

# Distance Covered and Activity Analysis of Football Players during World Cup 2014

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## Summary

**Introduction:** In the sport at top level of competition physical activities profile may be influenced by several factors as well as environmental or biological factors. Some factors in football strongly effect on team success. Distance covered and maximum speed of players during a full match will show important data to the coaches.

**Objectives:** Analyzing distance covered and maximum speed of football players during FIFA World Cup, 2014 was the main purpose of this investigation. This data was analyzed by player positions and team ranking.

**Methods:** Activity profile of 474 football players including 104 forwards, 163 midfielders, 169 defenders and 38 goalkeepers, which played minimum 90 minutes at this tournament were analyzed by the researcher at this study. Distance covered in per minutes and maximum speed analyzed by routine methods according to player positions and team ranking.

**Results:** Analyzing data by one way ANOVA has shown that the distance covered by player was significantly different by player position  $P < 0.05$ . The data of research has shown that maximum speed of players was significantly different between players according to their position  $P < 0.05$ . The comparison of distance covered during game at condition in possession has shown that there are significant differences at the distance covered with this condition between groups  $P < 0.05$ .

**Conclusion:** In conclusion players need to improve their endurance performance according to their match position. Endurance performance ability is not only used to determine distance covered by the players. By the way there are several factors that may influenced at the profile activities such as tactical manners by the coaches.

## Key words:

Soccer. Football. Distance covered. Endurance. Player activity.

## Distancia recorrida y análisis de actividad en jugadores de fútbol en el mundial de 2014

### Resumen

**Introducción:** En el deporte de élite, la condición física puede estar influenciada por factores biológicos o externos. Algunos de estos factores pueden afectar en gran medida al éxito del equipo. La distancia recorrida y velocidad máxima de cada jugador durante el partido puede dar datos importantes a los entrenadores.

**Objetivos:** Analizar la distancia recorrida y la velocidad máxima en jugadores de fútbol durante el mundial FIFA de 2014 fue el principal objetivo de esta investigación. Estos datos se analizaron en función de las posiciones de cada jugador y el ranking del equipo.

**Resultados:** Analizando los datos de una Anova de un factor, observamos que la distancia recorrida por cada jugador fue significativamente diferente en función de la posición de juego ( $p < 0,05$ ). Los datos de la investigación han mostrado que la velocidad máxima es significativamente diferente entre jugadores en función de su posición ( $p < 0,05$ ). La comparación de la distancia recorrida durante el partido muestra que existen diferencias estadísticamente significativas entre grupos ( $p < 0,05$ ).

**Conclusión:** Los jugadores necesitan mejorar su resistencia en función de su posición de juego. El rendimiento en resistencia no es solo variable para determinar la distancia recorrida por los jugadores. Hay muchos factores que pueden influir en la actividad como las tácticas del entrenador.

## Palabras clave:

Fútbol. Distancia cubierta. Resistencia. Actividad del jugador.

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## Introduction

Football is one of the most popular sports during recent century. At this sport several aspect of human body are involved. Both of physical and mental preparations required for success at this sport. The Football is a high demanding energy sport, thus players need to improve their fitness in several aspects as well as aerobic and anaerobic capacities<sup>1</sup>. In football players, performance may be influenced by a number of physiological and environmental factors. Researchers have found that football is multi-demanding energy system sport. We need to improve all aspect of energy system for a football team. By the way it has been shown that there are differences between energy system specificity at the player's position at the field. For example goalkeepers need to improve their Alactic energy system more than the others<sup>2</sup>. It has been shown that aerobic and anaerobic energy system are also important components of football players at the forward and mid and defend positions<sup>3</sup>. Improving aerobic energy system may help players to run effectively during a full time game. Any decrease of aerobic energy system directly effect on aerobic capacity and distance covered by players during a football game<sup>4</sup>. Coaches and sport scientists need to monitor running ability of football players during training and completions. Distance Covered (DC) is the most important factor to determinate player's ability in competitions<sup>5</sup>. It has been shown that distance covered during football games strongly influenced on team success. Of course some other factors are involved in football games which may effect on football results. By the way DC has key role of completion success during official tournament<sup>6-8</sup>.

