



SHORT COMMUNICATION

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Correlation between ABO blood groups with the four factors of fitness

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Abstract

Physical fitness as an important factor in assessing a person's physical health and motor ability consists of various components such as endurance, strength, agility and flexibility. Due to the influence of various factors on physical fitness, this study examines the possible association of ABO blood groups as the oldest and most deeply rooted cause of genetic diversity with the four factors of physical fitness. This is a descriptive field study. The research population includes female students of Islamic Azad University Parand Campus that did not have a sports background. Using simple random sampling method based on a lottery a sample of 168 was selected for the study. Blood samples were identified by the laboratory experts and then all samples were examined anthropometrically and were placed into standard categories of determining the four factors of fitness including strength, cardiorespiratory endurance, muscular endurance, flexibility and agility. The obtained data was studied using descriptive statistics parameters like index, median and mean frequency table and were then analyzed using inferential statistical indices of T test and analysis of variance (Anova). ANOVA together with Tukey's post-hoc test was used to determine differences between the groups. The statistical tests of this research were conducted using SPSS software. After completion of the statistical tests no significant difference was found between blood groups and the four factors of physical fitness. In other words, the type of blood group factors and the potential impact of other factors will not affect the fitness of the physical capabilities of the blood.

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Introduction

Physical fitness as the most important factor in evaluating physical health and motor ability includes the ability to live as a balanced and complete person. From an athletic viewpoint physical fitness is the body's ability to perform physical activities, which includes various components such as endurance, strength, agility and flexibility (Caspersen *et al.*, 1985). Studying the four of these factors could represent an individual's physical fitness and can be measured through standard field tests. Physical fitness levels are strongly influenced by such various factors as regular exercise. However, other factors such as living conditions, nutrition, and individual and genetic differences also influence physical fitness (Dishman *et al.*, 1985).

Among the most important genetic differences is that between blood groups. Blood group is the oldest and most entrenched difference seen in humankind. Some anthropologists believe human classification on the basis of race is no absolute difference blood type is the key factor in similarities between individuals (Abdollahi *et al.*, 2009). Among the various classifications of blood groups ABO classification is the most important and the most practical from a clinical and transfusion point of view. Today, the effects of different ABO blood groups is widely considered in determining the proper nutrition method peculiar to each group in order to achieve the highest level of health. Also the effect of this difference in the risk of cardiovascular diseases (Abdollahi *et al.*, 2009), cancer (Slater *et al.*, 1993), infections (Garrison *et al.*, 1976), asthma (Bijanazadeh *et al.*, 2009), ability to lose weight and subcutaneous fat (Gregory *et al.*, 2005), the structural and morphological differences (Beom *et al.*, 2007), stress and mood in patients with any blood type, appropriate physical activity for each blood group (Rogers *et al.*, 2003) and even during the length of life has been studied by various researchers.

However, due to the close relationship between physical abilities and motor skills and physiological

differences and, at the top of the pyramid, the difference in blood groups the possibility of ABO blood groups apart from physical fitness factors seems to be considerable. This study aims to measure the physical abilities of students after controlling other influential factors and tries to clarify the relationship of ABO blood groups with the four factors of physical fitness.

Materials and methods

This research is a descriptive field correlation study. In the first step after providing a questionnaire on health status, exercise background, and general features, students are evaluated anthropometrically by experts and their height and weight and subcutaneous fat were to calculate and recorded for BMI measurements. The students ranging 20 to 30 years of age with BMI in the normal range, with no history of sport in full health, were selected to continue the project and this was done to control potential contributing factors and to increase the generalizability of the study.

Secondly, after obtaining written consent including the unconditional agreement of the subjects, blood samples were taken to determine their blood groups. After determining their blood groups, the students participated in standardized tests in order to record their physical fitness statistics and the records of four tests of physical fitness associated with cardiovascular endurance (540 m and 1,200 m running tests), flexibility (board flexible test), muscular endurance (sit-ups test) and agility test (9 × 4m) were recorded. Finally, the data were incorporated in SPSS software and using descriptive statistics including mean, variance, and frequency distribution and ... the data were described as a whole and individually for the samples for each of the blood groups. Inferential statistics indicators such as ANOVA and Spearman coefficient were used to investigate the correlation between ABO blood groups with physical fitness factors.

