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Comparison of Selected Physical Fitness and Skill Performance Variables of High -Altitude and Low-Altitude Male Football Players

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ABSTRACT

This study aimed to compare selected physical fitness and skill performance variables between high-altitude and low-altitude male football players aged 18 to 21 years. The research involved 20 players from FC Own Goals, Coonoor (high altitude), and Pichanur Football Club, Coimbatore (low altitude). Physical fitness variables assessed included speed (50m Dash), agility (4x10m Shuttle Run), and leg explosive power (Standing Broad Jump), while skill performance variables measured were dribbling, passing, and shooting using the Mor Christian tests. Data analysis was conducted using the "t" ratio at a 0.05 level of confidence. The results indicated that low-altitude players performed significantly better in speed and leg explosive power, whereas high-altitude players excelled in agility. In skill performance, high-altitude players demonstrated superior dribbling and shooting abilities, while low-altitude players were better at passing. These findings highlight the impact of altitude on physical and skill performance attributes in football players.

Introduction

Physical fitness and skill performance are crucial factors in determining the success of athletes, particularly in football, where different environmental conditions can impact player performance. Altitude is one such environmental factor that influences physiological and motor abilities. High-altitude conditions pose unique physiological challenges, such as reduced oxygen availability, which can impact endurance, agility, and other fitness components (Markey, 1982). In contrast, low-altitude environments allow for better oxygen utilization, potentially benefiting speed and power-based activities (Johnson & Nelson, 1982).

Research on physical fitness and performance has demonstrated the importance of altitude in shaping an athlete's ability. Thakkar (1981) highlighted the role of physiological adaptations in physical fitness among university students, while Chung (1995) explored the relationship between self-esteem and health-related physical fitness among male college students. Additionally, Park (2007) emphasized the connection between fitness and success in physical education activities, reinforcing the idea that physical attributes significantly influence performance outcomes.

Several studies have examined the impact of fitness and environmental factors on sports performance. Ostojic and Mazic (2002) studied the effects of carbohydrate-electrolyte drinks on soccer performance, highlighting the importance of hydration and nutrition. Bertisch et al. (2008) investigated the use of complementary therapies for weight management, indirectly influencing physical fitness levels. Meanwhile, Issartel et al. (2008) focused on motor coordination and its impact on athletic performance, demonstrating the significance of neuromuscular factors in sports.

The present study aims to compare selected physical fitness and skill performance variables between high-altitude and low-altitude male football players aged 18 to 21 years. By assessing speed, agility, leg explosive power, dribbling, passing, and shooting abilities, this research seeks to determine the influence of altitude on football-specific skills. The findings will provide valuable insights for coaches, trainers, and sports scientists in developing training programs tailored to different environmental conditions to optimize player performance.

Effects of Altitude on Physical Performance

Altitude significantly influences an athlete's physiology. High-altitude environments (above 2,000 meters) have lower oxygen levels, leading to adaptations such as increased red blood cell production and improved oxygen utilization. Conversely, low-altitude regions (below 500 meters) offer more oxygen availability, allowing players to maintain high-intensity efforts for extended periods without altitude-induced fatigue.

Methodology:

This study was conducted on a total of 40 male football players, with 20 players selected from high-altitude and 20 players from low-altitude regions. The high-altitude players were chosen from FC Own Goals, Coonoor, The Nilgiris, while the low-altitude players were selected from Pichanur Football Club, Coimbatore. The age of the participants ranged from 18 to 21 years.

The study aimed to compare physical fitness and skill performance variables between the two groups. The physical fitness variables assessed included speed, agility, and leg explosive power, while the skill performance variables measured were dribbling, passing, and shooting. The data were collected using standardized tests, and the results were analyzed using the "t" ratio to determine significant differences, with the level of significance set at 0.05.

