PSYCHOLOGY AND EDUCATION (2024) 61(4): 984-999
ISSN:1553-6939

The GPS Tool As An Average For Quantifying Physical Demands Among Algerian Footballers

Aouir Saddam[1], Redouan Boubekeur[2], Chiha Fouad[3]

[1]Laboratory of Sciences of Physical Sports Activities and Public Health, Departement of Science and Technology of Physical and Sport Activities, Mohamed Lamine Debaghine Setif 2 University, (Algeria), E-mail: S.aouir@univ-setif2.dz

[2]Laboratory of Sciences of Physical Sports Activities and Public Health, Departement of Science and Technology of Physical and Sport Activities, Mohamed Lamine Debaghine Setif 2 University (Algeria), E-mail: b.redouane@univ-setif2.dz

[3]Laboratory for Expertise and Analysis of Sports Performance «LEAPS», ISTAPS, Abdelhamid Mehri Constantine 2 University (Algeria), E-mail: fouad.chiha@univ-constantine2.dz

Received: 04/04/2024, Published: 06/06/2024

Abstract:

Faced with growing sporting and financial challenges, high-level or ambitious clubs have an obligation to achieve results. Challenges are daily for technical staff.Eleven male subjects participated in this study, forming a professional team.Experimental protocol:

- The study was carried out over a period of 8 weeks, including 04 matches (4 in the championship)

- Satellite positioning systems were used in every football match

in the field.

- The analysis of the activity of the team's players in the Algerian championship during 8 halves - time football match made it possible to draw up a precise map of its evolution.

Keywords: satellite positioning system or GPS, FieldWiz® GPS 10 Hz, physical preparation, optimization of the training program.

1.Introduction and problem of the study

Football is considered as the most popular sport in the world in terms of media and practice as we find over 265 million practitioners in the world and 207 countries are affiliated with FIFA . Consequently, numerous studies have focused on this sport

in order to improve the effectiveness of training and thus improve performance . (Stølen&al., 2005)

From scientific- sporting point of view, it important to measure the efforts made by players on the field, in order to determine his optimal range for training load .

Furthermore , it allows us to determine positioning via satellite or Global Positioning System (GPS) to relieve fatigue of the footballer and therefore reducing the risk of injuries. (Andersson et al., 2008 ;Randers et al., 2010) , With the development of all sports standards through individual and group management of the training sessions and the intensity that will be practiced there .This tool is one of the main tools for an athlete or a group of athletes such as a football team, because its use provides a real complement to monitoring players and controlling training through the physical preparation or tactical plans and strategies.

Therefore, we decided to look into this topic during the training period conducted for the professional team (Algerian Professional Champion), using GPS during competition with the aim of discovering this tool and its various and diverse functions . In order to better understand football performance, analyzing activity times during a match has become necessary and has led to the emergence of many recently published studies (Bangsbo, 2006 ; Dellal, 2008 et 2010 ; Di Salvo, 2007, 2009 et 2010 ; Rampinini, 2007 ; Randers, 2010) . Understanding the different game sequences performed by players to improve training by promoting individualization of physical and technical work .

In football, As in all sports, technical trainers coach, fitness trainers coach,constantly searching new training techniques in order to develop the physical and technical characteristics of players with the aim of improving sport performance. During a match, players must move around the field taking into account so-called “open” situations including opponents, partners and the ball.

The development of video tracking systems for analyzing player activity during matches has made it possible to obtain large quantities of information on the movements of all players during the match.

1.1 General information and history of GPS :

The satellite positioning system (GPS) emerged after the invention of the atomic clock (Aughey, 2011), and is defined as a geolocation tool using satellite signals to pinpoint a location on a map .

It was developed by the United States with TRANSIT, the first satellite navigation system implemented for the US Navy in 1964. It enabled submarine

positions and missile launches to be determined with an accuracy of between 200 and 500 meters (Ahmed et al., 2006).

