Effects of goal-related statistics on match outcome during the Intercontinental Beach Soccer Cup Dubai 2019

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ABSTRACT

The aim of this study was to investigate the effects of goal-related statistics on match outcome during the Intercontinental Beach Soccer Cup Dubai 2019. The offensive sequences that resulted in goal was analyzed in all 20 matches during the competition (n=138 goals). A set of 35 goal-related statistics were grouped in nine macro-categories: Match-period, Court-zone, Set-play, Open-play, Touches by players before goal, Offensive method, Goalkeeper-line, Number of passes before goal, Ball trajectory. Match outcome in regular time was considered the matches resulting in a loss (n=16), draw (n=8) or win (n=16). The most goals were scored in Open-play (69%), during the 2nd and 3rd periods (36% for each), near to goal (Zone 4; 50%), preceded by 1-touch (67%) and 0-pass (29%), using positional attack (46%), without goalkeeper-line (68%), and with high-ball trajectory (51%). The results of the discriminant function analysis shows the following order of importance to discriminate match outcome, with advantage for winning teams: 4v4 goal-successful (F-Ratio = 12.022), Zone 4, 1-touch, 3rd period, High-ball, Counterattack, Zone 2, Sand-touch (F-Ratio = 4.838). Winning teams scored their goals mainly in open-play situations and without goalkeeper-line, using counterattack to achieve zones near the opponent's goals, implementing a direct offensive style. Also, goals scored were usually preceded by 1-touch, both through high-ball and sand-touch ball trajectory.

Keywords: match analysis; notational analysis; contextual factors; performance; sport science.

INTRODUCTION

Beach soccer substantially increased its number of participants, being considered amongst the world's most rapidly growing sports (Musa et al., 2019, 2020). Previous studies provided important insights of the elements that possibly influence the individual and team performance, mainly focused on physiological, injury occurrences (Al-Shaqsi et al., 2012; Castellano & Casamichana, 2010; W. S. Leite, 2016b; Shimakawa et al., 2016), and tactical-technical aspects (Lastella et al., 2020; Leite & Barreira, 2014; Leite, 2016a; Scarfone & Ammendolia, 2017).

A typical beach soccer game is identified with a severe effort coupled with the unexpected transfer of the ball into many directions (Musa et al., 2020). For that reason, the process to the goal may come from a variety of possibilities. Rosario et al. (2015) showed that during the ~61% of the offensive actions two players were involved and ~54 % of the offensive actions was performed by one pass. In addition, the most goals during the European Beach Soccer League (2018) were scored from a set-play (~39%; e.g., penalty-kicks, free-kicks), using counterattack (~23%), positional attack (~21%), goalkeeper-line (~14%), and goalkeeper-line defense (~3%) (Lastella et al., 2020). According to match-periods, Leite (2016a) verified greater number of goals in the 3rd (~36%) than 2nd (~33%) and 1st (~30%) periods during eight editions of Beach Soccer Worldwide (2005–2015). However, a deep understanding of the process to goal, considering a representative set of variables, should be better accounted to inform professional practice.

Furthermore, the selection of key-performance indicators to goal-related statistics is a critical decision during development of performance analysis in sports (O'Donoghue, 2008). The variables linked to goal process that discriminated match outcome (i.e., losing, drawing, winning) should provide important insights to coaches and practitioners. Musa et al. (2019) demonstrated that shot at front third court-zone, pass at front third court-zone, chances created, goals scored during the 1st, 2nd, and 3rd periods, as well as incomplete saves, could potentially influence the chances of winning or losing the matches during Asian elite beach soccer. However, despite the importance of these findings, the cited study did not consider key-variables of the beach soccer

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matches, such as offensive method (i.e., counterattack, positional attack), set-play condition (e.g., free-kicks, long-kicks), goalkeeper-line, ball trajectory, number of passes/touches before goal. An increase of possible discriminators of match performance may conduct to better information for coaches and, thus possibly improving decisions about which drills can be conceived to improve the team and also which strategy may employ before and during the matches to increase the opportunities of success. Therefore, to increase the knowledge about the performance in beach soccer, the present study aimed to investigate the effects of goal-related statistics on match outcome during the Intercontinental Beach Soccer Cup Dubai 2019.