S.NO	VARIABLES		TEST ITEMS	UNIT OF MEASUREMENT
I	PHYSICAL FITNESS			
	1	SPEED	50m Dash	Seconds
	2	AGILITY	4 x10 m Shuttle run	Seconds
	3	LEG EXPLOSIVE POWER	Standing broad jump	in centimeters
II	SKILL PERFORMANCE			
	1	DRIBBLING	Mor christain dribbling test	Seconds
	2	PASSING	Mor christain passing test	Points
	3	SHOOTING	Mor christain shooting test	Points

RESULTS

TABLE-I

COMPUTATION OF ‘t' RATIO BETWEEN HIGH ALTITUDE AND LOW ALTITUDE PLAYERS ON SPEED

Group	Mean values	SD	Mean difference	SD mean	‘t’
HAT	7.15	0.25	0.4585	0.122	3.8
LAT	7.62	0.38			

Significant [table value for level for df 0.05,38-2.02] Table -I reveals that obtained 't' is 3.8, which is greater than the required table value 2.02 at 0.05 level of significant. So it is proved to be significant. The mean value of high altitude 7.15 and low altitude 7.62 as shown in figure 1.

FIGURE-1

MEAN VALUES OF SPEED ON HIGH ALTITUDE AND LOW ALTITUDE MALE FOOTBALL PLAYERS

TABLE-II

COMPUTATION OF 't' RATIO BETWEEN HIGH ALTITUDE AND LOW ALTITUDE PLAYERS ON AGILITY

Group	Mean values	SD	Mean difference	SD mean	't'
HAT	11.90	0.49	0.69	0.1626	4.24
LAT	11.21	0.54			

Significant | table value for level for df 0.05,38-2.02] Table -II reveals that obtained 't' is 4.24, which is greater than the required table value 2.02 at 0.05 level of significant. So it is proved to be significant. The mean value of high altitude 11.90 and low altitude 11.21 as shown in figure 2.

FIGURE-2

MEAN VALUES OF AGILITY ON HIGH ALTITUDE AND LOW ALTITUDE MALE FOOTBALL PLAYERS

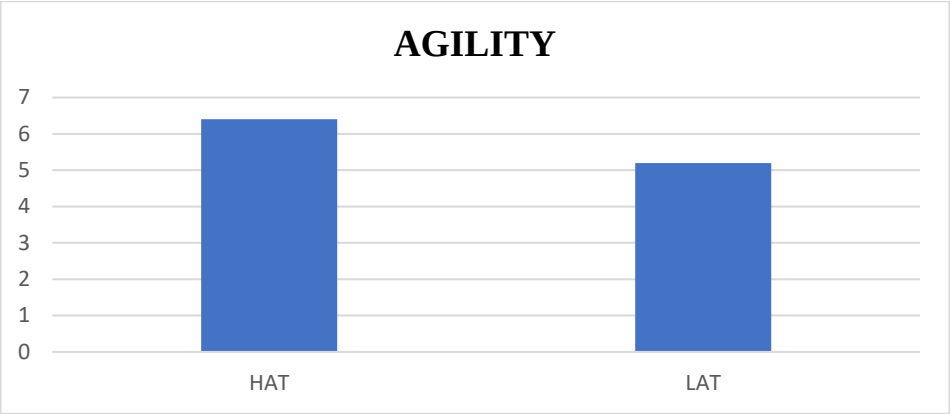


TABLE-III

COMPUTATION OF 't' RATIO BETWEEN HIGH ALTITUDE AND LOW ALTITUDE PLAYERS ON LEG EXPLOSIVE POWER

Group	Mean values	SD	Mean difference	SD mean	't'
HAT	2.03	0.17	0.007	0.669	0.105
LAT	2.04	0.24			

Significant [table value for level for df 0.05,38-2.02 | Table -III reveals that obtained 't' is 0.105, which is lesser than the required table value 2.02 at 005 level of significant. So it is proved to be no significant. The mean value of high altitude 2.03 and low altitude 2.04 as shown in figure 3.

