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“CORRELATION OF AGILITY, COORDINATION OF FOOT AND BALANCE IN FOOTBALL PLAYERS ON KICKING SPEED.”

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ABSTRACT

BACKGROUND - Football is one of the most popular sport worldwide in which a large percentage of the game is performed at maximum speed, and the functional activities include accelerations, decelerations, jumping, cutting, pivoting, turning, and kicking of the ball. Agility is the player's ability to perform rapid entire body movement with change of velocity or direction in response to a stimulus. By improving agility, balance and coordination football players will be able to move faster and change directions more quickly. In this game, eye-foot coordination influences the performance of the player, both in skills training and in the match.

AIM - To find the correlation of agility, coordination of foot and balance in football players on kicking speed.

METHOD – 75 male football players age between 15-30 years who had more than one year of training in football practice took participate in this study from [football institute name]. We took Slalom agility test [$r=0.992$], wall volley test [$r=0.97$], Y-balance test [$r=0.85-0.93$] & video analysis for kicking speed as an outcome measures to correlate the factors.

RESULT - Pearson's correlation test was done to find correlation of agility in football players on kicking speed. It revealed that, there was negative correlation between agility and kicking speed in football players ($p=0.001$). Pearson's correlation test was done to find correlation of coordination of foot in football players on kicking speed. It revealed that, there was positive correlation between coordination of foot and kicking speed in football players ($p<0.05$). Pearson's correlation test was done to find correlation of balance (posterolateral) in football players on kicking speed. It revealed that, there was negative correlation between balance (posterolateral) and kicking speed in football players ($p<0.05$).

CONCLUSION – This study concluded that (1) As agility increases, kicking speed of football players decreases. (2) As coordination of foot increases, kicking speed of football players increases. (3) As balance increases, kicking speed of football players decreases.

KEY WORDS – coordination of foot, agility, balance, speed, male football players.

I. INTRODUCTION

Football is one of the famous sport in worldwide. A large part of the football game is played at various ballistic activities such as high speed, acceleration, deceleration, cutting, jumping, spinning, kicking the ball and pivoting¹.

Muscle strength is an important part of physical performance responsible for both high-level performance as well as injury occurrence². Previous studies have proven that frequency and severity of injuries is more than other sports³.

Physical fitness is the ability to complete tasks with energy with no risk due to inactivity and ability to participate in various activities. Important aspects of physical fitness are strength, speed, endurance, agility, flexibility, coordination, balance and reaction time⁴.

Agility is the player's ability to perform rapid body movement with change of speed or direction in response to a stimulus. Agility needs good speed, balance, power and coordination⁵. Good agility enhances performance in football players also helps in preventing injuries⁶. Previous studies have proved that there is a complex relationship between the agility, kicking speed and quickness while playing in football players⁷. It has been also stated that agility improving exercises and improvement of eye-foot co-ordination using exercises improves the football player's dribbling capacity that is under training⁸.

The correlation of agility and speed depends on the demand of that particular sport game, perception and quickness. Thus, specific training is required to improve the agility and kicking speed⁹. Recently the selection of the players is based on the agility and kicking speed levels by the coaches to improve the team performance. Years of practice sessions are required to improve the sports specific skills to get a chance to play with a talented team¹⁰.

Balance is also a fundamental part of sports activities, which helps to carryout sports activities safely and perfectly. Football players are required to perform single leg movements repetitively and vigorously¹¹. The therapists often measure the dynamic balance in players for the assessment of the patient's level of injury or ability to perform sports related activities to initiate proper plan of care¹². Balance is an important aspect of agility and coordination. Also kicking speed has significant relationship with balance, coordination and agility¹³.

One of the basic motor skills required for football players is eye foot coordination. In almost all kinds of sports co-ordination is an important skill. This helps to carry out smooth, accurate, quick and efficient movements while playing¹⁴. Players with better eye foot coordination are able to perform sports related tasks, coordinated motor actions in certain time and space. Also training influences the eye foot coordination in football players¹⁵. The coordination depends on the position of the player and accuracy of movements. Lack of co-ordination explains the problem with processing the information and carrying out the motor tasks¹⁶.

