0.69

Table 5 displays the arithmetic mean and standard deviation of blood groups A, B, O, and AB for the 100-meter running test. It shows the results of the descriptive statistical analysis of the blood group in the endurance test of the athletics student, the AB blood type came the first due to its score of (M = 10.45, SD = 0.78), followed by B blood type with (M = 10.49, SD = 0.77), and the A blood type (M = 10.54, SD = 0.75), and the last O blood type (M = 11.59, SD = 0.64).

Table 5. Mean and SD of blood groups for the 100-meter running test.

No. of Participant	Blood types	Mean	SD
12	A	10.54	0.75
11	B	10.49	0.77
18	O	11.59	0.64
9	AB	10.45	0.78

DISCUSSION

By examining data listed in Table 2 shows the values of the mean and the standard deviations of the blood groups with the variable of the speed test is correlated to the blood grouping, the less mean values the highest performance . There is a clear discrepancy in the values of the mean for blood groups and what found of the difference and variance in the values of the mean, also find in the standard deviation. This is evidence that each group has a specificity distinguished from the rest of the variables. From examining Table 2, which is exhibited blood group AB enjoyed the highest arithmetic mean. This indicated that people who own this blood type enjoy the element of speed better than their peers who have other blood types A, B, [16]. This finding in agreement with those reported by Giuseppe Lippi 2017 [17], which is drew a a clearer correlation the performance has some correlation with blood group especially group O beside the weekly training. In our finding, the people with blood type B and AB show almost same performance. The variation in mean value may attributed also to the different environmental conditions and healthy living conditions and combine the strong found in blood groups AB and B. Most of them are less affected by weather of high in temperature reaching 50^{o}C during the peak in summer, or cold in winter, and or high areas, but AB takes less sleep [18,19]. By examining Table 3, which shows the values of the arithmetic mean and the standard deviations of the blood groups in consideration of the strength test variable. We Found that there is a discrepancy in the values of the arithmetic mean for blood groups and revealed a difference and variance in the values of the arithmetic mean, also observed in the deviation values. The results show the superiority of individuals belonging to blood type O in the test of muscular strength [20]. This can be concluded that these individuals possess excellent muscle strength enabled them to take care of the correct performance and proper training conditions. They are able apply the principle of privacy and determine the speed of exercise performance according to the speed of performance required. These have superiority over the members of the rest of the groups in this capacity. When highlighting the contents of Table 4, which shows the values of the arithmetic mean and the standard deviations of the blood groups in the variable endurance. Found that there is a discrepancy in the values of the arithmetic mean for blood groups and at the same time found the difference and variance in the values of the standard deviations [21]. This is

evidence that each blood group has a specificity that is distinguished from the rest of the groups in the variable endurance. The results of table 4 shows the blood type O has the highest arithmetic mean and this indicates the people who own this blood type enjoy a well-rounded character that enables them a superiority over the rest of the members via the superiority in performing exercises and effort made for a long period of time [20]. They have the ability to maintain or raise the level of performance during competition. This is evidence of maintaining the level of speed of performance and increasing the number of repetitions. Table 5 shows the arithmetic mean values and standard deviations of the blood groups in the 100-meter race. found that there is a discrepancy in the arithmetic mean values of the groups. This is evidence that each blood group has a specificity that distinguishes it from the rest of the other groups in the variable investigated. The results show that blood type AB enjoyed the highest arithmetic mean. This indicated that students who have this blood type have a good level to complete the 100-meter race which they were able to perform the race with maximum strength mixed with the speed in the least possible time.

CONCLUSION

Although the weekly training is the major factor in the athletes performance which is effecting on the body's systems, including the physiological ones, cannot be denied. However, the effect of blood type on the performance level of athletes needs to be highlighted. According to the results of the research, a positive relationship was found between blood type and athletes' speed. It has also been proven that there is a positive relationship between blood type and muscle strength. The study resulted a variation in performance in related to blood grouping using running performance as the main testing parameters. The collected data using SPSS software reveled the athletes who have type AB and type O blood are faster and have muscle strength, making them more likely to win in 100 sprint races. However, our finding shows AB and O performance is higher than those of A and B while some published articles indicated of O the highest performance. We may attribute this result to the genetics structure in the are

APPLICABLE REMARKS

- This study focused on the correlation between blood groups and fundamental physical traits, such as speed in 100-meter sprint races and muscle strength among athletes. Through the correlation between blood groups, sports physiologists and practitioners can assess the differences in the blood groups of Iraqi athletes.
- This could help sports physiologists and practitioners foster the identified factors by designing proper and inviting physical instruments for athletes to promote active involvement in sports.
- Future research could explore the connection between blood groups and other physical characteristics of athletes, as well as investigate the relationship between athletes' blood groups and their performance in various sports

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AUTHORS' CONTRIBUTION

All authors contributed to the study's conception and design. Material preparation, data collection and analysis were performed by Zahraa Saad Azzawi, Hayder N. Jawoosh, and Harith Abdelelah Alshukri. The first draft of the manuscript was written by Zahraa Saad Azzawi, Hayder N. Jawoosh,. Harith Abdelelah Alshukri commented on previous versions of the manuscript. Abdul Amir H. Kadhum and Ruqaya Jameel Saad has done the article polishing and formulation and final approval. All authors read and approved the final manuscript.

CONFLICT OF INTEREST

The authors have no conflicts of interest related to the publication of this study.

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