ANALYSIS OF GOAL SCORING PATTERNS IN SPANISH WOMEN NATIONAL LEAGUE

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February 11, 2022

Abstract

The aim of the study was to analyze the goals scored pattern in elite female soccer players. All goals (330) scored in the first half of the Spanish female national league (Iberdrola League) were analyzed using the Nacsport Scout Plus 6.0 New Assistant for Coach Sport SL software. The frequency, place and starting situation, position goal action, type and style of play, type of set play and action prior to goal score with a combination of space of the goal and scoring zones were analyzed. The periods with the greatest amount of goals were the last one of each half (18.2% and 26.1% respectively), and the teams that scored the first goal won 71% of matches. Open play, positional and first touch are the predominant actions prior to achieving a goal in elite female soccer players. It is also important to pay attention to the high number of steals in the center zone of the own side while designing defensive strategies. The relationship between the space of the goal and scoring zones shown that the majority of the close shoots enter throw the low part of the goal. These findings could be used for coaches to propose defensive strategies in female soccer players.

Introduction

Since 1990, when women's football became Olympic sports it has grown incredibly fast all around the world, especially in the last few years. FIFA estimates that 13.4 million women play football, of which 76% do so in a structured way (Krustrup et al., 2005). This growth has allowed to provide women's football a professional structure and to propose tools and mobilize resources for its development (Maneiro et al., 2020) increasing the number of studies that analyze women's football.

As an intermittent and acyclic sport, it depends on different intercorrelated skills: technique, fitness, psychological factors, and tactics (Armatas, 2006). Previous studies had shown that elite woman football players covered 10.3 km and 1.3 km at high-intensity running performed 125 times with a 2.3 s of average duration (Krustrup et al., 2005). These demands are lower according to level of players showing that elite players covered ~100 m·min^{-1} (Vescovi & Favero, 2014) in front of ~80 m·min^{-1} in sub-elite female players (Strauss et al., 2019). In addition, match demands are significantly different between gender since women covered less total distance and distance at high intensity than men (Bradley et al., 2014). However, performance is not only conditioned by physical aspects since scoring goals is the ultimate determinant of successful soccer team performance (Kubayi, 2020). If the physical demands are different between male and women players (Bradley et al., 2014), and if male soccer players are faster (~10%) than women's (Ingebrigtsen et al., 2014; Vescovi, 2012) it is to be expected that there will be differences in the way of scoring goals.

In male football players, most of the goals were scored: in positional attacks (75.9%) (González-Ródenas et al., 2019), in the second half (63%) (Kubayi, 2020), beginning from the attacking half (56.6%), with less than four passes (61.8%) (Armatas & Mitrotasios, 2013) and preceded by a straight sprinting (61%) whereas most powerful actions of the scoring player (81%) were conducted without the ball (Faude et al., 2012a).

However, to our knowledge there are no studies that analyze goal scoring in women soccer player, and there is a need to analyze how and when goals are scored because it is important for coaches to be cognizant of greater effectiveness actions during the offensive phase, recognizing deficiencies within the current game models, as well as making a defensive approach based on the strengths of the teams in the competition. On the other hand, coaching staff could modify training tasks, generating shooting situations from less common areas and training shooting variability looking for less frequent goal spaces.

This has led to an increase in the interest of game analysis science, both qualitatively and quantitatively (Maneiro et al., 2020) and to study these events, it is necessary to have an objective observation method, such as notational analysis (Škegro DMilanović, 2012). This consist on the record and later observation of the relevant images, carrying out a quality analysis (Vales, 2012) to explain performance aspects relevant to the game. Therefore, the purpose of the present study was to analyze the goals scored pattern in elite female soccer players.

Method

Design

An observational and descriptive design was implemented to analyze the goals scored pattern in elite women soccer players during the first half of the 2019–2020 season. A total of 330 goals were analyzed of the Spanish Women National League (Iberdrola League). All the teams that participated in the league and the goals were included in the analysis.

Procedures

Videotapes of all goals were analyzed using the Nacsport Scout Plus 6.0 New Assistant for Coach Sport Sl software. For determining the situations directly preceding the goals, the observer visualizes the actions the number of times it is necessary by visual video analysis to categorize the activities. The performance variables analyzed in this study were, the frequency of goal scoring from open play during a 15-min interval (1–15, 16–30, 31–half time, 45–60, 61–75, 76–full time), the place (home or away), starting situation (starters or non-starters), position (forward, midfielder, defender or own goal) goal action (first, two touch or individual action), type of play (open or set play), style of play (positional or counterattack), type of set play (corner kick, free kick, penalty kick or throw in) and action prior to goal score (frontal long pass, lateral long pass, frontal short pass, lateral short pass, rebound or steal). To analyzed scoring zones, the pitch was divided in 8 zones (Figure1). The definition of the criteria for codification the performance variables are shown in table 1.