But before the satellite system was introduced, Dr. Ivan (president and chief executive officer of the Aerospace Corporation) developed the first 3D geolocation system that used the time difference of arrival (TDoA), which it became the basis for the future as a positioning system (Alexandru, 2010)

Between 1978 and 1985, a minimum of eleven satellites were sent into space and placed in position (Evans, 1998), so that increasingly more powerful and accurate signals to be obtained when new satellites were placed in orbit on a regular basis.

Initially, it was created specifically for military use, then it was licensed in the civil society in 1983 after the US government approved it, but its real use was only after the 1990s in the Gulf War, as this historical event required the possession and use of all satellite systems . (Kaplan, 2006)

Is considered by researchers as a tool to discover and explore many data, including analyzing performance in sports, especially football (Randers et al., 2010).

The original use of this device in the sports specialization was by Shutz et Chambaz in 1997, who had the idea of a model that was more difficult to use at high speeds.

Then, the device was first tested in football in 2006, based on a real study conducted by Edgecomb and Norton, which led to verification of the usefulness and validity of this system particularly concerning the distances measured and those actually covered by team sport athletes.

A study conducted by Randers et al. In 2010, it was allowed to monitor different activity measurement tools such as a video time and motion analysis system, or create a semi-automated Multicam then determine comparable results considered statistically significant ($p < 0.05$) , Data recorded by GPS allows to determine the positive way in which this type of tool can be used, which is interesting by measuring data that can be compared to various and varied specimens panel .

Prior to the development and use of recently applied methods, movement analysis was done manually and focused on a single player in a specific period of time. Today, it is quite common to use high-tech measurement tools such as GPS, analyzing the movement of many players.

1.2 The advantages of using GPS data in football :

Analyzing activity in a match is of great importance in sports. Indeed, GPS is mainly used in team sports such as the Australian Football League (AFL) ... such other team sports as rugby, soccer, hockey, and American football .

Many authors, such as Bakraoui, Cazorla and Leger (2010), have emphasized the usefulness of GPS in football, allowing us in particular to determine the full distance covered by players collectively and individually, but also how this distance is covered.

This enables us to obtain targeting information that allows the personalization of sports preparation through the player's profile and the specific types of efforts exerted by him on the field. Thus, Athlete's movements will not be directed in a similar way from one player position to another .This allows the performance level of each player to be developed according to the qualities rquired by his position on the field.

In addition, this tool allows Taking into consideration the individual and collective sports profile of the group, thus determining the target intensity and corresponding training loads, leading to individual control and planning of training sessions, with the aim of reducing fatigue. Thus preventing possible injuries . (Andersson et al., 2008 ; Randers et al., 2010).

There are many multi-camera motion analysis systems in football to study players' movements on the field according to time and speed parameters, for example such as Amisco, ProZone or SICS. The latter is a semi-automatic tracking video analysis system equipped with six cameras (three on each side of the field) used mainly in Italy .

Table 01: List of different video and GPS analysis systems used in the analysis of the athletic activity profile of football players (according to Carling et al, 2008)

Performance Group international (Great Britain -UK)	DatatraX	Automatic video repair
ProZone Holdings Ltd (Great Britain -UK)	ProZone	Automatic video repair
Sport-Universal Process SA (France)	AMISCO Pro	Automatic video repair
TRACAB (Sweden)	Tracab	Automatic video repair
University of Campinus (Brazil)	Dvideo	Automatic video repair
		Semi-automatic video repair
Bassano del Grappa (Italy)	SICS	Automatic video repair
		Manual Analysis

Noldus (Netherlands)	Observer Pro	Manual video coding
Sportstec (Australia)	TrakPerformance	Touchscreen tablet (manual)

Studies that used multi-camera systems to analyze the movements of football players appeared in the 1970s, such as Reilly and Thomas (1976). Scientific progress makes it possible to have a wide range in the choice of analysis systems (automatic and semi-automatic cameras, GPS, accelerometer) (Table 2). More recently, a study by Randers (2010) looked at different data collection techniques in order to determine the preferential use of one or another system while comparing its reliability.