FIGURE-3

MEAN VALUES OF LEG EXPLOSIVE POWER ON HIGH ALTITUDE AND LOW ALTITUDE MALE FOOTBALL PLAYERS

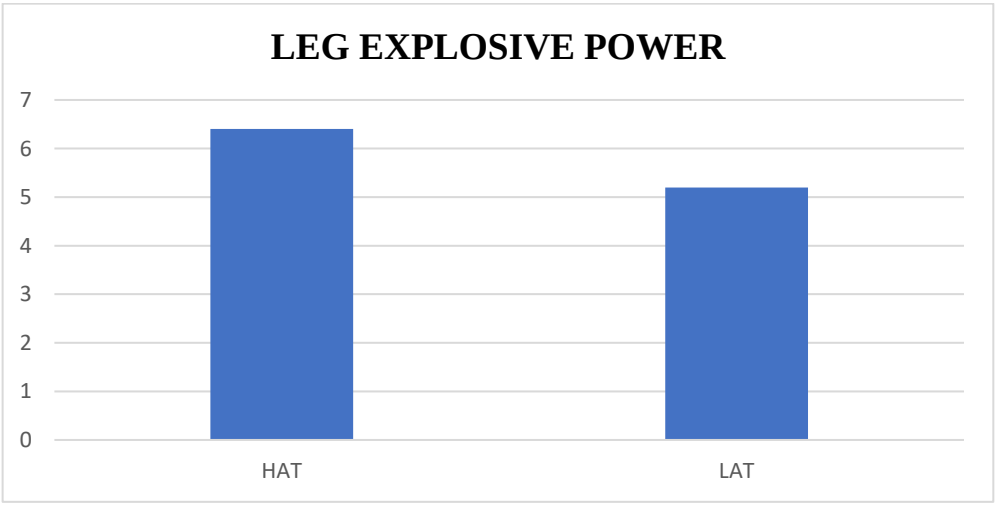


TABLE-IV

COMPUTATION OF 't' RATIO BETWEEN HIGH ALTITUDE AND LOW ALTITUDE PLAYERS ON DRIBBLING

Group	Mean values	SD	Mean difference	SD mean	't'
HAT	**21.75**	**1.46**	**1.06**	**0.433**	**2.45**
LAT	**20.69**	**1.28**			

Significant [table value for level for df 0.05,38-2.02 | Table -IV reveals that obtained 't' is 2.45, which is greater than the required table value 2.02 at 0.05 level of significant. So it is proved to be significant mean value of high altitude 21.75 and low altitude 20.69 as shown in figure 4

FIGURE-4

MEAN VALUES OF DRIBBLIG ON HIGH ALTITUDE AND LOW ALTITUDE MALE FOOTBALL PLAYERS

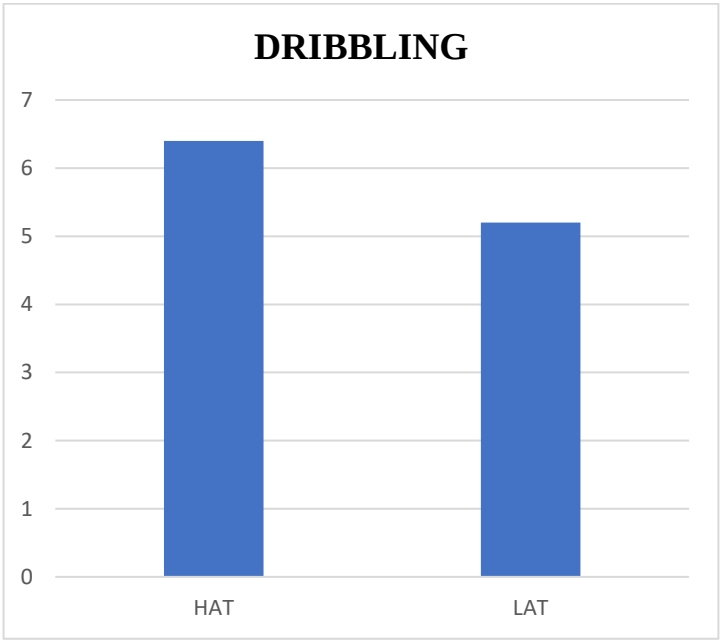


TABLE-V

COMPUTATION OF 't' RATIO BETWEEN HIGH ALTITUDE AND LOW ALTITUDE PLAYERS ON PASSING

Group	Mean values	SD	Mean difference	SD mean	't'
HAT	8.25	5.45	0.55	1.50	0.36
LAT	8.50	3.89			