Table 1 next here

Statistical analysis

Descriptive statistics such as frequencies and percentages were used to analyze and present the data. A chi-square test and normality distribution test were applied to examine any significant differences between categories. A level of $p < 0.05$ was used to indicate significance. Data were analyzed using the Statistical Package for Social Sciences (SPSS) version 25. Experiments reported in the manuscript were performed in accordance with the ethical standards of the Helsinki Declaration.

Results

The results showed that 330 goals were scored with an average of 2.9 goals per match. Presented in Table 2 are summarized statistics of different performance offensive variables.

Table 2 next here

Attending to the initiation zone of attack 48.4% of the goals began in the center zone and we observed difference between the right (31.3%) and left (20.3%) zone of the field to the initiation goal action ($\chi^2 =39.2$; p<0.001). Figure 1 represents the goal scoring zones, which are mainly scored from the center zone and near the goal ($\chi^2 =332.6$; p<0.001).

Figure 1 next here

Figure 2 illustrates the goal time distribution, it shows that most part of the goals were scored during the second half (56.06%), mainly in the last 15 min period (χ^2 =25.8; p<0.001). The first goal is critically important to match outcome, teams that scored the first goal won 71%, had drawn 20% and lost 9% of the matches (χ^2 =70.6; p<0.000).

Figure 2 next here

Concerning kicking surfaces 86.3% of the goals were scored with the foot, 11.8% with the head and 1.8% with other parts of the body (χ^2= 670.4; p<0.001). Regarding the space of the goal, the low part accounted 60.9% of the goals (χ^2=132.6; p<0.001), the other zones presents a normal distribution.

Most of the positional attacks began in the center of the own side (22.8%) and the right zone of the opponent side (26.2%), the counterattacks starts in the center of the opponent side (47.1%) and there are almost no plays starting from the left zone (χ^2=36.3; p<0.001).

Relationship between variables

Analyzing the relationship between the different actions prior to goal scoring and the different goal action we found significative differences (χ^2= 71.1; p<0.001). The lateral short and long passes ended with a first touch kick (67.3%). Frontal passes and rebounds are finished by a two touches action (47.7% and 22.7% respectively) or an individual action (41.8% and 19.4% respectively) and almost all the steals end in an individual action (87.5%).

Attending the relation between the space of the goal and the goal zones results shown significative differences (χ^2= 84.7; p<0.01). From the center area (Zone 5, 2 and 6) most of the kicks are to the low zones (69.2%, 60.6% and 36.7% respectively). There is a cross shooting tendency on lateral areas (Zones 4 and 7) and the pattern in the outside area (Zone 8) is to kick to the upper space of the goal (40%) and the right down (28%) (Table 3).

Table 3 next here

Discussion

The purpose of this study was to analyzed the goal scoring patterns in elite female soccer players during the first half of the season 2019/20, this is especially relevant because to our knowledge there are no studies that examine these aspects. Goal and its characteristics are vital for soccer, due to the few goals that are registered during the matches and because its technical-tactical complexity. The findings show that 2.9 goals per match are achieved in elite female soccer players, the periods with the greatest amount of goals are the last one of each half (18.2% and 26.1% respectively), that teams that scored the first goal won 71% of matches, and almost all the plays started in the center (48.4%) or right (31.3%) part of the field.

According to Sampedro y Prieto (2012), if you play at home you have an advantage because the 60.21% of the matches are won by the local team. Our results show that 60% of the total goals are scored by the local team, so it is logical to argue that they won more matches due to the few goals per match that occurred in soccer. In 2018 FIFA World Cup, males scored an average of 2.6 goals per match during the tournament (Kubayi, 2020) with a oscillation of 17.5% in number of goals per match in the last six tournament (Kubayi, 2020; Kubayi & Toriola, 2019). In the absence of studies analysing the number of goals in female soccer during a regular season we had compared with male soccer, where an average of 2.6 (Tenga et al., 2010) or 2.5 (Faude et al., 2012b) goals per match was scored in Norwegian male professional league or first German male national league respectively. Our results show a similar average of goals per match (2.9) as in elite male leagues.