Previously the only data for influence of the aerobic energy system and distance covered has only shown at the sport science books or practical reports, but nowadays researchers may track the DC real time during games and analyze it after games. The technology helped researchers at this area<sup>9,10</sup>. Now it is time to show coaches important aspects of players and team successfully with these type of technology.

Sport analysis and tracing system by the new technology in software and hardware help coaches to find the results and reports to improve player's ability<sup>11</sup>. In order to gain the enough knowledge and information during soccer games, researchers need to applied several technologies. Analysis of game activities also provides information regarding to the positions physiological requirements<sup>12</sup>.

Activity profiles of player during world cup 2010 has been investigated by Filipe and his colleagues. They have shown that midfielders have recorded more distance covered by almost 120 meters per minute and goalkeepers recorded nearly of 45m/min<sup>13</sup>. Several investigations have shown differences of activities profile of players during football game and they mentioned that these activities may affected by player fitness and tactical and positional differences<sup>14</sup>. Identifying of physical activities profile by player at top level of competition will help coaches to find weaknesses of their players and design training plan according to influenced factors at successful. At the top level of football competition researchers need to know differences conditioning status in compare between teams. Some researchers they believe that there is not conditioning and fitness differences between players at this level and the only experiences or tactical factors are important.

The major objective of this study is to investigate player activities and distance cover during football world cup 2014. In this study position

related distance covered, world cup final ranking and players distance covered analyzed.

## Material and method

Data and information of 474 soccer players who had minimum 90 minutes in world cup 2014, Brazil, were applied in this study. Total of 607 players with height  $181.19 \pm 6.69$  and age  $27.42 \pm 3.79$  were played in this event. For improve accuracy of this research, only used data from players who had minimum 90 minutes obtained. Players which played less than 90 minutes during this tournament were removed from list of data Information was obtained from official website of FIFA World Cup 2014. Number of match played, total playing time (minutes), total distance covered, distance covered in possession and distance covered in not-possession (per minutes), age, height, average of speed, and position of each players were recorded in excel software of proceeding data analysis.

Position of players were used as the independent variable in 4 area; goal keeper, defender, midfielder and forwards. Total distance covers were obtained for per players. Distance covers in per minute and per 10 minutes were calculated. Maximum speed were obtained from physical activity player of FIFA official website and applied by meter per second at this study.

Distances covered in differences position were compared. Distance covered was compared between 4 first position teams (Germany, Argentina, Netherlands and Brazil) *versus* others teams.

## Statistic method

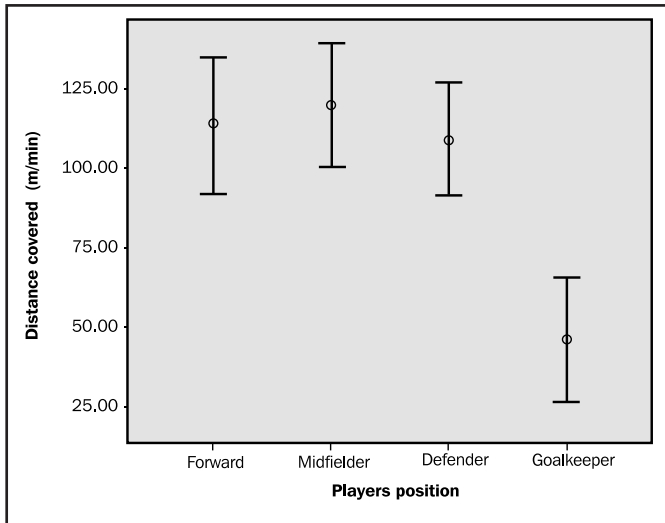
Result of analyzing data by Kolmogorov Smirnov test has been shown non-homogeneity of sample. Due the importance aspect of parametric test at this research, the Central Limit Theorem (CLT) was applied, that allowed us to adopt the assumption of normality<sup>15</sup>. One-way ANOVA was applied to determination of difference between groups and the Tukey test was used as *post hoc* test. This analysis was applied by using IBM SPSS Statistics software for a significance level of 5%.

