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COMPARISON OF THE PHYSICAL PERFORMANCE OF SOCCER PLAYERS IN MATCHES PLAYED AT HOME AND AWAY

COMPARAÇÃO DO DESEMPENHO FÍSICO DE JOGADORES DE FUTEBOL EM PARTIDAS REALIZADAS EM CASA E FORA DE CASA

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RESUMO

Introdução: Durante as atividades competitivas de futebol, há uma vantagem em jogar em casa em comparação com jogar fora, a equipe que joga em casa tem uma maior porcentagem de vitórias em comparação com empates e perdas.Este resultado pode estar relacionado à participação dos torcedores, familiaridade com o local, parcialidade do árbitro, territorialidade, táticas especiais e fatores psicológicos também podem influenciar o resultado.

Objetivo: Comparar as atividades locomotoras em jogos jogados em casa versus jogos fora de casa e se essas atividades influenciam o resultado da partida.

Metodologia: Estudo observacional do estudo foi realizada para caracterizar e comparar o perfil da atividade locomotora de uma equipe brasileira sub-20 de futebol em partidas oficiais em casa e fora de casa por meio de variáveis derivadas do Sistema de Posicionamento Global (distância total, carga do jogador, distâncias percorridas em diferentes velocidades, acelerações, desacelerações). As variáveis peso, altura, gordura corporal foram verificadas. Para análises estatísticas, foram utilizadas medidas descritivas, o teste Shapiro-Wilk para a distribuição de dados e o teste Student's T para comparar valores para jogos jogados em casa versus fora jogos.

Resultados: A amostra apresentou as seguintes médias: 19,09 ± 0,58 anos, 70.09 ± 7,64 kg, 176,66 ± 6,28 cm, 12,02 ± 1,78% de gordura corporal. Em jogos jogados em casa, a equipe alcançou melhores resultados, alcançando 57% de vitórias em comparação com 25% alcançado fora de casa. Os dados do GPS mostraram que as variáveis relacionadas à resistência (distância total e carga do jogador) eram mais baixas nos jogos em casa do que nos jogos fora, enquanto a velocidade, o sprint e as ações relacionadas à força (aceleração e desaceleração) eram maiores nos jogos de casa, mas não foram encontradas diferenças estatísticas.

Conclusão: Há vantagens em jogar em casa para jogar fora para ganhar jogos. Por outro lado, este resultado não tem relação com a capacidade de locomoção da equipe durante os jogos.

Palavras-chave: Futebol. Desempenho Atletico. Análise de Dados.

COMPARISON OF THE PHYSICAL PERFORMANCE OF SOCCER PLAYERS IN MATCHES PLAYED AT HOME AND AWAY

ABSTRACT

Introduction: During soccer competitive matches, there is an advantage in playing at home ground in comparison to playing away. The team playing at home has a higher percentage of wins compared to ties and losses. This result can have a correlation related to the supporters' participation, familiarity with the place, partiality of the referee, territoriality, special tactics and psychologic factors can influence the result.

Objective: Compare the locomotor activities between home matches and away matches, and investigate whether these activities influence the match results.

Methodology: The observational perspective of the study was conducted to characterize and compare the locomotor activity profile of a U-20 Brazilian soccer team in official home and away matches using variables derived from the Global Positioning System (total distance, player load, races at different speeds, accelerations and decelerations). The variables weight, height, body fat was measured. For statistical analyses, descriptive measures, the Shapiro-Wilk test for data distribution and the Student's T test to compare values for matches played at home versus away matches were used.

Results: The sample presented the following averages: 19.09 ± 0.58 years, 70.09 ± 7.64kg, 176.66 ± 6.28cm, 12.02 ± 1.78% of body fat. In matches played at home, the team achieved better results, achieving 57% victories compared to 25% achieved away from home. GPS data showed that the variables related to resistance (total distance and player load) were lower in home matches than away matches, while the speed, sprint and actions related to strength (acceleration and deceleration) were greater home matches, but no statistical differences were found.

Conclusion: There are advantages in playing at home ground to playing away to win matches. On the other hand, this result is not related to the locomotive capacity of the team during the matches.

Keywords: Soccer. Athletic Performance. Data Analysis.

1. INTRODUCTION

The home ground advantage is well documented in the literature, showing that teams are more successful playing at home than away from home [1]. The advantage of playing at home and the inconsistency of the referees are two phenomena well documented in professional sports, especially in soccer [1,2]. Among the various determining actors, the noise of the crowd is considered the most relevant [2]. The decision of a match can be determined by the noise of the crowd influencing the decisions of the referees in home ground or home away matches, but there are few works on this subject [3]. For many years, in team sports, playing at home has consistently provided an advantage over the visiting team, often influencing the outcome of the match, particularly in soccer, where this advantage has been present since the beginning of the season [4]. In soccer, home ground advantage has always been a particularly important factor in determining match outcomes, but little research has investigated the nature and cause of this advantage [5]. Several factors are considered important for success: athletic performance, player skill, training techniques, conditioning, team synergy and team respect in competition. These factors fall under the general category of quality and can help to achieve victory during the match [6]. Additionally, for spectator sports, performance can also be influenced by the crowd [6].