A handheld GPS system (GPSports SPI Elite System, Canberra, Australia) has been identified as reliable and valid for recording high-intensity running distance (HIR) and sprinting of football players (Jennings et al, 2010; Coutts et Duffield, 2010; Edgecombe and Norton, 2006; Barbero-Alavarez et al., 2010). GPS provides a coefficient of variation of 3.6% for total distance, 11.2% for high-intensity running distance (HIR), and 5.8% for sprint (Coutts et Duffield,2010)

In addition, Barbero-Alvarez et al (2010) confirmed the use of GPS as a surrogate for assessing Repeated-sprint ability (RSA) with particularly strong correlations between GPS performance and RSA performance measured during timess pour 15 m (r2=0.87) et 30 m (r2=0.94),knowing that the sprint distance is rarely greater than 30 m in football matches (Bradley et al, 2009)

The small difference in high-intensity running distance (HIR) values between GPS and semi-automatic video technology could be related to players' stress of wearing a GPS hardware system. Indeed, the GPS was placed on the back inside a neoprene pocket attached to a harness around the player's shoulder, inside another pocket sewn into a sleeveless undershirt. Comparatively, the MinimaxX v2.0 GPS system was considered less reliable in estimating high-intensity running distance (HIR) . In fact, it will only take into account 50 to 75% of the number of sprints compared to the other three systems. This difference can be explained by the lower recording frequency of this system.

SICS is a semi-automatic tracking video analysis system with six 25-Hz sample frequency cameras (three on each side of the field). The 6 fixed cameras were positioned all around the playground and subsequently calibrated and synchronized. All players were simultaneously monitored, and the total distance covered in different speed categories was determined as in the stady of Osgnach et al (2010). The reliability of the SICS video analysis system was demonstrated by Rampinini et al (2009a) who showed a typical error of 1.0% for the total distance covered and a typical error as for the coefficient of variation (CV) for the distance covered at high-

intensity running distance (HIR) of 3.2% (95% confidence interval [CI] = 1.9–9.2%) while a previous exploratory study showed an accuracy of 3.6% for high-intensity running distance (HIR) (n = 5, 95% confidence interval [CI] = 2.6–10.3%). This system is similar to the Amisco Pro® system, version 1.0.2 validated by Randers et al (2010).

1.3 Limitations of the tool:

However, the study of player movements is not enough to completely define football activities which is composed of multiple actions such as jumps, turnovers, tackles, passes . This is why coordination is an essential quality in playing football as in any sport. According to Hirtz (1977), its role in controlling and regulating motor skills activities gives it the status of primordial learning quality , perfection and adequate use of motor skills activities . According to Silon Frye (1978), coordination abilities of athletes perform actions in predictable (automatic) or unpredictable (adaptation) situations, through the execution of an economical technique and rapid learning of movements . Hahn (1988) defines it as the simultaneous action of the central nervous system and the skeletal muscle in order to execute a voluntary movement in such a way that there is a harmonious sequence between the different components of this movement .

During a football play- match, Bloomfield et al (2007) estimated that a player spent 41% of the match performing (PM) to perform motor actions. This author recorded 727 rotations and changes of direction. Strudwick and Reilly (2002) observed a change in activity every 3.5 seconds. Hawkins (2004) noted more than 450 more changes of direction 90°, involving jumps, tackles, long and short passes (Lobbed through balls, shot passes), running backwards,head the balls Random grouping during the football match, which takes place in the presence of the opponent and in relation to these partners, these elements require high-quality coordination. Bloomfield et al (2007) mainly relate to rotationsless than 90°.

During a match, players perform different actions as we have seen in the definition of activity by Taskin (2008) and Cazorla (1998). Thus, Whiters et al (1982) noted that a player made 9.2 jumps, 49.9 half-turns, and 13.1 tackles per match.

