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Skill Performance Among Young Soccer Players From Hilly Regions In Relation To Their Physical Fitness Components

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Abstract

The present study was designed to investigate the relationship between skill performance and physical fitness components among young female soccer players from hilly regions of Nagaland. A total of 50 subjects, all represented the state at National Level, aged 16-20 years, were selected for the study. Skill performance was measured using the Mor and Christian Soccer Playing Ability Test. The physical fitness components assessed include speed, cardiovascular endurance, agility, flexibility, and explosive leg strength. Pearson Product Moment Correlation was used to analyze the obtained data. The study's result shows positive correlations between speed and dribbling, agility and dribbling, explosive leg strength and dribbling. However, no significant correlation was found between cardiovascular endurance and shooting or passing. The findings suggest that players from hilly areas, where physical demands like climbing steep terrain are common, may have an advantage in developing speed, agility, and strength, which enhance dribbling skills. The study highlights the need for specialized training that balances physical fitness and skill development, especially for players from unique environments like hilly regions.

Keywords: Skill performance, physical fitness components, young female soccer players, hilly regions, speed, agility, dribbling

INTRODUCTION

The game of soccer has become extremely popular because of its explosive, short intermittent activities that can change game scores suddenly, such as changes in direction, sprinting, jumping, and kicking the ball (Stolen, Chamari, Castagna, & Wisloff, 2005). Another reason for its popularity is that it is unpredictable, acyclical, and intermittent with uniqueness through its variability (Bloomfield, Polman, & Donoghue, 2007). A player's success in soccer depends on a complex multidimensional performance that is influenced by technical, tactical, physical, anthropometric, and mental factors (Kokstejn & Musalek, 2019). It may be said that physical fitness is the most important determinant of sports performance (Kariyawasam, Ariyasinghe, Rajaratnam, & Subasinghe, 2019). Physical fitness is defined as the capacity to perform daily activities with vitality and sharpness, without undue fatigue, while appreciating the recreation time interests and facing unpredicted emergencies (Singh & Singh, 2017). Physical fitness components are classified as health- and skill-related fitness. Body composition, cardiorespiratory fitness, muscular strength, muscular endurance, and flexibility comprise health-related fitness, whereas skill-related fitness consists of speed, agility, power, balance, coordination, and reaction times .

Efforts to improve soccer performance primarily focus on techniques and tactics and very often, physical fitness is compromised. In a standard football match, elite-level players run about 10 kilometers at an average intensity close to the anaerobic threshold (80-90% of maximal heart rate). During this duration, intensive bursts of activities such as jumping, kicking, tackling, turning, sprinting, changing pace, and sustaining forceful contractions to maintain balance and control of the ball against defensive pressure are essential (Stolen, Chamari, Castagna, & Wisloff, 2005). A soccer player needs to meet at least minimum physical, physiological, and psychological requirements to cope with the demands of competition and reduce the risk of injury (Freeman & Hardin, 2015). The physical development of a sportsman has attracted the attention of anyone who is involved in the training of young sportsmen. Recently, in India, efforts to search for talents and determination of factors, responsible for ultimate success have tremendously increased. Sports scientists working with the top coaches in concerned sports are trying to find out the basic physical and physiological characteristics that might be performance-limiting factors (Freeman & Hardin, 2015).

Experts in physical education emphasize that soccer players can be categorized effectively by their physical and morphological attributes, along with their tactical and technical skills, based on their level of competition, positional roles, and talent assessment (Farley, Stein, Keogh, Woods, & Milne). There is a lack of a direct relationship between skill-related fitness and specific technical skills, such as speed dribbling, in prepubescent soccer players (Kokstejn & Musalek, 2019). It was also reported that there is no correlation between skill-related fitness and soccer-specific skills in amateur soccer players 19–30 years of age (Aslan CS, 2012).

In the last two decades, amongst other determinants, physical fitness has been frequently explored and identified as a key factor of young players' game performance, serving as discriminants between elite, sub-elite, and non-elite soccer players (Kokstejn & Musalek, 2019) but contradictory results (Bloomfield, Polman, & Donoghue, 2007) have made it very difficult for soccer coaches and other sports-related individuals to apply the results involving the relationship between physical related fitness and skill-related fitness research. Therefore, the purpose of this study was to examine the relationship between specific soccer skills performance and physical fitness of young soccer players in hilly regions.

a. MATERIALS AND METHODS

Selection of subjects: A total of 50 female subjects in the age range of 16-20 years were selected for this study. Participants were recruited from a football academy, located in Kohima, Nagaland. All the participants played at the national level. Exclusion criteria involved any recent injuries or health conditions that could impair performance. Informed consent was obtained from all participants prior to the study.