There are five components that can influence the planning structure and the team's outcome: 1) location, which can be at home ground or away from home; 2) localization, which is different for home or away matches [7]. The four factors that can interfere with the location are (fans, travel, rules and learning). These factors may supposedly influence the third component of the structure; 3) physiological state of athletes and coaches; 4) behavioral state that, in the same way as the third, influences the decision-making of athletes and coaches; 5) performance outcomes, such as: skill, physical conditioning and the end result of the context [7].

Still in this context, other elements that can promote an advantage at home ground matches: support from the fans, travel fatigue, familiarity with location, refereeing interference, special tactics and psychological factors [4]. The local public (support from the fans) may stimulate the energy and effort of the home team, intimidating opposing players and rewarding the local team when they make good plays. All these positive factors are likely to contribute to home players. Travel can be exhausting and may negatively impact performance, particularly over long distances, due to travel fatigue. Players will be more familiar with the size and context of the field when playing at home (familiarity with location), as well as the location and markings measurement. The crowd's reaction (refereeing influence) could sway the referee's decision in favor of the home team. Away teams often tend to adopt a more defensive tactical approach compared to when they play at home (strategic adjustments), facing psychological and territorial disadvantages that can impact their

overall performance. There is a strong belief that there is an advantage in playing at home (psychological factors), which can affect the attitude and performance of players [4].

With the increase in the physical demand of soccer matches, great physical preparation is necessary and indispensable as part of the preparation for the modern soccer. High-intensity stimuli are present in all matches, and matches are often won or lost on successful scoring attempts when performing high-intensity actions. One method used to clarify physical demands of soccer has been to measure the distance covered in various patterns of movements performed by players in different positions in the team. In the last 20 years, the average distance traveled has been reasonably close to 10km per match [8].

Over the past two decades, there has been a surge in interest regarding soccer performance analysis. These indicators aid coaches in assessing the performance of individual athletes or the team, enabling decision-making based on these findings. The author emphasizes that understanding the physiological load imposed on high-level players according to their positional relationships during competitive matches (activity profile, distance covered, intensity, energetic system and musculature involved) is necessary to develop a specific training protocol, taking into account the intensity of the stimuli and the recovery time between them. In addition, Match analysis is valuable for developing training sessions that replicate the physiological demands imposed by the game [9].

It can be noted that it is not only physical performance that wins the match. However, the physical delivery of the athletes and the team will contribute to a positive result in their home matches. The objective of study was to investigate whether locomotor activities influence the finalresult of soccer matches in home ground versus away matches.

2. METHODS

2.1 Participants

Thirty-five elite U20 male outfield soccer players participated being 6 central defenders, 6 external defenders, 12 central midfielders, 6 external midfielders and 5 forwards. Five of those players were called by National team of the respective age-category during last two years. The present study was approved by the Ethics Committee - CAAE registration document number 68281723.4.0000.5237.

2.2 Experimental draw

The observational perspective of the study was conducted to characterize and compare the locomotor activity profile of a U-20 Brazilian soccer team in official home and away matches. For this

comparison analysis, seven home matches and eight away home matches for the Brazilian championship were observed.

2.3 GPS performance measurement

The distance measures were recorded during the matches using a wearable 10-Hz GPS integrated with a 100-Hz Tri-Axial accelerometer, gyroscope, and magnetometer (Catapult Sports, Melbourne, Australia). The validity and accuracy of the devices were previously reported in the literature. The devices were fixed on the upper back of each player using adjustable harnesses and were activated 15 min before the data collection, in accordance with the manufacturer's instructions to optimize the acquisition of satellite signals. Throughout the season, the players used the same device to avoid inter-unit erros. The following metrics were obtained: total distance covered relative per minute played (meters/minute); total distance covered in high-speed running relative per minute played (19.8-25.1 km·h -1; meters/minute); total distance covered in sprinting relative per minute played (≥ 25.2 km·h -1; meters/minute); relative distance covered in moderete acceleration (> 2m·s 2) and moderete deceleration (< -2m·s 2) per minute played (meters/minute) and relative distance covered in high acceleration (> 3m·s 2) and high-deceleration (< -3m·s 2) per minute played (meters/minute).

2.4 Anthropometric variables

The records of height, body weight and body fat (4-fold Faulkner protocol) were taken from the athletes' assessment sheets, which is carried out routinely by the club.