Different football techniques such as dribbling, kicking, heading along with playing situations are supported by abilities such as speed, agility, coordination, balance and motivation. Dribbling, kicking, heading are required while playing football as player should be able to perform attacks and defenses without any injuries. Previous studies have found out the positive relation between agility, balance and eye foot coordination with the kicking speed which is developed through practice¹⁷. Similarly earlier studies have said that teams having fewer kicks on target have less probability to score a goal and win the game¹⁸. To score during a match a player should maintain good balance while they run at high speed and can change the direction rapidly and kick a ball at high speed to pass the ball. Along with this a player also should be able to control the ball with foot while playing¹⁹.

Kicking speed and distance is also considered as important skills in football game. Kicking is reported as addition of forces where foot is the fastest segment in open kinetic chain. Ball velocity and foot velocity both the teams are correlated and also important while measuring kicking speed in football players²⁰.

Excellent kicking performance in football players requires good kicking speed and accuracy. Out of these coaches and researchers focus on kicking speed as it directly affects the scoring during match. Higher ball velocity while kicking over the goal will make difficult to react for a goal keeper²¹. Kicking performance is affected by the age, height, gender and muscle strength. To improve kicking performance players should focus on improving motor control²².

Also some studies have proved that muscle flexibility is also a key factor for kicking speed, sprint and agility in football players. Thus, strength training can improve the kicking speed and kicking performance of football players²³.

According to the previous studies there is positive influence of agility, eye-foot coordination and balance on kicking speed and football performance. Thus, by improving agility, balance and coordination with practice football players will be able to move faster and change directions more quickly. Also, will be able to kick a ball with maximum speed²⁴.

There are previous studies done were agility, balance and eye foot coordination are found to be important aspects in football for better performance. There is positive influence of agility, balance and coordination on football playing skills and performance. There are studies explaining agility, balance and coordination helps the athlete to move faster and change directions quickly. But there is dearth of literature showing the relation of agility, balance and eye foot coordination on kicking speed.

II. AIM

To find the correlation of agility, coordination of foot and balance in football players on kicking speed.

III. OBJECTIVES

- To evaluate the correlation of agility in football players on kicking speed.
- To evaluate the correlation of coordination of foot in football players on kicking speed.
- To evaluate the correlation of balance in football players on kicking speed.

IV. MATERIAL AND METHODOLOGY

Ethical clearance was obtained by the Institutional Ethical Committee, prior to the beginning of the study. The study was conducted in elite male football players age ranging between 15 to 30 years with one year experience. The sample size was 75. Data was collected from Football Club in Miraj Sangli Kupwad. The purpose of the study was explained to the patients into their vernacular language. Each participant screened according to the inclusion and exclusion criteria. Exclusion criteria of the study was History of fracture of lower limb, neurological disorders, psychological or psychiatric disorders, cardiovascular disorders, post traumatic injury, recent ligament injury, soft tissue injury, deformities, menisci tear. Informed consent was taken from each participant. We took Slalom agility test, Y-balance test, wall volley test and video analysis as an outcome measure in our study.

V. PROCEDURE

1. Slalom Agility Test (ST): ($r=0.992$)

- The player will start with both the feet behind point A.
- 6 cones are set up with 2 m apart the first cone 1 m away from the starting line.
- The players will run from point A to B. The player should continue to run as fast as possible constantly changing the direction from right to left until reaches point F.
- After point F the player will take 180° turn and will keep running to a starting point¹⁷.