Pre-Test Preparation: Participants were instructed to avoid strenuous physical activity for 48 hours prior to testing to minimize the effects of fatigue. They were also advised to maintain normal hydration levels and avoid alcohol or caffeine consumption within 24 hours of testing. Each participant completed a standardized warm-up protocol consisting of 10 minutes of light aerobic activity followed by dynamic stretching to prepare the body for physical exertion and minimize injury risk during testing.

Physical Fitness Assessments

Speed: Speed was measured using a 50-meter dash test. Participants were instructed to sprint a distance of 50 meters on a flat, marked track as quickly as possible. The time taken to complete the dash (in seconds) was recorded using a digital stopwatch.

Cardiovascular Endurance: Cardiovascular endurance was assessed using the 12-Minute Run-Walk Test. Participants were instructed to cover as much distance as possible within 12 minutes, either by running, walking, or combining both, depending on their ability. The test was conducted on a standard 400-meter track, and the total distance covered (in meters) at the end of 12 minutes was recorded. The results were used to estimate cardiovascular endurance, with higher distances indicating better performance.

Agility: The Quadrant Jump Test was conducted to measured agility by having participants jump sequentially through the quadrants, starting with both feet together at the starting line. On the command "go," participants jumped into quadrant 1 and continued through quadrants 2, 3, and 4 in a clockwise pattern as quickly as possible for 10 seconds. The test was repeated after a rest period, and the average score of the two trials was calculated. Scores were determined by the number of correct jumps, with penalties of 0.5 points deducted for touching a line or landing in an incorrect quadrant.

Flexibility: Flexibility was measured using the Sit and Reach Test. Participants sat with their legs extended and feet placed flat against a sit-and-reach box. They were instructed to reach forward as far as possible with their arms extended, and the distance reached was recorded in centimeters (cm). Three trials were conducted, and the highest score (in cm) was used for analysis**.**

Explosive Leg Strength: Explosive leg strength was assessed using the Sargent Jump Test. Participants marked their standing reach height on a wall and then performed three maximum vertical jumps, touching the wall at the highest point of each jump. The difference between the standing reach height and the jump height was measured in centimeters. The best score from the three trials was recorded as the participant's explosive leg strength.

Skill Test

To assess technical skills, the General Soccer Ability Skill Test Battery proposed by Mor and Christian was used. This battery verifies the performance of players in passing, shooting on goal, and dribbling. In the passing and shooting on goal, the players were requested to shoot at previously established targets, while in the dribble test, the time taken to run at a previously known trajectory with the ball was assessed.

TABLE 1

Criterion Measures

Criterion variables	Test Item	Unit of Measurement
Speed	50 meter Dash	Seconds
Cardiovascular Endurance	12 minutes run/ walk Test	Meters
Agility	Quadrant Jump Test	Points
Flexibility	Sit and Reach Test	Centimeters
Explosive Leg Strength	Sargent Jump Test	Centimeters
Dribbling	Mor-Christian General Soccer Ability Skill Test Battery	Seconds
Passing	Mor-Christian General Soccer Ability Skill Test Battery	Points
Shooting	Mor-Christian General Soccer Ability Skill Test Battery	Points

Statistical Technique

Pearson Product Moment Correlation was applied at a significance level of 0.05 to determine the relationship between skill performance and selected physical fitness components. MS Excel was used to organize and manage the dataset, while the statistical software SPSS was utilized to perform correlation analyses and calculate the necessary coefficients.

Results

The players physical fitness characteristics and soccer-specific skills are presented in Tables 2–3, respectively.

Table 2

Physical fitness characteristics of the players

Variables	Minimum	Maximum	Mean	SD
Speed(secs)	7	8.9	7.92	0.50
Cardiovascular Endurance (m)	2100	2400	2235	95.43
Agility	16	19.5	17.8	1.04
Flexibility(cm)	27	34	30.1	2.31
Explosive Leg Strength	40	55	46.4	4.34

note:SD (Standard Deviation)

The overall mean speed of the players was 7.92 ± 0.50 seconds, indicating relatively consistent performance in this component. Cardiovascular endurance produced a mean of 2235 ± 95.43 meters, showing some variability among participants. In the agility component, a mean value of 17.8 ± 1.04 was observed, reflecting

slight variability within the group. Flexibility had a mean of 30.1 ± 2.31 cm, while explosive leg strength recorded a mean of 46.4 ± 4.34, suggesting moderate variation among participants.