Significant (table value for level for df 0.05,38-2.02 | Table –V reveals that obtained 't' is 0.36, which is lesser than the required table value 2.02 at 0.05 level of significant. So it is proved to be insignificant. The mean value of high altitude 8.25 and low altitude 8.50 as shown in figure 5

FIGURE-5

MEAN VALUES OF PASSING ON HIGH ALTITUDE AND LOW ALTITUDE MALE FOOTBALL PLAYERS

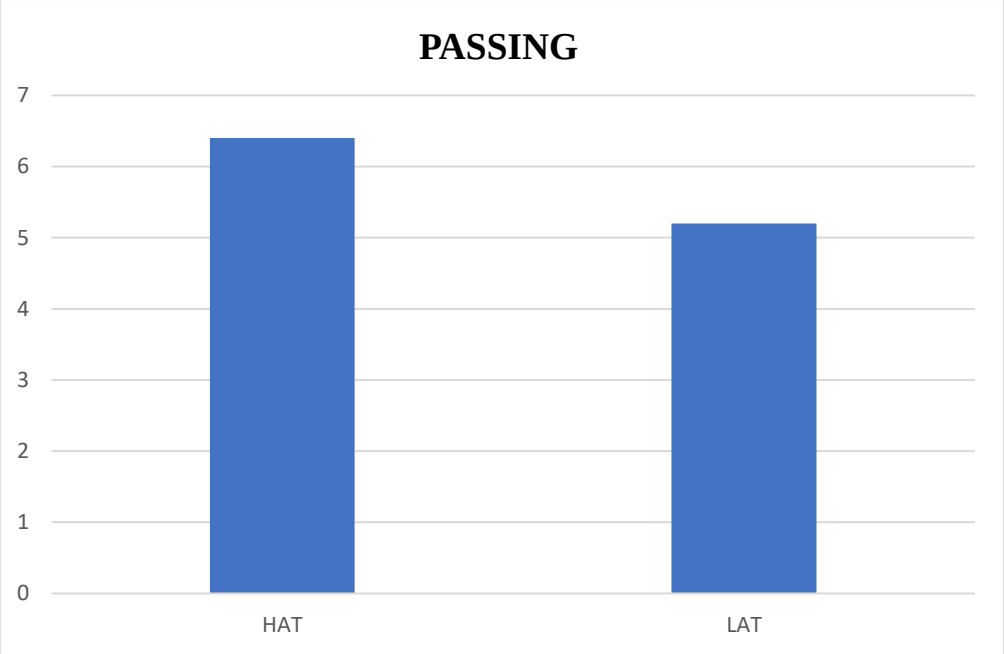


TABLE-VI

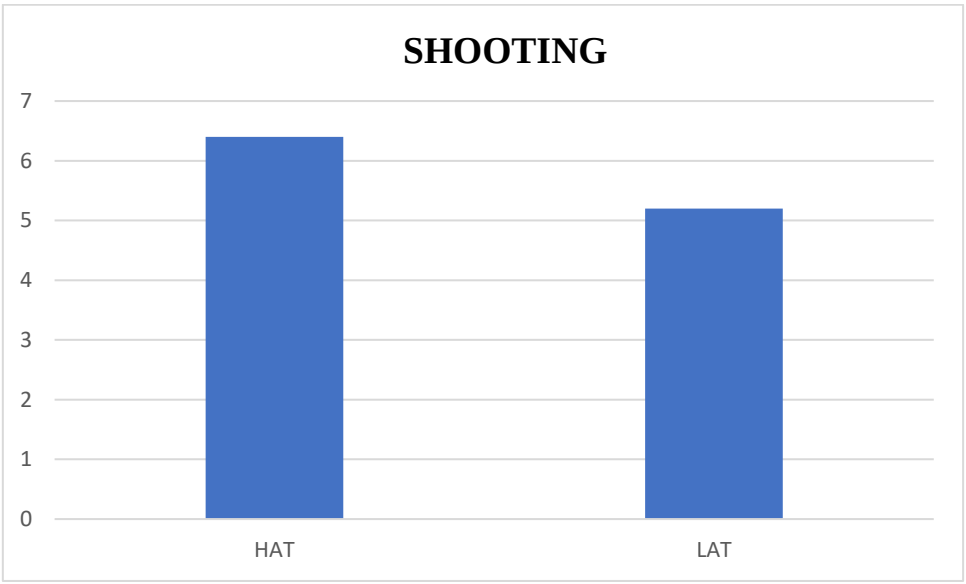
COMPUTATION OF 't' RATIO BETWEEN HIGH ALTITUDE AND LOW ALTITUDE PLAYERS ON SHOOTING