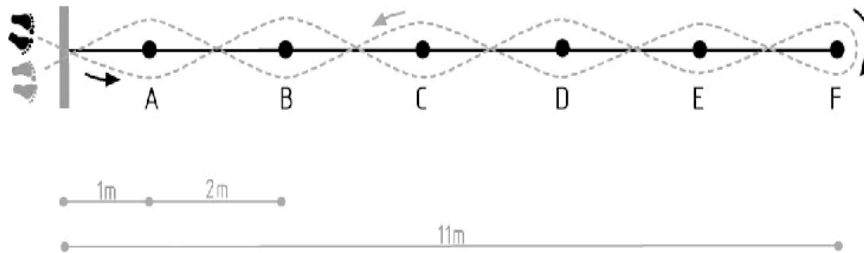


Figure 1:-Slalom Agility Test

2. Wall Volley Test: ($r= 0.97$)

- Players are required to kick against a wall and then kick the ball on the rebound as many times as possible within a 30-seconds period. Number of kicks in 30 seconds will be recorded.
- The players are allowed to kick the ball in air or ground. (3 sets)¹⁸.

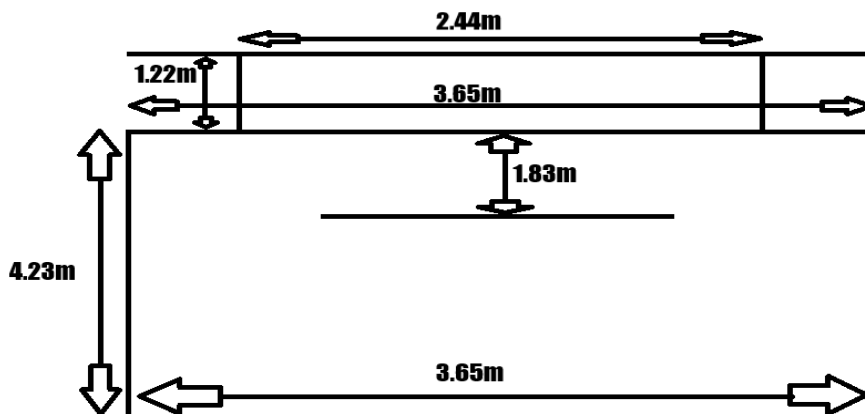


Figure 2 :- Wall volley test

3. Y- Balance Test: ($r=0.85- 0.93$)

- The player will stand at the center platform with the hands firmly placed on the hips
- The player should then be instructed to slide the first box forward as far as possible with their right foot and return back to the starting upright position (3 reps)
- After they complete 3 successful reaches with their right foot, then they are supposed to repeat this process with their left foot.
- Change the direction and repeat the same.
- Any loss of balance will result in a failed attempt. However, once they have returned to the starting position, they are permitted to place their foot down behind the centre/balance foot box.
- The maximum distance reached should be measured¹⁹.