Bangsbo (1994) completed these data by counting 8 headers and 30 dribbles. More recently, Mohr et al (2003) counted 15 heads and 20 tackles.

Bloomfield et al (2007) studied the activity pattern of a football player depending on his playing position (Table 14 and Table 15). It appears that differences exist between

defenders, midfielders and attackers. Indeed, a defender makes on average 822 rotations and changes of direction while a midfielder makes 608 and an attacker 748.

The position also affects the type of rotation and change of direction. A significant difference is observed for rotations from 0 to 90° (right and left) as well as for changes of direction to the left. On average, a defender performs approximately 700 rotations between 0 and 90° while a midfielder performs 500 and an attacker 600. However, midfielders and attackers rotate more from 270 to 360° than defenders.

Table 02: Number of rotations and changes of direction during a match depending on the playing position (Bloomfield et al, 2007)

Variables	Attackers	Midfielders	Defenders	Total
0-90˚ Right	323.7	248.3	344.3	305.8
0-90˚ Left	302.2	243	364.3	303.2
90-180˚ Right	43.3	49.3	43	45.2
90-180˚ Left	51.5	47	49.3	49.3
180-270˚Right	2.5	4.7	2.3	3.2
180-270˚Left	2.2	3	2	2.4
270-360˚Right	1.3	0.7	0	0.7
270-360˚ Left	0.6	2.3	0	1
change of direction to the left	8.5	5.7	7.7	7.3
change of direction to the right	12	4	9.3	8.5
Total	748	608	822	727

Table 03: % of time spent during different changes of direction depending on the time spent performing motor actions reported at the playing station (Bloomfield et al, 2007)

Variables	Attackers	Midfielders	Defenders	Total
Straight ahead	46.9	54.1	45.3	48.7
Straight back	5.6	5.2	10.1	7
Lateral left side	3.7	3.4	6.5	4.5
Lateral right side	3.5	3.2	5	3.9
Forward, diagonal and left	4.5	4.9	4.5	4.6
Forward, diagonal and	5.4	4.4	5.1	5

right				
None	**24.4**	**18.8**	**18.3**	**20.6**

In terms of intensity , attackers spend 35.8% of their time performing motor actions, midfielders 44.5% and defenders 41.9% at an average frequency of 28 repetitions every 15 minutes. The average duration of a motor action is 13 seconds and the average duration between two low-intensity motor actions is 20 seconds. The authors conclude with an activity time/recovery time ratio of 1/1.6.

1.4 GPS data and match requirements:

1.4 Analysis of motor activities of professional footballer players:

Football is a physiologically demanding sport where efforts are both aerobic and anaerobic (Di Salvo et al., 2007). This physical activity requires alternating sprints and technical actions that require speed, strength and precision in execution, but also require a series of passive recovery periods or short actions (Cazorla, 1998). These characteristics of the game allow football to be defined as an activity involving short, highly intense, intermittent exercises, randomly distributed by position, partners and opponents and taking place in smaller spaces .

These game characteristics make it possible to define football as an activity involving short, very intense intermittent exercises, randomly distributed according to position, partners and opponents and taking place in smaller spaces.

These different requirements require great qualities:

- Techniques performed at the highest possible speeds.

- Starting speed and endurance speed.

- Power and muscular endurance.

- Maximum aerobic power and endurance.

A player performs on average 27.22 ± 11.1 sprints per match (Di Salvo et al., 2010),

carried out mainly over very short distances from 0-5 meters to 5-10 meters (Di Salvoet al., 2010).

In addition, many intense races, that is to say between 100 and 120% of the maximum aerobic speed (i.e. on average 17 to 25 km/h), are carried out during a football match, this over fairly large distances, on average 22.8 meters ± 14.5 meters (Cazorla,1998). To this must be added blocks as well as changes of direction, present

in significant quantities during a match. Indeed, these types of actions are performed between 40 and 68 times per match, or 54 ± 12 times (Cazorla, 1998).

