# A Comparative Study of some Biokinematic Variables for Kicking the Ball on Different Grounds of the Football Players

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## ABSTRACT

The aim of present study is to comparative some of biokinematic variables for kicking the ball on different grounds of the football players. Five (5) students from faculty of basic education-University of Diyalain Diyala province were selected randomly. A descriptive research design was used because it is suitable to the nature of the study. The study was conducted in 2013 and data was analyzed by using SPSS. However, our conclusions showed statistically significant differences for some biokinematic variables for kicking the ball on different grounds and in favor of grasp ground.The angle of the hit leg is a good indicator of the performance of the skill of kicking the ball when appropriate with the goal achieving.Moreover, researcher found out that biokinematic variables have a great importance when performing the skill of ball kicking.

**Keywords:** biokinematic variables, grounds, football.

## 1. Introduction

Football is one of the more famous games around the world which attractive millions of players and spectators or admires, whether through its exercise or view. Giventhe greatinterest of football game, the states who have an experience and expert have sought to think aboutfinding the bestways and meansin order toraise the level of the game. Moreover, find the most suitabletraining methodsto develop the bestachievements andachieve thenumbersin varioussporting events were not easy, sothe researcherinthe field of sports have started to innovation sophisticatedtrainingmethods which may be achievepositiveeffects.One of these exercises is the training by usingothersurfaces such asdry land, carped, woodor grasp which isresistantagainstinner strengthandthis resistancecan be used tostrengthen musclesand increase the kinetic of join becauseincreasing the speed ofmovement results in increasesthe resistance of them, and training is characterized bythe difficultyandgainingmore power.

The study biokinematic variables enables the trainer to learn the correct position or optimal taken when implementing kickball with different floors, which affect son the motor achievement and then reflects on the training and on the level ofball kicking performance, whether for the purpose ofhandlingthefellowin the right placeorthe scoringon goalwhenhe is in thevicinity of the goal which plays an importantrole inthe win especially at the lasttimeof the game.

Theskill ofball kicking is one of the mostbasic skillsof footballs which can be classifiedfromthe alone skills that consist of three sections:

- Preparatory part: Apart that provides the appropriate strength and form fitting body for the implementation of the next part.
- The main part: A primary goal of the movement.
- The final part: Apart which is responsible for return the body to normal position (Khyoun., 2002).

It is called alone skill because the performing is once and itsbeginning and endingare clear.However, its performancerequires a chronological order, connected, and smoothly like a single partition (Mahjoub., 1987). The skill of kicking ballis one ofthe circular movements whichperforms on a stapled axis is located in the hip join and this movement generates angle speed which is suitable for the striking foot ofthe ball and then leads to generate kinetic chain by depending on the body parts through performance (Luhtanen., 2004). In addition, the successfuland proper performance of kicking the ball for a football player depends on the high speed and ideal angle and the economy in the used force of foot during implementation, the angular velocity which the ball movesin the moment of kickit by foot controlled by some of the factors which decide the outcome of this collision according to the law of momentum between the foot and the ball and these factors are the mass, primary speed, strength and angle speed traveled by strike foot (Al-Shammari., 1998).

The importance of present study isa practical attempt to identify the impact of different lands in biomechanics variables for football players during their performance of kicking the ball because these various and changing places area great importance in the trainingand may contribute to finding a new scientific approach in the training process with the coaches and football players at these stadiums to develop their skills. However, present study aimed to identify some biomechanics variables for kicking the ball of football players on different floors.

## 2. Methodology

Five (5) students from faculty of basic education-University of Diyala in Diyala province were selected randomly. A descriptive research design was used because it is suitable to the nature of the study.

## 2.1 Photography

Researcher used a camera type (Sony) which is its fast (25) pictures per second to filmthe playermovement through the performance ofkickingthe ball andthe movement ofthe striking leg of the ballwhile performingkicks. In addition, the researcherand an assistance teamdetermined places of camera,moreover the dimension of the camera was the same when changesits locations andthe cameraheight was (1.15m)and the distance (5.5m).

## 2.2 The Main Experiment

The main experiment was conducted on Football Stadium of Physical Education Faculty-DiyalaUniversity11-12/11/2010. Subject of study included five players from the football team of Diyala University, each player was given three attempts and was written the number of attempt and the name of player during the performance. Moreover, information of biokinematic variables was collected through photography and analysis by using the program of (Dartfish).

## 2.3 Biokinematic Variables

### 2.3.1 The angular velocity of the striking leg of the ball

It was measured by extracting angle of transfer the striking legfrom the preparatory position (preparedness moment) to the moment of kicking, which is the angle between the line connecting the foot to the hip in the shape of preparedness with the connecting line from the foot to hip at the moment of kicking divided on the time of this transition.

### 2.3.2 Torso angle

It is the angle between the connecting line of the shoulder and hip and the connecting line between the hip and the trunk.

### 2.3.3 The distance of the last step before kicking the ball

It is a distance between the striking leg foot and the ball.

### 2.3.4 The angle of the inclination body

It is the angle between the connecting line of the shoulder and ankle and the connecting line between the forefoot at the moment of shooting the ball and over the last step.