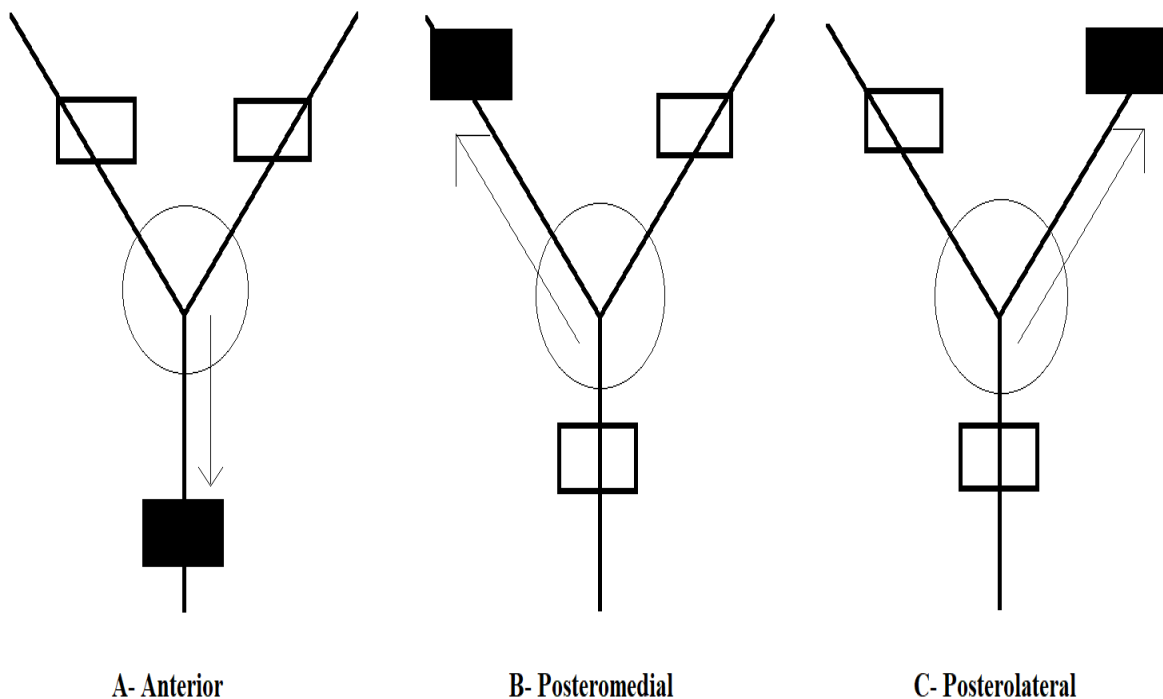


Figure 3 :-Y-Balance

4. Video Analysis for Kicking Speed:

- Kicking speed will be measured by video analysis.
- Starting point is marked 11 m from the goal post. **Smart phone** will be positioned 1.5 m off the ground at the side and one behind the goal post²⁰.

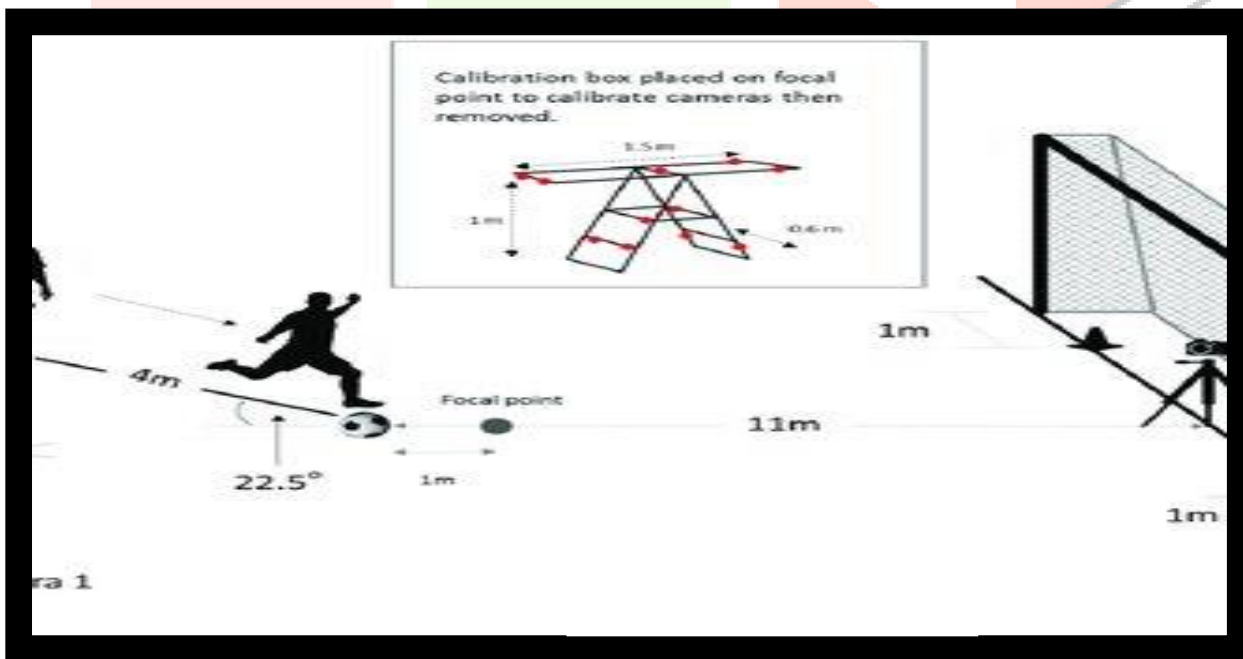


Figure 4 :- Video Analysis For Kicking Speed

VI. STATISTICAL ANALYSIS

Statistical analysis was done by the Pearson’s correlation test.