Thus, a football player must perform well during these brief and intense actions, because they correspond to decisive actions allowing the team to win a match. However, they only represent a very small amount of time in the entire match.

In fact, the player spends between 7 and 8% of the time performing intense actions, almost 40% of the time walking and 15 to 20 minutes standing in a static position (Mohr et al., 2003).

In addition, the increasing increase in the level of play (regional to national) implies different efforts during the match, particularly regarding the total distance covered at high intensity (Andersson et al., 2010). This type of configuration inevitably leads to increased fatigue and a reduction in reproducing intense efforts throughout the match, particularly in the second half, and at the end of the match (75'-90') (Mohr et al., 2003). Consequently, the role of aerobic metabolism remains predominant in football, although intense actions, which are often the most decisive on the outcome of the match, require anaerobic metabolism (Stolen et al., 2005).

Finally, it is essential for the football player to possess muscular qualities allowing him to carry out the most intense and rapid actions possible, but also cardiorespiratory and cardiovascular capacities allowing him to benefit from these qualities of speed and explosiveness on the match**.**

2. Resume objectives:

A large number of studies, such as that of El Bakraoui, Cazorla, and Leger (2010), have confirmed the usefulness of the GPS system in football, allowing us to learn about a large number of actions carried out during the match, and in particular the way in which these are carried out. It has particularly been shown that the most decisive races during a football match are those carried out at high intensity or even very high intensity (Stolen et al., 2005), explaining the significant proportion of low-intensity efforts such as walking or slow running (nearly 40% of the time walking and 15 to 20 minutes standing in a static position) (Mohr et al., 2003).

This type of physical effort leads to increased fatigue and a reduction in reproducing intense efforts throughout the match (Mohr et al., 2003)

Thus, this creates a significant risk of injury due to this accumulation of fatigue following the heavy training load of the football player, who produces very violent and repeated efforts. (Mohr et al., 2003),in the match but also during training cycles.

In addition, the satellite positioning system or GPS makes it possible to quantify the type of efforts made and to control the footballer's state of fatigue, and therefore to limit injuries (Andersson et al., 2008; Randers et al. , 2010).

In addition , this tool constitutes a real contribution in terms of developing the performance of the player but also of the group of players as a whole, the data collected can be processed in a unitary manner according to the intentions and instructions of the coach.

This makes it possible to have essential information concerning the monitoring of an athlete's training load, but also of the athletic performances achieved during a match or a particular training session.

From these observations, it would seem interesting to analyze the activity of the Algerian player during the Algerian championship.

3. Material and method :

3.1 Subjects:

Eleven male participated in this study, constituting a professional football team. All participants completed approximately 15 hours of football practice per week with a daily training session from Monday to Friday in the morning or evening, combining both tactical technical training and physical preparation sessions, to which we adds the match (Often two per week).

3.2 Experimental protocol:

The study was carried out over a period of 8 weeks, including 04 matches (4 in the championship).

Satellite positioning systems were used during every football match on the field. They were given to the players individually before the session, and retrieved at the end of the match in order to recover the data.

3.3 Tool used: The FieldWiz® GPS 10 Hz:

The GPS model used is a tool from the FieldWiz® brand (in French the “field wizard”). This system constitutes a method of measuring strategic and physical performance in team sports such as football. Created in Switzerland, this tool is based on a sampling frequency of 18 Hertz (corresponding to 18 data recorded per second), as well as an accelerometer (250kHz configurable; + 16G; 16-Bit) allowing acceleration to be measured linear of the user in movement, and this with a fairly substantial autonomy lasting more than ten hours.

The GPS is inserted by the user in a bra provided for this purpose, allowing it to be positioned on the back and thus limiting the discomfort caused when practicing physical activity, and in particular in football during certain playing actions (ball control from the chest or physical duels for example).