Analyzing the influence of the first goal in the final result we found that the 71.0% of the matches are won by the team who scores first, this has also been highlighted by (Mitrotasios & Armatas, 2012) and (Njororai, 2005a) who found a 75.9% and 73.5% of victories respectively. In Spanish elite male soccer matches the

team who scores the first goal win the 74.4% of the matches, while this percentage is reduced (62.1%) if the team that scores the first goal is the visitor (Sampedro & Prieto, 2012). Previous studies have shown the advantage of playing at home for performance in team sports (Lago-Peñas et al., 2013; Lago-peñas & Lago-ballesteros, 2011), however this home advantage effect may be transient given that it tended to disappear as the first half of the matches progressed (Lago-Peñas et al., 2017) reinforcing the importance of scoring the first goal. Factors such as the public, travel, playing environment, refereeing, tactical aspects of play, aspects of territoriality and psychological effects (Pollard, 2006b, 2006a), have been argued as possible causes of the advantage of playing at home in match outcome. Teams decreased their possession when they were 1 goal up (Lago-Ballesteros & Lago-Peñas, 2010; Lago-Peñas & Dellal, 2010; Lago-Peñas & Gómez-López, 2014) suggesting they preferred to play counter-attacking or direct play. These results stand out the importance of the first goal in the match outcome.

Most goals are scored after open play (70%) and 30% after set plays. This coincides with the results of (Wright et al., 2017) and (J. J. Taylor et al., 2005) who showed that about 30-40% of all goals have been scored on set plays. Our findings provide further evidence of the importance of effectiveness in the execution of set plays because they have an important role in the final outcome of the game. Attending the style of play, 63% of the open play goals occurred after a positional attack and 37% after a counterattack, this is like the 60% observed by (Armatas & Mitrotasios, 2013). Some authors have suggested that counterattacks are more effective than positional play (Armatas, 2006). (Kubayi & Toriola, 2019) has registered the type of set plays during the 2018 FIFA World Cup, they found that the 31.8% of the goals are originated by a corner kick, 30.3% by free kicks and 34.9% from penalties. The present study observed similar results: 26% corner kick, 29% free kick and 34% penalties. This release the importance of training penalties and analyzing kicks patterns from the opponents for the team success in a season.

The majority of soccer goals are achieved in the second half, although without significant differences from the first half. Specifically if we divide the total game time into periods of 15 min, the 25.2% of the goals in the male World Cups between 1998 and 2014 (Kubayi & Toriola, 2019; Njororai, 2005b) and 26.6% in female World Cups of 1995 and 1999 (Armatas et al., 2007) are scored in the last 15 minutes period of the second half. This trend is in accordance with our results, where the 26.1% of goals in elite female soccer players are scored at this time. This pattern has been modified in the last world cup, since the 15 min period of the first half and not of the second half, was the one that presented the highest (29%) number of goals (Kubayi, 2020). It could be explained by an increase in fatigue (in the second half players covered a shorter total distance and distance at high intensity) (Di Salvo et al., 2007, 2009; Strauss et al., 2019) which can cause a lost of players' technical effectiveness and therefore increasing the mistakes during the last periods of each half, especially in the second one.

Regarding the initiation zone of attack many of the plays starts in the center zone as well as in male soccer (Armatas & Mitrotasios, 2013) but women uses less the left side, and this could be argued as there are much fewer left-handed players than in male soccer (Mentiplay et al., 2019). According to (De Andrade et al., 2015), more than a half of the actions prior to goal scoring in elite male soccer players come from lateral zones (52.7%) and the rest of actions are mainly frontal passes (30.6%), the results of our study show a 52% of goals after a lateral assistance and 31% from frontal actions, so this evidence that there aren´t differences between women and male. We also found that a 15% of the goals come after a rebound, this could mean that women players aren´t enough overwhelming with the clearance.

In relation to goal action 23% occurred in an individual action, results in accordance with (Armatas, 2006), although in other studies who compared women and male soccer matches describes that women made fewer individual actions than men (P. Taylor et al., 2010). This could be associated with a disagreement in the definition of the action. Analyzing the goal scoring zones the results supports previous findings, more of the goals are scored from center zones, especially the penalty area (37.3%) (Armatas & Mitrotasios, 2013; Wright et al., 2017) but it was expected that women have less effectiveness kicking from the frontal area than men as a consequence of the lower muscle strength in women (P. Taylor et al., 2010). In our study the results differ, both have the same percentage of goals from outside zones which is supported by other investigations

such us (Gomez, M. , Alvaro, J. , Barriopedro, 2009). With relation to the space of the goal we found a 60.9% in the low zone, the current value is similar to that observed by (De Andrade et al., 2015)

Gonzalez-Rodenas et al. (2017) describes the relation between a successful counterattack and its initiation zone, they found that most of them started in the opposite central side of the field. The present study also shows this relation, a 47.1% of the counterattacks starts in the adversary's central zone. This could be explained because there is less distance to the goal and less adversaries to overcome, highlighting the importance of planning defensive pressure to steal the ball in the middle zones to be more effective (Sanjurjo et al., 2015).