VII. RESULT

Table 1: Variables showing different r and p values

Variables	r value	p value
Slalom Agility Test	-.387**	0.001
Wall Volley Test	.228*	0.049
Anterior	0.036	0.757
Posteromedial	0.101	0.389
Posterolateral	-.260*	0.024
Composite score	-0.043	0.712

Pearson’s correlation test was done to find correlation of agility in football players on kicking speed. It revealed that, there was negative correlation between agility and kicking speed in football players (p=0.001). As agility increases, kicking speed of football players decreases.

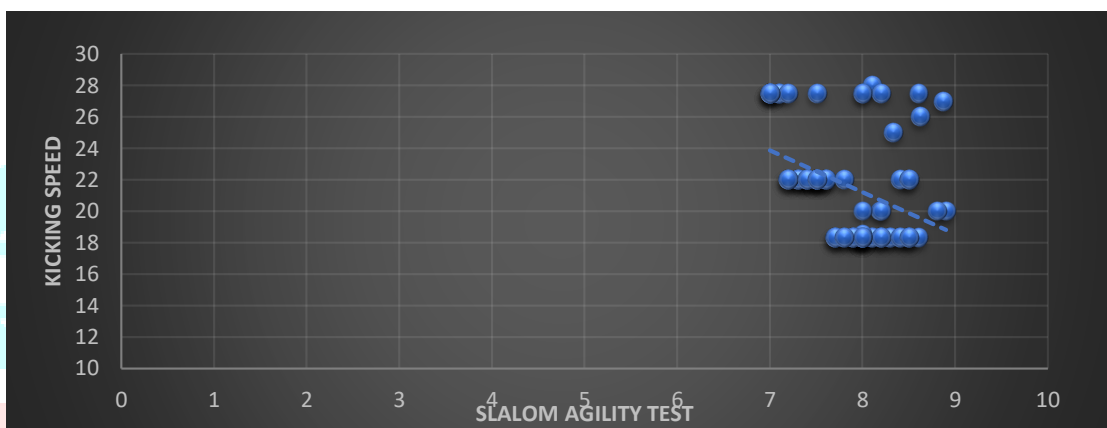


Fig. 1: Graphical representation of correlation between Slalom Agility Test and Kicking Speed

Pearson’s correlation test was done to find correlation of coordination of foot in football players on kicking speed. It revealed that, there was positive correlation between coordination of foot and kicking speed in football players (p<0.05). As coordination of foot increases, kicking speed of football players increases.

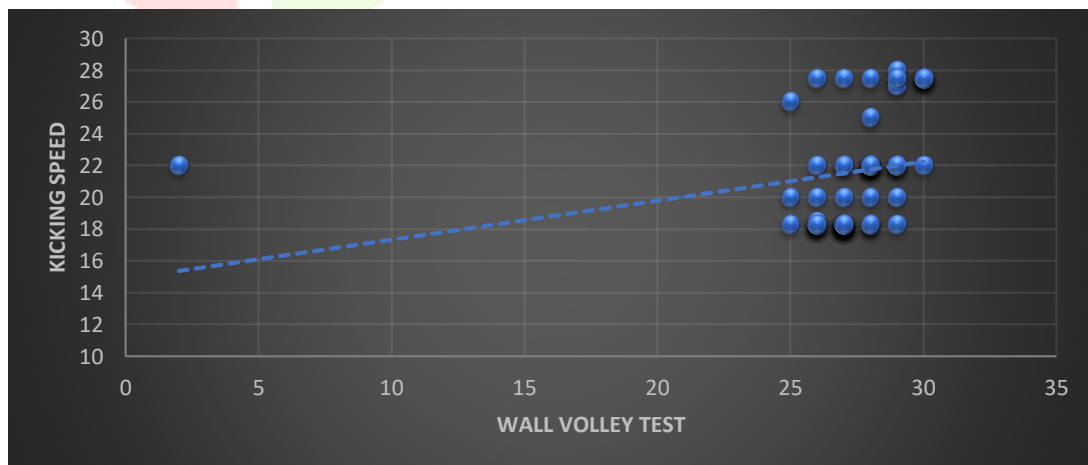


Fig. 2: Graphical representation of correlation between Wall Volley Test and Kicking Speed

