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Analysis of the influence of blood groups of children on their speed and agility components of motor ability measured by the obstacle race component of the Scott motor ability test

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Abstract
Sports performance depends on several factors, and genetic factors are particularly important, potentially heavily influencing motor ability and consequent sports performance. The effect of blood groups on the motor ability component, as measured by the obstacle race performance, was analysed. A total of 294 boys and girls aged 13 to 16 were tested on their obstacle race performance using the Scott Motor Ability Test protocol, with blood group information collected. Analysis of Variance showed a significant difference (obtained F of 3.985 at 0.005 level) among the four groups for their obstacle race performance (table value of 2.69 at P of 0.0004) and further post hoc analysis indicated that the O and B blood groups showed dominating performance in their obstacle race performance, but O group showed significant performance difference of all the other three groups, and hence it was concluded that the blood groups of the children played a significant role in terms of achieving better obstacle race performance of the motor ability test, more specifically the O and B blood group children of the study.

Keywords: Blood groups, motor ability, obstacle race, speed and agility.

Introduction

Introduction and premise for the study

Physical performance and sports talent are influenced by genetic and epigenetic factors, as well as training, nutrition, and environment. Of these, genetics significantly determines an individual's natural tendency for physical performance and high-level sports achievement. Nurture, through activities such as scientific training, can support the expression of genetic potential, helping individuals reach their highest performance standards. Genetics, including the types of blood groups of individuals, not only influences performance expectations [1] but also affects recovery from injuries and intense training. Additionally, neuropsychologists suggest that genetics can impact an individual's ability to manage competition anxiety. In summary, genetics plays a crucial role in both the preparation and ongoing development of athletes, with inherited traits sometimes giving certain children an advantage in mastering complex sports skills.

It is important to examine how genetics, particularly blood groups, influence schoolchildren's ability to perform complex motor abilities, including speed [2] and agility in sports. Success in these skills is shaped by specific motor abilities such as agility, speed, coordination, and coupling. Some children acquire motor skills more quickly and comfortably, likely due to genetic factors that provide physical, physiological, and neurological advantages. Consequently, their level of motor educability can differ significantly from others'. Several factors, such as proprioception ability, muscle physiology, neuromuscular adaptations and facilitations, and several other metabolic adaptations, are highly essential for exhibiting a high level of motor educability among children, and hence genetics could play a vital role in terms of deciding the level of motor educability and the consequent motor ability of the children. While training further shapes these abilities, those with genetic advantages often achieve better results. Therefore, genetic research into sports performance has become crucial, especially as children begin training at young ages. Specialists and coaches increasingly seek to understand genetic markers relevant to athletic development. Among these markers, blood groups may play an important role in determining metabolic and performance factors [3], including those affecting speed and agility. This doctoral study, conducted at the Department of Physical Education and Sports, Osmania University, Hyderabad, India, specifically examines how blood group affects speed and agility in schoolchildren.

Methodology

In this study, the children's speed and agility component of motor ability was analysed by their blood groups, which is a potential genetic component of them. School children in the age group of thirteen to sixteen were identified for this study and were tested on their motor ability test item, the basketball throw. A total of two hundred and ninety-four boys and girls from different schools in Hyderabad participated in this study. This being an invasive study, full information was provided to the human ethics committee of Osmania University from time to time, and the study was conducted under strict supervision. The blood collection and other processes were conducted strictly adhering to the rules of human ethics of the Geneva Convention rules and the results were verified. Obstacle race item of the Scott Motor Ability Test was conducted under the expert physical education teachers and athletics coaches, and the readings were accurately recorded for further statistical analysis. Analysis of Variance (ANOVA) at a significant level of 0.05 was done, and the results were verified for further discussion and drawing conclusions from the study.