## Results

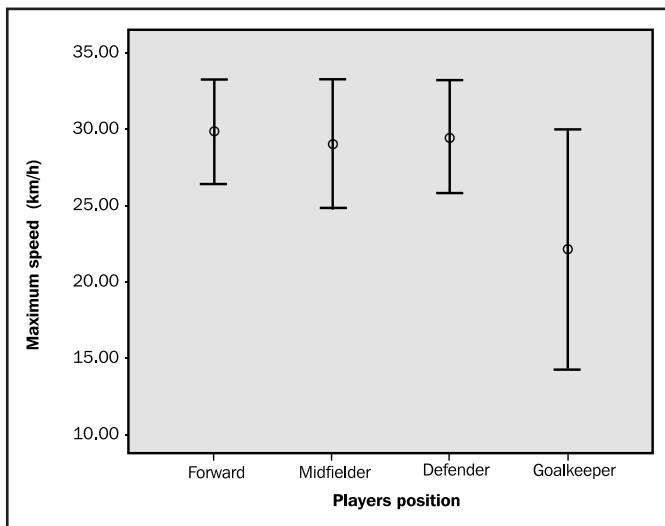
At the first step, distance covered (per min) was compared by player positions. The result of statistical analysis has been show significant difference between groups at distance cover  $F(3, 470) = 611.945$ ;  $P < 0.05$ . The post hoc test has been shown that largest distance cover at the midfielders. Players at the defend position were at the second rank after midfielders. Midfielders player were significantly different at DC with defenders ( $p < 0.05$ ), forwards ( $p < 0.05$ ) and with goalkeepers ( $p < 0.05$ ).

At the second step, speed by the posts (Maximum Speed) was compared by player positions. The result of statistical analysis has been show significant difference between groups at maximum speed  $F(3, 470) = 131.690$ ;  $P < 0.05$ . The post hoc test has been shown that higher speed at the midfielders. Players at the defend position were at the second rank after forward players. Forwards player were significantly different at maximum speed with goalkeepers ( $p < 0.05$ ), midfield players ( $p < 0.05$ ) but not to defenders ( $p < 0.497$ ) (Figure 1).

**Figure 1. Comparison at distance covered by player according to players positions.**



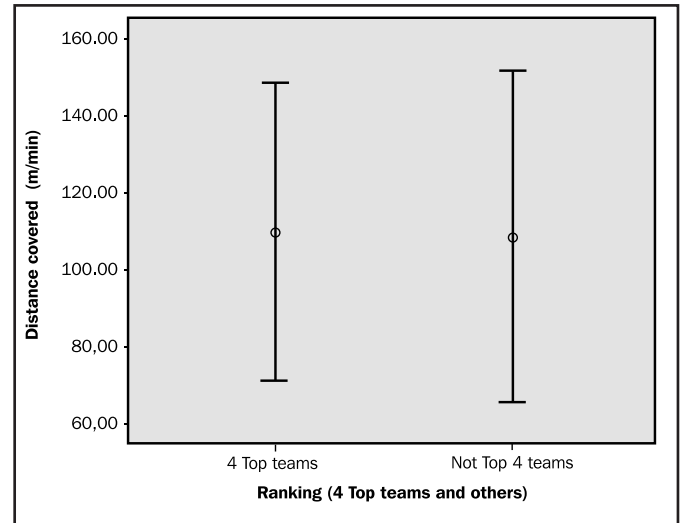
**Figure 2. Comparison of Maximum Speed according to player positions.**



Result of one way analysis of variance at the distance covered (per 90 minutes) while in possession at the player positions has been shown significant differences  $F(3,470)=190.725; P<0.05$ . Statistical analysis and also has been confirmed significant differences at the distance cover (per 90 minutes) at the player position while not in possession  $F(3, 470) =230.273; P<0.05$ . These results have been shown largest distance cover per 90 minutes at both conditions among the midfielder players. At the condition of in possession, forward position was at the second rank at distance cover after midfielders. Defenders were at the second position in condition of not in possession (Figure 2).

At the next step, researcher compared distance cover (per minute) according to teams ranking. Four team by the best position (one to four); players of Germany, Argentina, Poland and Brazil, were compared with others. Statistical result has been shown there is not nay significant

**Figure 3. Comparison of Distance Covered by teams according their ranking- Top 4 teams in compare to others.**



differences at DC between groups F (1, 472) =0.190;  $P=0.663$ . It has been shown there is not any significant difference at the distance cover during not in possession has been shown there is not there is not nay significant differences at DC during not in possession between groups F (1, 472) =1.826;  $P=0.177$ .