METHODS

Observational Design and Match Sample

This study observed multiple players and teams (i.e., nomothetic) during the group and knockout phases (i.e., intra- and inter-sessional) of the Intercontinental Beach Soccer Cup Dubai 2019 (Argilaga et al., 2011). The process to goal was analyzed in 20 matches played by eight teams (i.e., Iran, Spain, United Arab Emirates [UAE], Russia, Japan, Egypt, Italy, Mexico) during the group and knockout phases. The goal-related statistics of the teams were recorded and analyzed throughout the tournament (i.e., 138 goals, mean ~7 goals per match). This study was conducted in compliance with the Declaration of Helsinki and approved by the local university research committee.

Dependent and Independent Variables

A set of 35 goal-related statistics were analyzed (dependent variables). The indicators were grouped in nine macro-categories organized to respond three main practical questions of the process to goal: "When?" (macro-category: match-period), "Where?" (macro-category: court-zone [Figure 1]), and "How?" (macro-categories: Set-play, Open-play, Touches by players before goal, Offensive method, Goalkeeper-line, Number of passes before goal, Ball trajectory). The macro-categories were defined consulting Beach Soccer coaches (i.e., content validity). Five experts with academic degree and a mean of 10 years (standard deviation = 2 years) of coach practice in youth and/or professional Beach Soccer levels individually analyzed the content of the macro-categories, according to the following aspects: i) the importance and definition of the variables; and ii) the spatial references used in the definition of court-zone category. All the contents that raised questions of a semantic nature were reformulated and presented again to the experts (in person or via email) until a consensus was reached. After unanimous approval, the variables were incorporated to analysis (Table 1). Two researchers randomly reanalyzed two matches (~10% of

the total; ~7-days between analysis) to verify intra- and inter-rater reliability of the data and notably reported values for ICC = 0.96 and ICC = 0.90, respectively. Match outcome (independent variable) in regular time (i.e., 1st, 2nd, 3rd periods) was the result of each team, including matches resulting in a loss (n = 16), draw (n = 8) or win (n = 16) (Aquino et al., 2019).

Statistical Analysis

Data normality was verified using the Shapiro-Wilk test and when necessary non-parametrical tests were employed. Multivariate normal distribution was confirmed using the software SYSTAT 13. The comparisons of goal statistics according to match outcome (i.e., loss vs. draw vs. won) were performed using the Kruskal-Wallis test. Using only the variables that were statistically significant, a discriminant function analysis (DF) was employed to identify the order of importance of variables that maximized differences between the match outcome. The significance level was set at 5% ($p < 0.05$). The software SPSS 22.0 for Windows (IBM Statistics, Chicago, IL) was used for statistical analysis. To provide a results section clearly and concise, only the discriminant goal-related statistics were presented. Find the description of the other variables in the Supplementary File 1.

Figure 1. Court-zone delimitations in Beach Soccer.

Table 1. Selected goal-related statistics and operational description in Beach Soccer (adapted from Lastella et al., 2020; Musa et al., 2019).