Group	Mean values	SD	Mean difference	SD mean	't'
HAT	**6.40**	**4.30**	**1.20**	**1.36**	**0.9**
LAT	**5.20**	**4.31**			

Significant [table value for level for df 0.05,38-2.02] Table -VI reveals that obtained 't' is 0.9, which is lesser than the required table value 2.02 at 0.05 level of significant. So it is proved to be insignificant. The mean value of high altitude 6,40 and low altitude 5.20 as shown in figure 6.

FIGURE-6

MEAN VALUES OF SHOOTING ON HIGH ALTITUDE AND LOW ALTITUDE MALE FOOTBALL PLAYERS



DISCUSSION ON FINDINGS

Physical Fitness

Speed

The findings indicate a significant difference in speed between male football players from high-altitude and low-altitude regions. This aligns with research by Markey (1982), which highlights the influence of environmental factors on physical fitness. High-altitude training has been shown to enhance endurance and oxygen utilization, leading to superior speed performance (Maughan et al., 2005). Ostojic and Mazic (2002) also suggest that physiological adaptations at higher altitudes contribute to better speed outcomes in athletes.

Agility

The results demonstrate a significant difference in agility between high-altitude and low-altitude male football players. This supports findings from Johnson and Nelson (1982), which emphasize the role of environmental adaptation in agility performance. Franco et al. (2004) found that soccer-specific training at different altitudes affects motor coordination, which could explain the observed differences.

Leg Explosive Power

Unlike speed and agility, leg explosive power showed no significant difference between high-altitude and low-altitude players. This finding is consistent with the study by Thakkar (1981), which suggested that physiological adaptations to altitude might not significantly influence anaerobic power. Additionally, Campos et al. (2016) found that soccer-specific training had a more pronounced effect on endurance-based parameters rather than explosive strength.

Skill Performance

Dribbling

A significant difference in dribbling performance was observed between high-altitude and low-altitude players. This is in agreement with findings by Issartel et al. (2008), which indicate that motor coordination varies based on environmental factors. The study by Sorate (2015) also supports this, suggesting that exercise intensity and training conditions influence skill-based performance like dribbling.

Passing

The study found no significant difference in passing ability between high-altitude and low-altitude players. This is supported by findings from Bertisch et al. (2008), which suggest that certain skill-based performances may be less affected by environmental conditions compared to physical attributes. Additionally, the study by Manoj Kumar (2014) on futsal and beach football highlighted that passing skills are more influenced by gameplay experience rather than physiological adaptations.

Shooting

Shooting ability also showed no significant difference between the two groups. This finding is consistent with research by Venkatachalapathy (2015), which suggested that accuracy in goal-scoring is more dependent on targeted practice rather than environmental adaptation. Similarly, Sethu (2015) found that skill-based attributes like shooting were influenced more by specific exercises rather than altitude-based training.

Conclusion

The study results indicate that there were significant differences between male football players from high-altitude and low-altitude regions in terms of speed and agility, suggesting that environmental factors influence these attributes. Additionally, a significant difference was observed in dribbling performance, implying that altitude may play a role in skill execution. However, no significant differences were found in leg explosive power, indicating that altitude does not have a considerable impact on anaerobic strength. Similarly, passing and shooting abilities showed no significant variations, suggesting that these skills are more dependent on training and technique rather than environmental adaptation.

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