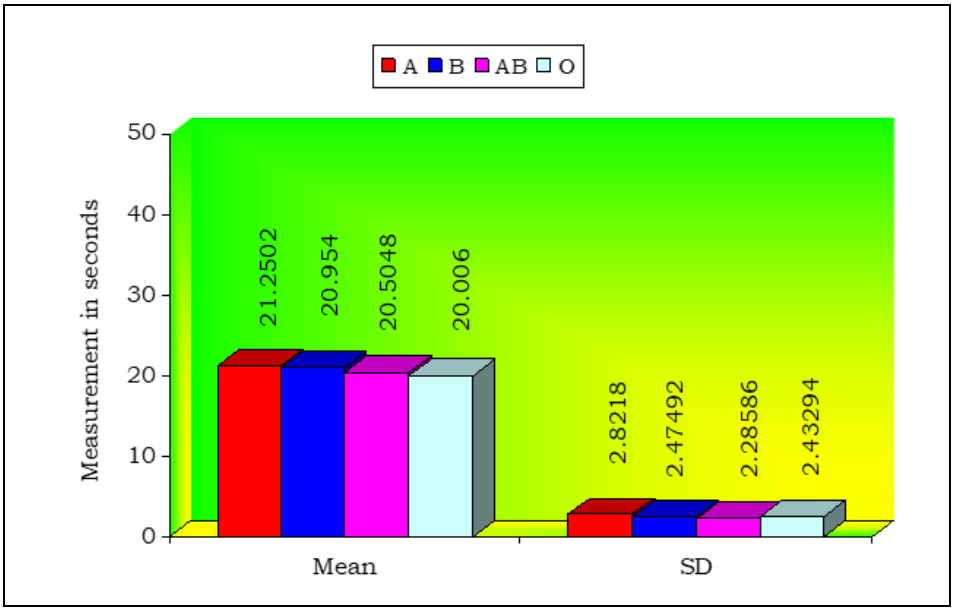
Results of the study

Both descriptive and analytical statistics were applied to understand the data on the Obstacle race timing of the children about their blood groups. Table 1 depicts the descriptive statistics explaining the mean and standard

deviations for the four blood group children with respect to their obstacle race timings. As per the table, O blood group children showed the highest speed and agility as their obstacle race timing was the least recorded, i.e., 20.006 seconds, when compared to the AB group at 20.504 seconds, the B group with 20.953 seconds and A blood group children with 21.25 seconds. Graph 1 presents the same information.

Table 1: Mean, Standard Deviation for Obstacle Race Timings

Blood group	Obstacle Race		
	No.	Mean	SD
A	52	21.250192	2.8218013
B	106	20.953962	2.4749233
AB	23	20.504783	2.2858594
O	113	20.006018	2.4329415



Graph 1: Mean and Standard Deviation of four blood group children

Table 2 depicts the Analysis of variance results for the obstacle race for the four blood group children of the study. The table clearly indicates that there is a significant difference among the four groups of the study with respect to their obstacle race performance of the Scott Motor Ability test, as the obtained F value, i.e., 3.985, is much higher when compared to the table value of 2.60 at a P value of 0.0008. Hence, the post hoc consideration test was done using Scheffé's Least Significant Difference. The table clearly indicates that the groups differ among themselves, and the difference between the blood group O and B was significant, and also the difference between the Blood group O and A was significant, and there were no other significant differences observed among other group combinations.

Table 2: Analysis of Variance (ANOVA) for Obstacle race timings

Obstacle race	df	Sum of squares	Mean square	F	Sig.
Between groups	3	75.32	25.10	3.985	0.008
Within groups	290	1827.14	6.30		

Table 3: Post Hoc test using the Least Significant Difference of Scheffé's

(I) Blood	(J) Blood	Obstacle Race		
		Mean Difference (I-J)	Std. Error	Sig.
A	B	.2962300	.4249732	.486
	AB	.7454097	.6285685	.237
	O	1.2441746*	.4206188	.003
B	A	-.2962300	.4249732	.486
	AB	.4491797	.5773851	.437
	O	.9479446*	.3394044	.006
AB	A	-.7454097	.6285685	.237
	B	-.4491797	.5773851	.437
	O	.4987649	.5741877	.386
O	A	-1.2441746*	.4206188	.003
	B	-.9479446*	.3394044	.006
	AB	-.4987649	.5741877	.386

Discussion on results

The results of the study suggest that blood groups may influence children's speed and agility, as measured by the obstacle race test item of the Scott Motor Ability test. The findings clearly show that children with O and AB blood groups perform better in the obstacle race compared to those in the B and A groups. Among all four groups, children with the O blood group demonstrate significantly better results in speed and agility, indicating a clear advantage in obstacle race performance. This suggests that the O blood group

might provide some benefit to children in terms of their speed and agility. These findings support the idea that genetic factors, such as blood type, may play a significant role in motor abilities and influence children's physical and sports performances[4]. However, it may be difficult to attribute a significant reason or causative factor for this variation among the children of the study. The analysis may be highly essential to understand the effect of the blood groups on more aspects of motor ability, and physical fitness components, to further understand and to have proper training protocols for the better and improved training programs that may cause effective sports performance changes among the individuals.

Conclusion

Based on the results of the study, it is concluded that the blood group O may have a dominating effect on the obstacle race performance of the children of the study and may have a positive effect on their motor ability in terms of better physical performances when compared to the other blood groups.

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