Results

In this study the interaction of ABO blood groups with factors of physical fitness was examined. The mean and standard deviation (0.77 ± 2.71) was calculated to test cardiovascular endurance suggesting that the subjects are in a relatively proper condition in terms of this factor. Also small standard deviation indicates the similarity of the subjects in terms of cardiovascular endurance, however, after the hypothesis test as to the difference in cardiorespiratory endurance of ABO blood groups there was no significant difference in the magnitude of this factor in the different

ABO blood groups ($p \geq 0.05$). The mean and standard deviation calculated on the other hand suggest that the subjects are not in good condition in terms of agility, body muscle endurance, flexibility, and the large standard deviation, reminds that the subjects are dissimilar in terms of these factors, but after hypothesis testing no significant difference was seen in these factors in the different ABO blood groups ($p \geq 0.05$). Comparison of the means based on sub blood groups such as A-, - B- and ... again showed no difference in terms of physical fitness between the blood groups ($p \geq 0.05$) (Table 1).

Table 1. Analysis of physical fitness factors.

Physical Fitness Factors	Source of changes	Sum of Squares	Degree of freedom	Mean square	F	Sig
Cardiovascular endurance of blood groups	Variance between groups	0.657	3	0.219	1.135	0.337
	Variance within groups	30.112	156	0.193		
	Total	30.769	159	---		
Flexibility of blood groups	Variance between groups	96.64	3	32.21	0.631	0.596
	Variance within groups	8379.74	164	51.09		
	Total	8475.99	167	---		
Local muscle endurance	Variance between groups	120.89	3	40.29	0.558	0.643
	Variance within groups	11841.75	164	72.2		
	Total	11962.64	167	---		
Agility	Variance between groups	5.147	3	1.716	2.14	0.097
	Variance within groups	132.015	165	0.8		
	Total	137.162	168	---		

Discussion

Flexibility as an important factor in physical fitness includes the ability of the joints and tendons to stretch and to produce smooth movements (Gregory, 2005). This factor is directly related to sports injuries (Glyn, 1954). A recent study found a significant correlation between ABO blood groups and the muscular structure which resulted in O blood group trait against rupture of muscular tendons (Beom *et al.*, 2007). In another study, there was no relation between blood groups muscle flexibility (Kunher *et al.*, 2005).

This study found no significant difference between flexibility and different blood groups among the

samples in other words the different ABO blood groups do not differ in terms of flexibility. This finding could be due to differences in muscle structures as an uncontrollable factor (Didem *et al.*, 2010).

After performing statistical calculations no significant association was found between muscular endurance and ABO blood groups. This result is confirmed by Pouri's study on bicep muscle endurance among teenage students (Kelso *et al.*, 1994).

This result can be attributed to different types of fast-twitch muscle fibers and slow-twitch muscles in

individuals. A research on diversity and the combination of these two types of muscle fibers in the different blood groups compared with the agility factor in ABO blood groups and no significant differences were found between ABO blood groups and agility factor (Beom *et al.*, 2004; Nydegger *et al.*, 2003).

This relationship has not been studied in any research project so far and this lack of correlation could be due to the effects side factors including subcutaneous fat or lack of coordination of the neuromuscular system in different individuals.

To sum up it can be said the present study revealed no significant relationship between the four factors of physical fitness including cardio-respiratory endurance, muscular endurance, flexibility and agility and the different ABO blood groups.

Nevertheless, the number of available blood type was different from the others and due to this distribution with 37.3 percent frequency of O- blood group to 10.1 percent of AB blood group the results of the study may have been affected. This factor, combined with the low number of samples can have influenced the obtained results.

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