## 2.3.5 Angle of the ball shooting

It is the angle between the horizontal line which is passing through the center of the ball before starting with the connecting line between the center of the ball before and after the starting with the path line of the ball for a single image.

## 2.4 Statistical analysis

The data of present study was analyzed by using SPSS and we used following laws.
- Mean.
- Standard deviation.
- Varianceanalysis.
- Toki law.

## 3. Results and Discussion

The results of present study were showed in following tables.

### Table (1)
### Shows mean and standard deviation of biokinematic variables of ball shooting

| Variable | Group | Measure unit | Mean | SD | Error |
|---|---|---|---|---|---|
| Distance of last step | Solid | Cm | 131.083 | 3.704 | 1.069 |
| | Grasp | Cm | 124.500 | 2.431 | 0.702 |
| | Sandy | Cm | 132.000 | 4.472 | 1.291 |

### Table (2)
### Shows mean and standard deviation of biokinematic variables of ball shooting

| Variable | Group | Measure unit | Mean | SD | Error |
|---|---|---|---|---|---|
| Angle of the inclination body | Solid | Degree | 84.667 | 1.435 | 0.414 |
| | Grasp | Degree | 87.250 | 1.422 | 0.411 |
| | Sandy | Degree | 81.750 | 1.865 | 0.538 |

### Table (3)
### Shows mean and standard deviation of biokinematic variables of ball shooting

| Variable | Group | Measure unit | Mean | SD | Error |
|---|---|---|---|---|---|
| Angle speeding of the shooting leg | Solid | Degree\S | 1258.833 | 23.717 | 6.847 |
| | Grasp | Degree\S | 1262.250 | 21.918 | 6.327 |
| | Sandy | Degree\S | 1261.750 | 28.375 | 8.191 |

**Table (4)**
**Shows mean and standard deviation of biokinematic variables of ball shooting**

| Variable | Group | Measure unit | Mean | SD | Error |
|---|---|---|---|---|---|
| Angle of the trunk | Solid | Degree | 83.917 | 3.476 | 1.004 |
| | Grasp | Degree | 83.917 | 1.975 | 0.570 |
| | Sandy | Degree | 85.750 | 2.598 | 0.750 |

**Table (5)**
**Shows mean and standard deviation of biokinematic variables of ball shooting**

| Variable | Group | Measure unit | Mean | SD | Error |
|---|---|---|---|---|---|
| Angle of the ball shoot | Solid | Degree | 22.083 | 2.151 | 0.621 |
| | Grasp | Degree | 17.083 | 3.088 | 0.890 |
| | Sandy | Degree | 23.500 | 1.382 | 0.399 |

Tables (1-5) showed significant differences between means, standard deviation, and error ratio for the results of the biokinematic variables of ball kicking on different grounds and to know the significant of these differences the researcher used Variation analysis (F) as showed in the following tables.

**Table (6)**
**Shows F value between different grounds in variable of last step before kick the ball**

| Variable | Groups | Sum of square | df | Mean square | F | Sig |
|---|---|---|---|---|---|---|
| Distance of last step | Between groups | 401.722 | 2 | 200.861 | 15.206 | .000 |
| | Within groups | 435.917 | 33 | 13.210 | | |
| | Total | 837.639 | 35 | | | |

Tabulated F value at the significant level (0.05) and freedom degree (2,33)= 3.29

**Table (7)**
**Shows F value between different grounds in variable of angle of the inclination body**

| Variable | Groups | Sum of square | df | Mean square | F | Sig |
|---|---|---|---|---|---|---|
| Angle of the inclination body | Between groups | 181.722 | 2 | 90.861 | 36.053 | .000 |
| | Inside groups | 83.167 | 33 | 2.520 | | |
| | Total | 264.889 | 35 | | | |

**Table (8)**
**Shows F value between different grounds in variable of Angle speeding of the shooting leg**

| Variable | Groups | Sum of square | df | Mean square | F | Sig |
|---|---|---|---|---|---|---|
| Angle speeding of the shooting leg | Between groups | 81.722 | 2 | 40.861 | .066 | .936 |
| | Inside groups | 20328.167 | 33 | 616.005 | | |
| | Total | 20409.889 | 35 | | | |

**Table (9)**
**Shows F value between different grounds in variable of trunk angle during shooting**

| Variable | Groups | Sum of square | df | Mean square | F | Sig |
|---|---|---|---|---|---|---|
| Trunk angle | Between groups | 26.889 | 2 | 13.444 | 1.774 | .185 |
| | Inside groups | 250.083 | 33 | 7.578 | | |
| | Total | 276.972 | 35 | | | |

**Table (10)**
**Shows F value between different grounds in variable of angle of the ball shoot**

| Variable | Groups | Sum of square | df | Mean square | F | Sig |
|---|---|---|---|---|---|---|
| Angle of the ball shoot | Between groups | 272.722 | 2 | 136.361 | 25.447 | .000 |
| | Inside groups | 176.833 | 33 | 5.359 | | |
| | Total | 449.556 | 35 | | | |