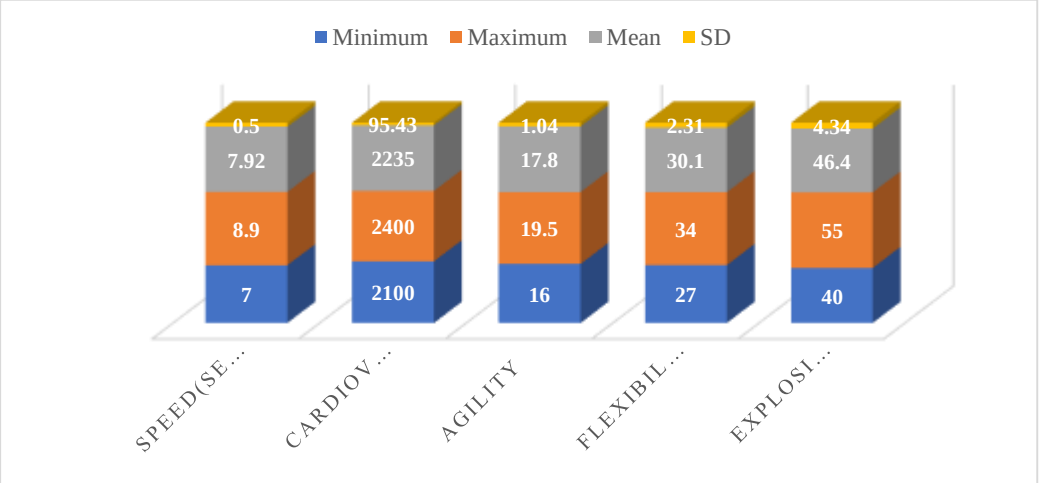

Fig 1. Physical fitness performance analysis

Table 3

Specific soccer skills of the players

Variables	Minimum	Maximum	Mean	SD
Dribbling	14.4	16.4	15.2	0.58
Shooting	57	65	60.4	2.45
Passing	60	70	64.4	2.66

note:SD (Standard Deviation)

Specific soccer skills performance of the players are presented in Table 3, measured in dribbling, shooting, and passing. The mean dribbling time was 15.2 ± 0.58 seconds, which is a high consistent performance. This may be influenced by the players' exposure to steep and uneven terrains that enhance agility and balance. The mean score of shooting was 60.4 ± 2.45, reflecting moderate variability, Passing showed a mean score of 64.4 ± 2.66, with slightly greater variability, which could be attributed to differences in individual skill levels and technical preparation.