In addition, it is not bulky because it measures 65mm x 35mm x 15mm and weighs 35 grams, giving maximum comfort to the athlete during practice. The box is made up of a single button to start and stop it, visible by a green indicator light, flashing when it is in capture action. This indicator light is also flashing when the case is charging. In order to signal that it is fully recharged, the indicator light becomes static. A docking station is provided in order to be able to bring together all the GPS boxes used when charging the devices and retrieving recorded data. This multitasking station makes it possible to combine all the measurements but also to easily delete them, saving considerable time unlike individualized use of each box.

However, individualization of the data is entirely possible via a single cable making it possible to obtain the data recorded on a single box, thus making it possible to focus on a player in a specific and precise way.

This FieldWiz® 18 Hz GPS allows you to quantify the efforts made by an athlete or a group of athletes when practicing a sporting activity. The data recorded is synchronized at the end of the training session or match, and is collected through software which will transmit the final results, transcribed according to the user's wishes (in particular for the calibration of speeds and thresholds analyzed).

The data collected by this tool corresponds to the total distance covered by the athlete initially, then the details of this distance and the way in which it was covered as a whole. Thus, the distance by speed thresholds according to the user's wishes (observed with the percentage of these distances per the primary benchmark of the total distance), the number of accelerations, decelerations and sprints (number of actions) with the maximum speed reached, or the preferential activity zones (heat map), are the main characteristics retained by this technological tool.

3.4 Data entry protocol with GPS systems:

As a first step, it is important to ensure that the data recorded during the previous session is cleared, so that each GPS unit is empty and able to measure the unique entirety of the given session.

Then, it is preferable to identify the player(s) to be monitored, so as to initialize each box individually, with the aim of facilitating data entry following the match or session. Each box is then provided to the players concerned with their respective bra,

so that they can position it in complete comfort before the match, both below and above sports clothing (no impact exists regarding the position of the GPS in relation to the clothing for the quantity and reliability of the measurements recorded). To ensure the proper functioning of each GPS unit during the entire sports activity captured, all boxes can be started before providing them to athletes.

One of the essential steps in this measurement is the precise recording of activity times. Indeed, in order to retrieve the data corresponding to a precise period of the activity carried out, it remains essential to take into account the exact time of the start of the match, as well as the time at which it ends. It is noted that it is entirely possible to use the GPS tool for the entire match, but to only keep the exact data for one or more specific periods of effort desired by the user.

For example, the user can measure the entirety of a football match, then subsequently isolate the two halves or quarter of an hour to see the evolution in the match (like the last quarter of an hour of a match). At the end of the measured match, all GPS tools are recovered by the user, and each box must be turned off in order to end the data recording. They are then placed in the docking station to start group data recording and device charging. The GPS statistics are thus imported onto a USB medium, allowing the data to be presented clearly via the FieldWiz® software.

4. Presentation and discussion of results:

4.1 Presentation of results:

Football is an activity that continues to evolve. In an interview with France Football on September 25, 2007, Gérard Houiller reported that “Speed, reduction of spaces, technical and physical demands: the evolution is profound”. This development must be the subject of the greatest attention.

We need to know the physical impact of high-level matches, that is to say how the player expends his energy and what types of effort he makes. These elements must be known in a quantitative plan (raw analysis, volume, number) and in a qualitative plan (average recovery time between two sprints for an attacker...). This data will allow the training to be directly adapted.

In any scientific work, the collection of raw data alone is not enough to have rational interpretations to explain the subject studied, through this chapter we will try to organize, analyze and interpret them as best as we can. results of our experimental group, as well as the analysis of the results, to ultimately arrive at discussions and tangible conclusions.

After having explained the methodology of our study, here are the results of the different parameters measured.

Table n° 04: Results of the comparative statistical analysis by playing position for the 8 halves - time football match of the Algerian championship.