Goal-related Statistics		Descriptions
Set-play	Corner-kicks	Goals-scored directly or indirectly from the corner of the court
	Throw-ins	Goals-scored directly from the sidelines of the court (with the hands or feet)
	Free-kicks	Goals-scored from free-kicks
	Penalty-kicks	The penalty goals are taken at a distance of nine meters from the opponent's goal
	Ball output	Goals-scored after start/restart, goal-kick, and match interruptions (e.g., time-out)
Open-play	1v1 situation	Goals-scored from individual dispute between 1-attacker and 1-defender.
	Long-kicks	Goals-scored from kicks that originates in Zone 1 or Zone 2 (see Figure 1)
	Rebound	Goals-scored after rebound opponent's goalkeeper or defender
	Bicycle-kicks	Goals-scored from bicycle movement
	Second-post	Goals-scored by players positioned on the second-post after receiving a pass
	Receiving pass	Goals-scored by player receiving a pass
	Goal-against	Goals-scored by players who had ball possession in their own goal
Match-period	1 st period	Goals-scored during the first match period
	2 nd period	Goals-scored during the second match period
	3 rd period	Goals-scored during the third match period
	Extra-time	Goals-scored during the match extra-time
Court-zone	Zone 1	Goals-scored from the goalkeeper's area of the possession team (see Figure 1)
	Zone 2	Goals-scored between goalkeeper's area and the court middle of the possession team (see Figure 1)
	Zone 3	Goals-scored between the court middle and goalkeeper's area of the defense team (see Figure 1)
	Zone 4	Goals-scored from the goalkeeper's area of the defense team (see Figure 1)
Touches by players before goal	1-touch	Goal-scored when the player uses 1-touch on the ball
	2-touches	Goal-scored when the player uses 2-touches on the ball
	≥3-touches	Goal-scored when the player use ≥3-touches on the ball
Offensive method	Counterattack	Goals-scored when the defending team gains possession of the ball and quickly executes a quick transition
	Positional attack	Goals-scored when the possession team is confronted with an organized defense usually in 4v4 confrontation in Zone 3 and Zone 4
Goalkeeper-line	5v4	Goals-scored when the team uses the goalkeeper outside the goal area, giving them the possibility to finish the goal or make passes with line players to obtain numerical superiority over the opponent
	goal-successful	
	4v4	Goals-scored without numerical superiority over the opponent
	goal-successful	
	5v4	Occurs when the opposing team uses the goalkeeper-line attack and the defending team recovers the ball and executes the goal quickly in the absence of the goalkeeper
Number of passes before goal	failure-attempt	
	0-pass	Goal scored without any pass
	1-pass	Goal scored after 1-pass
	2-passes	Goal scored after 2-passes
	3-passes	Goal scored after 3-passes
Ball trajectory	≥4-passes	Goal scored after ≥4-passes
	Sand-touch	Goals-scored with the ball touching the sand
	High-ball	Goals-scored without the ball touching the sand

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Results

Twenty matches during the Intercontinental Beach Soccer Cup Dubai 2019 resulted in 138 goals (~7 goals per match), including 95 (69%) in Open-play and 43 (31%) in Set-play conditions. According to match-period, 37 (27%), 49 (36%), 49 (36%), and 3 (1%) of the goals were scored during the 1st, 2nd, 3rd, and Extra-time periods, respectively. Also, 7 (5%) goals were noted in Zone 1, 14 (10%) in Zone 2, 48 (35%) in Zone 3, and 69 (50%) in Zone 4. The analysis of the touches by players before goal showed 92 (67%), 23 (17%), and 23 (17%) goals preceded by 1-touch, 2-touches, and ≥ 3 -touches, respectively. Thirty-one (22%) goals were scored using Counterattack and 64 (46%) using Positional attack (the others 43 goals [31%] resulted in set-play condition). The variables of Goalkeeper-line demonstrated 33 (24%) goals noted in 5v4 goal-successful; while 94 (68%) and 11 (8%) were performed in 4v4 goal-successful and 5v4 failure-attempt conditions, respectively. The macro-category of number of passes before goal showed 40 (29%), 39 (28%), 23 (17%), 13 (9%), and 23 (17%) goals preceded by 0-pass, 1-pass, 2-passes, 3-passes, ≥ 4 -passes, respectively. Seventy-one (51%) and 67 (49%) goals were scored with the ball-trajectory in Sand-touch and High-ball, respectively.

The effects of 35 goal-related statistics on match outcome (loss vs. draw vs. won) showed significant differences only in nine variables (see Supplementary File 1). Therefore, we opted to describe the following results of these variables. Won matches presented higher number of goals in Zone 4, 1-touch, Counterattack, 4v4 goal-successful, Sand-touch, and High-ball compared to draw and loss matches ($p < 0.05$) (Figure 2). In addition, greater number of goals Receiving pass ($p = 0.02$) was observed in won matches than loss and draw (Figure 3). Also, the frequency of goals during the 3rd period was higher in won vs. loss matches ($p = 0.01$) (Figure 2). Draw matches resulted in higher values of goals in Zone 2 compared to loss matches ($p = 0.008$) (Figure 3).