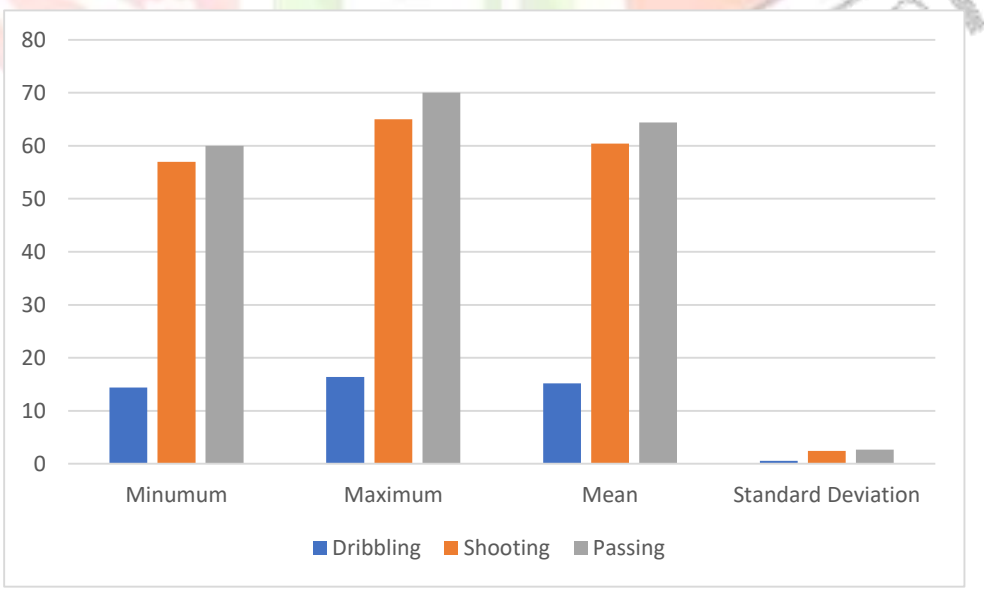

Fig 2. Soccer skills performance analysis

Table 4

Relationships between physical fitness and Soccer skills of the players

Variables	Speed	Cardiovascular Endurance	Agility	Explosive Leg Strength	Dribbling	Shooting	Passing
Speed	1	0.12	-0.56	-0.65	-0.89	0.03	0.08
Cardiovascular Endurance	0.12	1	0.05	0.02	-0.04	0.16	0.2
Agility	-0.56	0.05	1	0.78	-0.82	0.08	0.15
Explosive Leg Strength	-0.65	0.02	0.78	1	-0.87	0.06	0.09
Dribbling	-0.89	-0.04	-0.82	-0.87	1	-0.01	0.05
Shooting	0.03	0.16	0.08	0.06	-0.01	1	0.75
Passing	0.08	0.2	0.15	0.09	0.05	0.75	1

b. Discussion

At 0.05 level of significance, the Pearson correlation analysis shows many significant relationships between physical fitness components and soccer skills. A strong negative correlation was observed between speed and dribbling time (-0.89). This may be due to the reason that faster players tend to complete dribbling tasks in less time, thereby demonstrating superior performance. Similarly, agility and explosive leg strength also show strong negative correlations with dribbling time (-0.82 and -0.87, respectively), indicating that players with higher agility and explosive strength can execute dribbles more efficiently. These results suggest that physical attributes like speed, agility, and strength are essential for optimal dribbling performance. Moreover, a significant positive correlation between shooting and passing (0.75) implies that players proficient in one skill (shooting) are likely to excel in the other (passing), highlighting the interconnectedness of different technical soccer skills.

However, the analysis showed that cardiovascular endurance does not have a significant relationship with key soccer skills, such as dribbling, shooting, or passing (-0.04, 0.16 and 0.2 respectively). The correlation between cardiovascular endurance and dribbling time is -0.04. This suggests that endurance may not directly influence dribbling performance. This finding correlates with previous studies that while cardiovascular fitness is important for overall endurance during a match, it may not be very essential for skills that rely more on technical ability, speed, and agility. The weak correlations between cardiovascular endurance and other skill variables further support this, pointing to the conclusion that factors like technique, decision-making, and physical attributes such as strength and agility are more influential in these specific soccer skills.

Passing, dribbling, ball control, kicking, and shooting are basic soccer techniques. These basic soccer-specific skills might be affected by several factors, such as age, maturity, body composition, power, muscle strength, muscle endurance, and balance (Viran, Canli, & Kurt, 2022).

Singh et al. reported a strong association among physical, technical, conditional, and tactical components in soccer(7). Kokstejn & Musalek found a strong relationship between fundamental motor skills (running, broad jumping, leaping, hopping, galloping, and sliding) and game-specific motor skills (dribbling and shooting) in adolescent Czech football players. Vänttinen et al. also reported that passing accuracy is associated with the 10-m sprint ($r = 0.71$, $p < 0.05$), countermovement jump performance ($r = - 0.62$, $p < 0.05$), and eye–hand–foot coordination ($r = 0.63$, $p < 0.05$) in adolescent soccer players (Zou, 2016)

In conclusion, the study underscores the importance of physical fitness components like speed, agility, and explosive strength in improving dribbling performance and overall soccer skill. However, cardiovascular endurance appears to have less influence on soccer skills such as passing and shooting, suggesting that

specialized training targeting these attributes could be more beneficial for players looking to enhance their performance in these areas.

c. Conclusion

Significant relationships were found between physical attributes like speed, agility, and explosive leg strength, and soccer skills such as dribbling, highlighting their importance in performance.

a) Although important for overall match performance, cardiovascular endurance did not directly influence skills like dribbling, shooting, or passing.
b) Players from hilly regions may develop speed, agility, and explosive leg strength, giving them an edge in soccer skills like dribbling.
c) A positive correlation between shooting and passing indicates that proficiency in one skill supports improvement in the other, emphasizing a holistic approach to training.

d. Recommendations

a) Coaches should focus on improving speed, agility, and explosive strength in young female players, especially those from hilly regions, as these are crucial for better dribbling and soccer performance.
b) Training should strike a balance between physical fitness and technical skills like dribbling, shooting, and passing.
c) Cardiovascular endurance, while important for stamina, has less direct impact on specific skills but should still be part of the overall training.
d) Workouts like plyometric drills and ladder exercises should be included to boost agility and explosive strength.
e) Future research should examine how fitness affects skills over time, include factors like mental toughness, and compare players from different regions to explore environmental impacts on soccer performance.

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