Match 1 championship							
Football Players Position	**DT**	**>14km /h**	**>24km /h**	**>28km /h**	**%HID**	**V Relative**	**Frequence**
RBW	**9870**	**2140**	**17**	**5**	**21 ,7**	**103**	**0.23**
LBW	**10210**	**2270**	**15**	**3**	**22.2**	**106**	**0.19**
RB	**9120**	**1140**	**9**	**0**	**12.5**	**95**	**0.09**
LB	**8320**	**780**	**10**	**1**	**9.4**	**87**	**0.11**
DM	**10720**	**10720**	**9**	**3**	**22.1**	**112**	**0.13**
CM	**9890**	**1710**	**6**	**1**	**17.3**	**103**	**0.07**
AM	**11210**	**2860**	**19**	**3**	**25.5**	**118**	**0.23**
RW	**11270**	**2810**	**17**	**1**	**24.9**	**117**	**0.13**
LW	**10780**	**1820**	**14**	**6**	**16.9**	**112**	**0.21**
ST	**9630**	**1550**	**12**	**3**	**16.1**	**101**	**0.16**
RBW	**10000**	**2140**	**22**	**8**	**21.4**	**105**	**0.23**
LBW	**10540**	**2840**	**19**	**7**	**26.9**	**111**	**0.27**
RB	**8670**	**1020**	**5**	**1**	**11.8**	**91**	**0.06**
LB	**8060**	**810**	**2**	**1**	**10**	**85**	**0.03**
DM	**11070**	**2600**	**8**	**0**	**23.5**	**117**	**0.08**
CM	**10010**	**1930**	**12**	**3**	**19.3**	**105**	**0.16**
AM	**11880**	**3340**	**12**	**1**	**28.1**	**122**	**0.13**
RW	**11270**	**2810**	**17**	**1**	**24.9**	**119**	**0.19**
LW	**3670**	**1620**	**19**	**6**	**16.8**	**103**	**0.27**
ST	**34101**	**1430**	**13**	**0**	**15.8**	**36**	**0.13**
RBW	**10000**	**2140**	**13**	**2**	**24.1**	**116**	**0.16**
LBW	**10540**	**2840**	**22**	**7**	**25.9**	**109**	**0.3**
RB	**8670**	**1020**	**5**	**0**	**14.5**	**98**	**0.05**
LB	**8060**	**810**	**4**	**2**	**10.5**	**92**	**0.06**
DM	**11070**	**2600**	**13**	**4**	**23.7**	**115**	**0.17**
CM	**10010**	**1930**	**10**	**1**	**18.8**	**93**	**0.11**
AM	**11880**	**3340**	**9**	**1**	**21.6**	**116**	**0.1**
RW	**11270**	**2810**	**10**	**2**	**17.9**	**113**	**0.12**
LW	**3670**	**1620**	**8**	**2**	**21.7**	**116**	**0.11**
ST	**9410**	**1490**	**19**	**4**	**21.5**	**111**	**0.24**
RBW	**10440**	**1920**	**25**	**4**	**18.4**	**111**	**0.31**
LBW	**10640**	**2700**	**22**	**2**	**25.4**	**113**	**0.26**
RB	**8270**	**930**	**7**	**2**	**11.2**	**88**	**0.1**
LB	**8900**	**990**	**5**	**0**	**11.1**	**95**	**0.05**
DM	**10420**	**2240**	**8**	**0**	**21.5**	**111**	**0.09**
CM	**11460**	**3020**	**13**	**1**	**26.4**	**122**	**0.15**
AM	**11920**	**2950**	**15**	**1**	**24.7**	**123**	**0.16**
RW	**11420**	**2580**	**10**	**2**	**22.6**	**118**	**0.12**
LW	**11320**	**2510**	**16**	**2**	**22.2**	**119**	**0.19**
ST	**10190**	**1660**	**10**	**1**	**16.3**	**107**	**0.12**
Average	**10284**	**2268**	**13**	**2**	**20**	**107**	**0**
SD	**1016.48**	**1455.27**	**5.56**	**2.03**	**5.22**	**10.53**	**0.08**
Square root $^{(2)}$ (n)	**6.32**	**6.32**	**6.32**	**6.32**	**6.32**	**6.32**	**6.32**
	321.44	**460.20**	**1.76**	**0.66**	**1.65**	**3.33**	**0.02**
Lim<	**9962.81**	**1807.55**	**10.77**	**1.69**	**18.03**	**104.02**	**0.13**
Lim>	**10605.96**	**2727.95**	**14.28**	**3.01**	**21.33**	**110.68**	**0.18**
IC	**(9962.81 ;10605.96)**	**(1807.55 ;2727.95)**	**(1077 ;14.28)**	**(1.6 ;3.01)**	**(18.03 ;21.33)**	**(104.02 ;110.68)**	**(0.13 ;0.18)**
P(0.05)	**0.20**	**0.44**	**0.38**	**0.29**	**0.03**	**0.27**	**0.39**
	not significant	**not significant**	**not significant**	**not significant**	**significant**	**not significant**	**not significant**
SD Average	**978.46**	**1081.59**	**5.92**	**2.24**	**5.22**	**10.491**	**0.080**
Ave LDC/	**118**	**-34**	**0**	**0**	**1**	**1**	**0**
d (Cohen)	**No difference**	**No difference**	**No**	**No**	**Little**	**No difference**	**No difference**