Figure 2. Frequency of goal-related statistics that differentiate the win outcome from loss and draw during the Intercontinental Beach Soccer Cup Dubai 2019. Symbols represent the frequency in each match and horizontal lines represents the median values. * Significant differences ($p < 0.05$) from other outcomes.

Figure 3. Frequency of goal-related statistics during the Intercontinental Beach Soccer Cup Dubai 2019. Symbols represent the frequency in each match and horizontal lines represents the median values. + Significant differences ($p < 0.05$) from loss; # Significant differences ($p < 0.05$) from draw.

Table 2 reports the main results of the discriminant function analysis and shows the following order of importance: i) 4v4 goal-successful; ii) Zone 4; iii) 1-touch; iv) 3rd period; v) High-ball; vi) Counterattack; vii) Zone 2; viii) Sand-touch.

Table 2. Summary of discriminant function analysis.

Variable	Wilks's Lambda	Approx. F-Ratio	<i>p</i>
4v4 goal-successful	0.606	12.022	< 0.001
Zone 4	0.699	7.950	0.001
1-touch	0.705	7.732	0.002
3 rd period	0.762	5.788	0.007
High-ball	0.770	5.521	0.008
Counterattack	0.771	5.496	0.008
Zone 2	0.782	5.149	0.01
Sand-touch	0.793	4.838	0.01

Discussion

The current study is the first to investigate the effects of goal-related statistics on match outcome during elite Beach Soccer. The main results showed the following variables that discriminated losing, drawing, and winning teams, with the following order of importance: 4v4 goal-successful, Zone 4, 1-touch, 3rd period, High-ball, Counterattack, Zone 2, and Sand-touch.

Coaches and practitioners have used goalkeeper-line to increase the possibilities to finish the goal or make passes with line players to obtain numerical superiority over the opponent. Recent study observed that ~14% of the goals during the European Beach Soccer League 2018 were scored using goalkeeper-line and this strategy explained 42% of the tournament points (Lastella et al., 2020). Here, 24% of the goals were noted using this condition (i.e., 5v4 goal-successful). However, we observed that winning teams scored more goals using the 4v4 condition (i.e., 4v4 goal-successful) than drawing and losing teams. Therefore, the strategy of using goalkeeper-line can be performed in specific match moments, with the purposes of maintaining ball possession, advance on the opponents' court and/or score goals; although coaches and players must consider that most goals occur in the 4v4 condition and this discriminated the match outcome.

The macro-categories Court-zone and Match-period also demonstrated an influence on winning, drawing, and losing teams. During the tournament, sixty-nine goals (50%) were scored in Zone 4 (i.e., opponents' goalkeeper area) and mostly performed by winning than drawing and losing teams. Also, ~72% of the goals were scored during the 2nd and 3rd period (~36% for each); while ~27% were performed during the 1st period (extra-time presented only ~1% of the goals). Here, winning teams scored more goals during the 3rd period than losing teams. Previous study in the Asian elite beach soccer demonstrated that shot at front third (i.e., similar to Zone 4), pass at front third, chances created, goals scored during the 1st, 2nd, and 3rd periods, as well as incomplete saves, could potentially influence the chances of winning or losing the matches (Musa et al., 2019). In addition, Leite (2016a) verified greater number of goals in the 3rd (~36%) than 2nd (~33%) and 1st (~30%) periods during eight editions of Beach Soccer Worldwide (2005–2015). This author suggested that the higher incidence of goals in the last match period (excluding extra-time) is associated mainly to the interaction of physical and psychological factors, such as previous demonstrated in soccer matches, although objective measurements of these factors remains to be elucidated. In addition, it is relatively difficulty to highlight the factors that really seem to affect the higher amount of goals scored in the last periods, without considering match status. The need for a team to seek to equalize the score, to take the game to the extra-time, may exposed them defensively, leaving spaces for the opposing teams to scored their goals through counterattacks, 1-touch and high-balls.