**Table (11)**
**Shows results of H.S.D for variable of last step of ball kicking between three grounds**

| Variable | Group | Means different | Significant error | Error ratio |
|---|---|---|---|---|
| Last step | Solid-Grasp | 6.583(*) | 1.484 | .000 |
| | Solid-Sandy | -.917 | 1.484 | .811 |
| | Grasp-Sandy | -7.500(*) | 1.484 | .000 |

**Table (12)**
**Shows results of H.S.D for variable of angle of the inclination body during ball kicking between three grounds**

| Variable | Group | Means different | Significant error | Error ratio |
|---|---|---|---|---|
| Angle of the inclination body | Solid-Grasp | 2.583(*) | .648 | .001 |
| | Solid-Sandy | 2.917(*) | .648 | .000 |
| | Grasp-Sandy | 5.500(*) | .648 | .000 |

**Table (13)**
**Shows results of H.S.D for variable of angle of ball shoot between three grounds**

| Variable | Group | Means different | Significant error | Error ratio |
|---|---|---|---|---|
| Angle of the ball shoot | Solid-Grasp | 5.000(*) | .945 | .000 |
| | Solid-Sandy | 1.417 | .945 | .304 |
| | Grasp-Sandy | 6.417(*) | .945 | .000 |

Tables (6,7,10) showed a significant differences in variable of last step distance before kicking the ball which was (15.206) and variable of angle of the inclination bodyat the moment of ball kicking amounted (36.053), whereas angle of the ball shootamounted (25.445) which is beggar than tabulated F value (3.29) with significant level (0.05) and freedom degree (2, 33).

Researcher see that last step distance is responsible for determine the ball shooting with suitable direction and height, it means the last step distance will be suitable if the path of the ball is good and has a positive relationship with angle of the ball shoot. Either in anangle of the inclination body at the moment of ball kicking, researcher see that this angle connected to body gravity center and whenevercontinueto declinefrom the moment ofcontactchockfootball to the groundtothe moment ofcontactstriking leg feet, and this declineresulted from thebend of chockleg which invested by the playerina kickedperformance and consistent withthe nature of the implementation of kicking style down to the required precision, Talha (1993) said that human

body when go down atthe moment ofthe collisionduringthe kick, it will lead to good performance of mechanical work to get through good balancehelps tousethe movement ofthe jointsandbody partsin order to achieveamotorto behitting the ballat an appropriate speedensuresit reaches thetargetandthe required accuracy. In variable of angle of ball shooting, researcher see that suitable angleof theprojectileis located between theangle(28°) to (31°)andthis angleapproaching theproper angle, this means that the angle when they arsis table to be high accuracy because shooting angle increases appropriately will increase the height of the ball during its transfer inthe air. However, an increase inthe time whichthe ball is spending with angle(45°)becauseif the angleis greaterwill lead tohighball in the airand the lack ofthe time whichthe ball is spending andthusthe loss ofthe ball, it is commonly know nuthatches larger the angle within the angle (45°)at maximum spend the projectile greater off sets due to the project exposures to a little of the gravity strength and air resistance and then leading to continuum minuman the arias to ensurearrival to thespecified region in requiredaccuracy(Hassan, 1999).

Thevariable of angular velocityof the striking leg of the ballhas reachedthe calculated(F)value(0.066) which isless thanthe tabulated(F)value (3.29) levelof significance (0.05) and the degree offreedom(2.33), as shown by theresults oftable(8)itis no significant.As well as forvariableof angle ofthe trunkpend at the moment kicking the ball has reached the value of calculated(F)(1.774) which is less than the value of tabulated (F)(3.29) with significance level (0.05) and the degree of freedom (2.33), as shown in table (9) it is no significant. There searcher attributed the reason to the fact that the two variables were not influenced by the quality of the ground where the test took place.

To know which grounds best in effect on biokinematic variables, the researcher used Toniest (HSD) to see the smallest significant difference between means in the variables under consideration. However, tables (11.12, 13) showed significant differences between solid ground (tartan) and grasp grounding favor ofgrasp,as well as between graspgroundand sandy groundin last stepdistanceandangle of inclinationbodyat the momentof kicking the balland the angle of ball shooting in favor of grasp ground, researcher attributes the reason that most of the players have been trained on grasp round permanently leading to adapt their performance to the skill of kicking the ball largely and control of biokinematic variables, which is less harmful tothe player'sskillthan onsolidland(tartan) orsand.

The results also showed that there were significant differences between the solid ground (tartan) and sandy grounding the variable of angle of the body end in favor of the solid ground and attribute the reason to the fact that the solid ground is resistance less than the sandy ground and this resistance effect on the angle of the body pond during the performance of the skill of kicking the ball.

## 4. Conclusion

Our conclusions showed statistically significant differences for some biokinematic variables for kicking the ball on different grounds and in favor of grasp ground.The angle of the hit leg is a good indicator of the performance of the skill of kicking the ball when appropriate with the goal achieving.Moreover, researcher found out that biokinematic variables have a great importance when performing the skill of ball kicking.

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