			difference	difference	difference		

RBW= right back winger defensive player ; **LBW** = left back Winger defensive player ;**RB** = right center-back defensive player ;**LB**= left center-back defensive player ;**DM**= defensive midfield ;**AM**= attacking midfielder;**CM**= Center midfielde ;**RW** = Right Winger striker ;**LW** = Left Winger striker ;**ST**= Striker

5.Data analysis

This activity analysis covered 8 halves in the championship of attackers, midfielders, defenders players who participated in the entire match**.**

5.2.1 Total distance covered

The analysis of the total distance covered showed that the values vary between 9962 m and 10605m. The minimum values concerned center-back defensive player and the maximum values concerned defensive, attacking and wide midfielders. The values of back winger defensive players vary depending on the match (context, home and away match, etc…)

5.2.2 The total distance covered in High intensity (>14km/h)

Analysis of the distance covered above (>14 km/h) shows that the values vary between 1807m and 2727m. It is the defensive midfielders, the attacking midfielders and the wide players who cover the greatest distance, which would correspond more to their activity.

5.2.3 Number of sprints (>24Km/h)

They vary from 10.77 to 14.28 sprints per match. The back winger defensive players and the wideouts are the ones who do more. On the contrary, center-back defensive players are those who do the least**.**

5.2.4 Number of sprints (>28Km/h)

They vary from 1.69 to 3.01 sprints per match. Back winger defensive players and wide midfielders are the ones who do more. On the contrary, the center-back defensive players are the ones who do the least**.**

5.2.5 High Intensity Percentage (%HID)

This is the percentage of the distance covered at high intensity compared to the total distance covered. They vary from 18.03% to 21.33%. back winger defensive players, defensive midfielders, attacking midfielders and wide midfielders are the ones who have high percentages. On the other hand, it is the center-back defensive players who have low percentages, which is due to the specificity of the position..

5.2.6 Relative speed

This is the distance covered in meters per minute. They vary from 104.02m to 110.68m. Attacking midfielders are those who have higher ratios (= or >122m/min) those who demonstrate that these midfielders are active by participating in offensive and defensive tasks.

6. Results of the Algerian championship

The analysis of the activity of the players from the team in the Algerian championship during 8 halves - time football match made it possible to draw up a precise map of its progress. Center-back defensive players cover the least distance, which is due to the specificity of the position and the coach's instructions. For the % of HID, defensive, offensive, wide midfielders and back winger defensive players are those who have a high ration, which demonstrates the participation of these players in defensive and offensive tasks. Regarding the relative speed, it is the attacking midfielders who cover more distance in a minute, which is due to the tasks given to the player to cover a larger area during the four phases of play. Finally for the Sprints it is the back winger defensive players and the midfielders who do more, due to their set-up to participate in offensive and also defensive actions, while the center-back defensive players do less.

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