Traditionally, the greatest number of goals in Beach Soccer were scored in set-play condition. Lastella et al. (2020) verified that the number of goals scored from a set-play were considerably higher than any other goal scoring strategy (i.e., counterattack, positional attack, goalkeeper-line, goalkeeper-line defense) during 52 matches of the European Beach Soccer League 2018. However, in our study, most of the goals during the Intercontinental Beach Soccer Cup Dubai 2019 were scored in Open-play condition (69%). Also, during the Beach Soccer Worldwide 2020 ~63% of the goals were scored in Open-play actions (~37% Set-play; unpublished data). These results may reflect a potential behavioral change in the process to goal during elite Beach Soccer matches. In the macro-categories of Open-play, regarding to ball-touches by players before goal and Offensive methods, we verified that the variable Receiving pass, 1-touch, and counterattack presented greater occurrence in winning vs. drawing and losing teams. Previous study also showed in Beach Soccer players that during the ~61 of the offensive actions two players was involved and ~54% of the offensive actions was performed by one pass (Rosario et al., 2015). Therefore, coaches and practitioners should consider the importance of process to goal receiving pass, by 1-touch, and the counterattack offensive method during the process to goal in training and matches.

The possible influence of the sand-court in the ball direction potentially alter the process to goal compared to other team invasion sports (e.g., futsal, soccer). Therefore, we can expect that the kicks touching the sand can result in a higher difficulty level of goalkeeper defense, resulting in a greater frequency of occurrence than high-ball during the process to the goal. However, we verified an equilibrium between the goals scored with the ball touching the sand (51%) or not (49%). Also, the two ball trajectories showed greater values in winning compared to drawing and losing. However, High-ball was more important to discriminate the match outcome. Therefore, the players' option for the kick-type should consider the interaction between task (e.g., long-kick, penalty-kick), player (e.g., personal preferences) and environmental constraints (e.g., sand-type).

The most evident limitation of this study was related to the analysis performed only in one tournament (i.e., Intercontinental Beach Soccer Cup Dubai 2019). Further studies may provide these analyses in other editions and/or tournaments to verify the consistency of the results. On the other hand, we consider the strengths of this study the set of variables related to goal process, including nine representative macro-categories and 35 variables suggested by expert coaches. Moreover, this study analyzed a full-elite competition representing the highest level of the specific sport which is a strength of the present work.

Conclusion

In summary, winning teams scored their goals mainly in open-play situations and without goalkeeper-line, using counterattack to achieve zones near the opponent's goals, implementing a direct offensive style. Also, goals scored were usually preceded by 1-touch, both through high-ball and sand-touch ball trajectory. Coaches and practitioners may consider these variables to training prescription and deep understanding the process to goal in elite Beach soccer.

Contributions

Conceptualization, R.A., B.M, F.S., P.M., V.S.N.; methodology, R.A., B.M, F.S., F.B.M., C.A.K.F., and F.M.C.; formal analysis, R.A., B.M., F.S., P.M., V.S.N., C.A.K.F.; investigation, R.A., B.M, F.S., P.M., V.S.N.; writing—original draft preparation, R.A., B.B.M., C.A.K.F., I.S.A., J.C.M., F.M.C.; writing—review and editing, all authors. All authors have read and agreed to the final version of the manuscript.

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Supplementary File 1. Median (interquartile range) [minimum-maximum] of goal-related statistics according to match outcome during the Intercontinental Beach Soccer Cup Dubai 2019.