Regarding the relation between the actions prior to goal scoring and the goal action we have described that lateral actions ended with a first touch kick. Attending the preponderance of right foot players and the prior use of the right side of the field, previously described, the first touch kick towards the left side of the goal is the most natural shoot (Nagasawa et al., 2011). Straight sprinting (61%) is the most dominant action when scoring goals, and 81% of these actions were conducted without the ball (i.e. one-touch actions) and in 62% there was at least one powerful action of the scoring player (Faude et al., 2012a). Our results show that 62% of the goal are scored by one-touch actions in female elite soccer players. Even though male soccer players are more explosive and perform more powerful action (Bradley et al., 2014; Cardoso de Araújo et al., 2018) the goals in one-touch actions were similar.

Analyzing kicks from center zones we observed that most of them went to the low part of the goal, maybe because it is a more security kick (Palao, M. López-Botella, 2017) and a possible lack of technical variability (Hjelm, 2011). The cross-shooting tendency on lateral areas could be explained as there are more empty spaces in the opposite side of the goal since the goalkeeper is usually defending the nearest goalpost (Welsh, 2014). Most of the frontal shoots are to the upper space of the goal and the right downside, this might be due to the physical and technical difficulties of women goalkeepers for reaching these zones (Alcock, 2010).

With regards to the limitations of the study the analysis of only the first part of the competition (half season) is the main limitation. However, the last competitive season (2019-2020) characterized by COVID-19 and a period of confinement has disabled the analysis of the end of the season. In addition, previous studies that analyze the most frequent action in goal situations in professional football analyze one half (Faude et al., 2012a). On the other hand, the use of visual video inspection to assess different actions when scoring a goal might be prone to subjective bias. Furthermore, it should be considered that the present data were obtained during a female professional league, although the analyzed league is a professional league, a transfer of the results to other leagues or levels of play should be done with care.

From this study we can point three key factors that can be trained to improve performance in women soccer: A) The predominance of goals in the last minutes of each half, shown the critical importance of maintaining the optimal physical fitness until the end of the match. B) The importance of defensive transition and defensive vigilance because of the high number of steals in the middle zone of the own side, allowing a quick offensive transition near the goal. C) Goalkeepers must keep special attention to low zones because most of the goals are scored in that spaces. It also must be trained the shooting variability with the forwards so that it is more difficult for the goalkeeper to predict the shoot direction. These findings could be used for coaches to propose defensive strategies during the competition and training methods to improve match offensive performance.

Conclusion

The results of the present study suggest that open play, positional and first touch are the predominant actions prior to achieving a goal in elite women soccer players. It is also important to pay attention to the high number of steals in the center zone of the own side. There is a high increase of goals in the last 15 minutes periods, but it should be noticed that teams who score the first goal only lose a 10% of the matches. Interestingly relationship between the space of the goal and scoring zones shown that most of the goals enter throw the low part. Even though the results show in other studies that women soccer players do not shoot from far zones we found almost the same number of goals from the outside area than in male soccer.

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`Table 1.docx` available at https://authorea.com/users/719896/articles/704794-analysis-of-goal-scoring-patterns-in-spanish-women-national-league

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`Table 2.docx` available at https://authorea.com/users/719896/articles/704794-analysis-of-goal-scoring-patterns-in-spanish-women-national-league

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Table 3.docx available at https://authorea.com/users/719896/articles/704794-analysis-of-goal-scoring-patterns-in-spanish-women-national-league
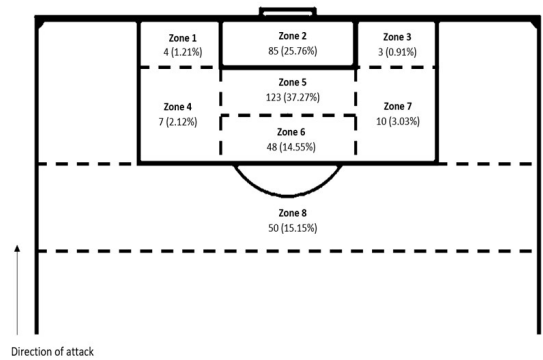

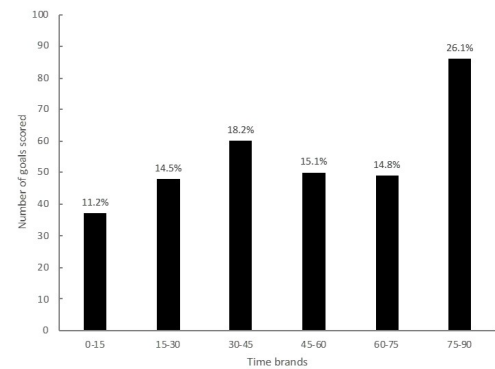Figure 1: Scoring zones in female elite soccer matches.

Figure 2: Number of goals scored per 15 min periods in in female elite soccer matches.