The comparison of distance cover during game at condition in possession has been shown that there is significant differences at the distance cover with this condition between groups F (1, 472) =10.753;  $P=0.01$ . This result has been shown top four team were with higher at distance cover in this condition. Maximum speed also has been reported with higher speed at top 4 team than others F (1, 472) =12.862;  $P=0.000$  (Figure 3).

## Discussion and Conclusion

Player's performance at the several variables as well as distance cover and maximum speed were analyzed at the several studies<sup>5,10,16</sup>. It has been shown that there is strong relationship between player's positions and distance covered during the game and maximum speed too<sup>17,18</sup>.

The main purpose of the current study was to analyze player performance during game according to player positions and team ranks at the world cup 2014 Brazil. This study examined distance covered by players and maximum speed at four positions. Researcher also compared DC and Maximum speed at teams according to their ranking at this event. Result of this study has been shown highest distance covered by players at midfielder players. The forward players was at the second position regarding to distance covered at per game. In support of this results Mohr *et al.* reported the largest distance covered by midfielder players. They also reported forward players were at the second rank at distance covered after midfielders<sup>18</sup>.

This research confirmed that midfield players covered highest distance covered during the game, because they are linking between defends and forward players during the matches<sup>13</sup>. This study also

has been reported highest amount of distance cover by midfielders by both possession and not-in-possession condition. They covered a small amount more during not-in-possession condition. Bangsbo *et al.* have been reported same distance covered by defenders and forward players during the game<sup>19</sup>.

The distance covered strongly related to the tactical manners of the coaches. The differences method at tactics has been shown between the teams. This research for the first time has compared player's distance covered between 4 top team at world cup 2014 and other teams that were participated at this tournament.

The result of this study has been shown, there is not significant differences at the distance covered by player between 4 top teams and other teams, but comparison of distance covered by teams according to in possession and not in possession has been shown significant higher at distance cover during in possession by 4 top teams than the others. Interesting find outs in this study mean of 374 m higher at distance covered at per 90 min of match at 4 top teams player than the other teams.

Improving aerobic performance and endurance abilities at the football player is very important at games successfully<sup>20</sup>. Endurance performance strongly effect of distance covered. Players normally spend with mean of 70% of maximum oxygen uptake during 90 min football game<sup>21</sup>. By the way some time tactical methods by the coaches may make the players at limited conditions and they are not allow to run despite their abilities.

Maximum speed of players has been monitored during match by several researchers<sup>18,22</sup>. Nowadays technology help researcher to tack at real time player at the field. This study confirmed that forward players were with highest amount of maximal speed. Defenders and midfielder were at the next step respectively. Forward players need special ability to reach the goal. At this time teams with defender at highest level of speed will be more successful in front of these forward players. By the way has been well documented that speed of player need another variable to be complete. This variable is acceleration<sup>23</sup>.

Researcher at this study notice that the distance covered will not be alone cause of competition successfully. The tactical and technical readiness and experience of players at related strategy are important. Consequently at the high level of competitions players need to prepare in multi aspect to show their highest performance level at the match. This study were limited by finding some data as well as weight of players. At conclusion researcher suggest players and coach to improve their ability according fitness demand related to their position. At this study has been shown strong effect of distance covered during in possession time at four top teams. This data confirmed that not only ability to distance covered also speed, acceleration influenced at team successfully. By the way for several limitation researcher has not access to full activity profile of players during the tournament. Researcher recommend to compare physical activities of player with women's world cup. Also physical activity profile according to result of competitions are strongly recommended for feature research.

The data of current study may apply by coaches and player to find the best way for improving players according to factors influenced at team successfully. Distance cover as the important factor for team suc-

cessfully at the world cup strongly related by endurance performance. Several factors as well as lactate lactate threshold, economy of activity, fraction utilization and strength and endurance of muscle effect on endurance performance.

## Conflict of interest

The authors do not declare a conflict of interest.

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