Pearson’s correlation test was done to find correlation of balance (posterolateral) in football players on kicking speed. It revealed that, there was negative correlation between balance (posterolateral) and kicking speed in football players (p<0.05). As balance (posterolateral) increases, kicking speed of football players decreases.

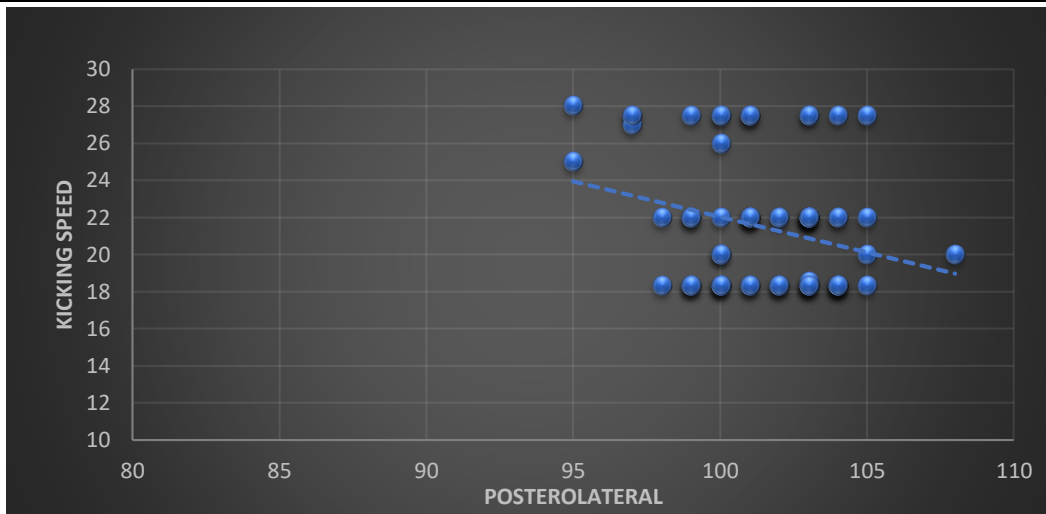


Fig. 3: Graphical representation of correlation between Balance and Kicking Speed

Table 2: Descriptive statistics

Variables	N	Minimum	Maximum	Mean	Std. Deviation
Age	75	15	29	22.29	3.79
Slalom Agility Test	75	7	8.9	7.86	0.50
Wall Volley Test	75	2	30	27.33	3.24
Anterior	75	95	106	100.23	2.70
Posteromedial	75	97	108	101.41	2.24
Posterolateral	75	95	108	101.41	2.42
Composite score	75	101.7	108.7	105.24	1.34
Kicking speed	75	18.3	28	21.58	3.48

- Mean age of football players was 22.29 years.
- Mean agility score was 7.86 sec.
- Mean no. of kicks were 27.33/30 sec.
- Mean balance of dominant leg (anterior) was 100.23 cm.
- Mean balance of dominant leg (posteromedial) was 100.41 cm.
- Mean balance of dominant leg (posterolateral) was 100.41 cm.
- Mean balance of dominant leg (composite score) was 105.24 cm.
- Mean kicking speed was 21.58/sec.

VIII. DISCUSSION

The purpose of the study was to find the correlation of agility, coordination of foot and balance in football players on kicking speed. This study concluded that (1) As agility increases, kicking speed of football players decreases. (2) As coordination of foot increases, kicking speed of football players increases. (3) As balance increases, kicking speed of football players decreases.

In our study, we included 75 male football players who were practicing football for more than one year. As an outcome measures, we took Slalom agility test to measure agility of players, wall volley test to count the goals performed by the players, Y-balance test to evaluate the player's balance and video analysis for kicking speed.