	Win	Draw	Loss	p
<i>Set-play</i>				
Corner-kicks	0 (0) [0 – 1]	0 (0) [0 – 0]	0 (0) [0 – 2]	0.56
Throw-ins	0 (0.3) [0 – 1]	0 (0) [0 – 0]	0 (0) [0 – 1]	0.26
Free-kicks	0 (1) [0 – 2]	0 (1) [0 – 1]	1 (0.3) [0 – 3]	0.07
Penalty-kicks	0 (0) [0 – 1]	0 (0) [0 – 1]	0 (0) [0 – 1]	1.00
Ball output	0 (0) [0 – 1]	0 (0) [0 – 0]	0 (0) [0 – 1]	0.77
<i>Open-play</i>				
1v1 situation	0.5 (1) [0 – 2]	0 (0) [0 – 1]	0.5 (1) [0 – 2]	0.16
Long-kicks	0 (1) [0 – 1]	1 (0.3) [0 – 1]	1 (1.3) [0 – 2]	0.06
Rebound	0 (0) [0 – 0]	0 (0.3) [0 – 1]	0 (0) [0 – 1]	0.14
Bycicle-kicks	0 (1) [0 – 1]	0 (0) [0 – 1]	0 (0.3) [0 – 2]	0.30
Second Post	0 (0) [0 – 0]	0 (0) [0 – 0]	0 (0.3) [0 – 2]	0.06
Receiving pass	1 (1) [0 – 5]	0 (0) [0 – 1]	0 (2.3) [0 – 5]	0.03*
Goal-against	0 (0) [0 – 0]	0 (0) [0 – 1]	0 (0) [0 – 1]	0.43
<i>Match-period</i>				
1 st period	0.5 (2) [0 – 2]	0 (1) [0 – 1]	1 (1) [0 – 3]	0.05
2 nd period	1 (1.3) [0 – 5]	0 (1.3) [0 – 2]	1.5 (1) [0 – 4]	0.09
3rd period	1 (1.3) [0 – 2]	1 (0.3) [0 – 1]	2 (1.3) [0 – 4]	0.01*
Extra-time	0 (0) [0 – 0]	0 (0) [0 – 0]	0 (0) [0 – 2]	0.21
<i>Court-zone</i>				
Zone 1	0.3 (0) [0 – 1]	0 (0) [0 – 0]	0 (0) [0 – 1]	0.32
Zone 2	0 (0) [0 – 0]	0.5 (1) [0 – 2]	0 (1) [0 – 2]	0.008*
Zone 3	1 (2) [0 – 3]	1 (1) [0 – 1]	1.5 (1) [0 – 4]	0.07
Zone 4	1 (1) [0 – 4]	0.5 (1) [0 – 1]	2 (2.3) [1 – 5]	0.001*
<i>Touches before goal</i>				
1-touch	1.5 (2) [0 – 5]	1 (2) [0 – 2]	3.5 (2) [1 – 7]	0.003*

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2-touches	0 (1) [0 – 2]	0 (0.5) [0 – 1]	1 (1) [0 – 2]	0.15
≥3-touches	0 (0.3) [0 – 3]	0 (0.3) [0 – 2]	0.5 (1) [0 – 2]	0.48
<i>Offensive method</i>				
Counterattack	0 (1.3) [0 – 2]	0 (0) [0 – 1]	1 (1.3) [0 – 3]	0.009*
Positional attack	1 (2) [0 – 5]	1 (1.3) [0 – 3]	1.5 (3) [0 – 6]	0.07
<i>Goalkeeper-line</i>				
5v4 goal-successful	0 (1) [0 – 2]	0.5 (1) [0 – 3]	1 (2) [0 – 4]	0.52
4v4 goal-successful	2 (2) [0 – 5]	1 (1) [0 – 2]	3 (1.3) [0 – 5]	< 0.001*
5v4 failure-attempt	0 (1) [0 – 1]	0 (0) [0 – 0]	0 (1) [0 – 2]	0.20
<i>Number of passes before goal</i>				
0-pass	1 (1) [0 – 3]	0 (1) [0 – 2]	1 (1.3) [0 – 3]	0.12
1-touch	1 (0.3) [0 – 4]	0 (0.3) [0 – 1]	1 (1.3) [0 – 4]	0.09
2-touches	0 (1) [0 – 2]	0 (0) [0 – 1]	0.5 (2) [0 – 3]	0.11
3-touches	0 (0.3) [0 – 2]	0 (0) [0 – 1]	0 (1) [0 – 1]	0.63
≥4-touches	0 (0.3) [0 – 1]	0 (0.3) [0 – 2]	0.5 (1.3) [0 – 4]	0.17
<i>Ball trajectory</i>				
Sand-touch	1 (1) [0 – 3]	1 (0.3) [0 – 2]	2 (1.3) [1 – 6]	0.02*
High-ball	1 (1) [0 – 5]	0.5 (1) [0 – 2]	2 (1.3) [0 – 6]	0.004*