Some previous studies done by. Priya S *et.al* shown that agility has positive correlation with functional performance indicating better agility can result in better functional performance.^[29] There are few articles were it is been proven that agility is negatively as well as positively correlated with the speed. Study done by Horička P *et.al*, proved that there is , no significant differences observed in the level of reaction speed to various stimuli between the players of various sport games (basketball, volleyball and soccer) and also no significant relationship was found between the level of performance in agility with complex reaction (FAC) and the speed components tested by Illinois test.^[30] In this result analysed that there is a negative correlation between agility and kicking speed in football players ($p=0.001$). This means as an agility increases, kicking speed of football players decreases.

Few Researches has also proven that coordination is correlated to the speed. Study done by Cojocaru Viorel *et.al*, concluded that there is a positive relation between the coordination and functional performance in football players.^[31] Further, Ahmad Adil *et.al* also found that there is a positive influence between eye-foot coordination on the skills of playing soccer of the students. There is a positive influence between eye-foot coordination on motivation.^[32] Hence the above researches are similar with present research were, there is positive correlation between coordination of foot and kicking speed in football players ($p<0.05$). This concludes that as coordination of foot increases, kicking speed of football players increases.

Studies have also proven that balance is positively correlated with the speed. Erick Burhaein *et.al* performed a study in which research concluded that there is a relationship between balance and the ability to shoot using the instep and positive relationship between leg muscle power, balance, and coordination with the shooting ability using the instep.^[33] Study performed by Raouf Hammam *et.al* showed results were it illustrated the importance of developing high levels of lower-body speed, balance and power to enhance change of direction performance in pre-pubescent soccer players.^[34] But, in present study results it was found that, there is a negative correlation between balance and kicking speed in football players ($p<0.05$). This means that balance increases whereas kicking speed of football players decreases.

In various studies it was found that there is a negative correlation between agility and speed and significant relationship between coordination and balance with speed. One of the research states that agility is not simply one of speed abilities. Besides simple reaction speed, acceleration, deceleration accompanied by the change of direction of movement, it comprises also perceptual components determined by complex reaction to unexpected, changeable stimuli occurring during a sport game. To develop speed and agility would appear to demand a high degree of neuromuscular specificity. Güler and Eniseler *et.al* concluded in their study that 6-week balance exercises significantly improve agility and explosive strength ($p=0.005$).

Jovanoic M. *et.al* stated in their study that in-season speed, agility and quickness [SAQ] training program intervention had a positive effect on power performance in soccer players. It indicates that the 8-week intervention was successful as regards performance enhancement when it comes to quickness and acceleration. The improvements were also significant because of the shortening of the time necessary to cover the distances in sprint tests and the skill level of the participants involved in the study.

Exhibition of both agility and speed in team sports occurs in response to game situations. It follows that perception-action coupling and decision making are critical elements in terms of developing the ability to express speed and agility capabilities under match conditions.^[30] Agility requires the integration of isolated movement skills using a combination of balance, coordination, speed, reflexes, strength, and endurance.

Peñailillo L. *et.al* suggested in study that it is important to develop muscle strength in youth soccer players to improve their acceleration, speed and agility. Though, individual level characteristics in relation to growth and maturation should be taken into account when children are compared as they correlate well with both speed and muscle strength. At the end they also stated that a strong and consistent relationship between strength and speed indicates that an increase in maximum muscle strength as a result of resistance and/or plyometric training, may improve soccer performance. It is important not to neglect other qualities that could also be important such as power and coordination, as suggested by the moderate relationships observed between maximum muscle strength and acceleration and agility.^[35]

IX. CONCLUSION

This study concluded that (1) As agility increases, kicking speed of football players decreases. (2) As coordination of foot increases, kicking speed of football players increases. (3) As balance increases, kicking speed of football players decreases.

X. LIMITATIONS AND SUGGESTIONS

Our study had small sample size as it a coorelation study. Female participants were not included. Further studies can be performed on speed and coordination. For calculating speed another outcome measure can also be used.

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