2.5 Statistic

The Shapiro-Wilk test was used for data distribution. Then, the Student's T test was used to compare home matches versus away matches, using Prism Graph Pad software 6.0 (California, USA). Data are presented as mean and standard deviation. A value lower than 0.05 was used to assess the significance of the differences.

3. RESULTS

Table I shows the study participants' morphologicalcharacteristics of male athletes from the Under-20 category of a soccer team from the 1st Division of Rio de Janeiro's soccer. Table II shows the home and away matches records with their respective results (win, loss and tie) and the percentage of success rate in relation to these variables.

Table 1.Morphological characteristicsof the sample.

Variable	Values (Mean ± SD)
Age (years)	19.09 ± 0.58
Weight (kg)	70.09 ± 7.64
Height (cm)	176.66 ± 6.28
% of body fat	12.02 ± 1.78

SD: Standard deviation.

Table II. Home and away matches records, results and performance.

Location	Total Matches	Wins	Losses	Ties	Success Rate
At home ground	7	4	0	3	57%
Outof home	8	2	1	5	25%

The figures below show the locomotor behavior of the U-20 team in official matches of the Brazilian championship associated with home and away matches. All results are presented in relative values per minute.

In Figure 1, the total distance (1A) and the match load (player load) (1B) are shown. A difference was only found when comparing the relative total distance in home and away matches (p=0.09). The same was observed in relation to the match load (Fig. 1B)

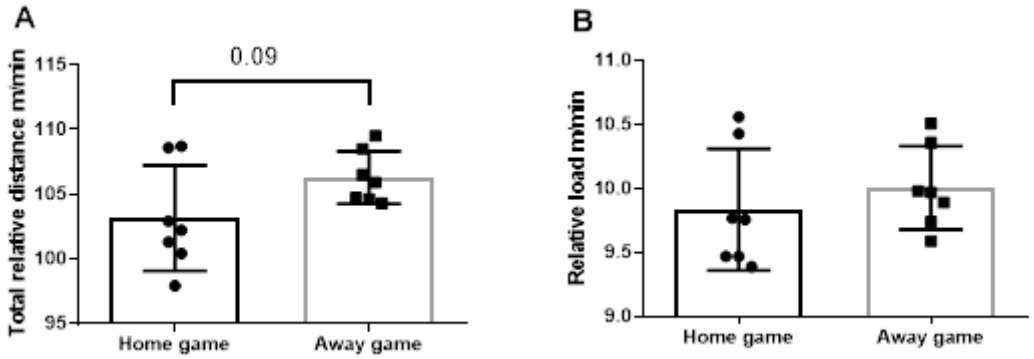

Figure 1. Comparison of locomotor actions related to resistance in the Brazilian Under-20 soccer championship in home matches versus the opponent's home.

A) Total distance covered in the match adjusted by each athlete's time on the field. B) Match load adjusted by the time of each athlete on the field. (n=7 matches at home and 8 away from home).

In Figure 2, the behavior of speed actions during matches was divided into 2 speed bands. Figure 2A represents the speed actions (19.8km/h to 25.2km/h) and figure 2B the Sprint actions (>25km/h), both bands showed no significant difference when compared in matches played at home or at the opponent's home.

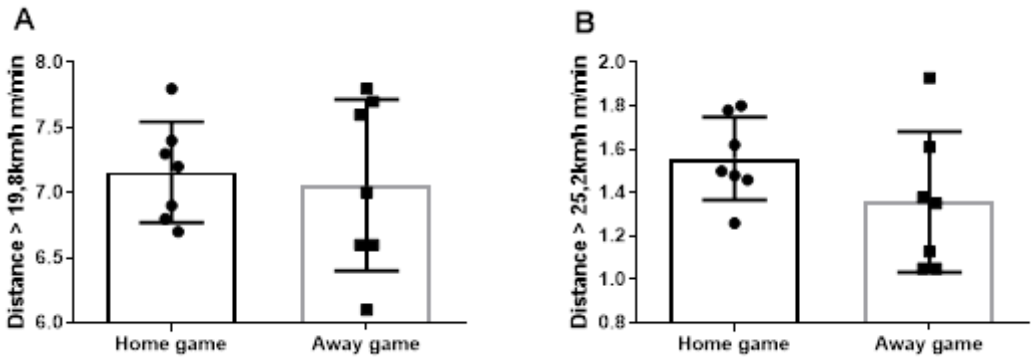

Figure 2. Comparison of locomotor actions related to speed in the Brazilian U-20 soccer championship in home matches versus the opponent's home.

A) Speed covered in the match adjusted by the time of each athlete on the field. B) Sprint adjusted by the time of each athlete on the field. (n=7 matches at home and 8 away from home).

In Figure 3, we can see the locomotor actions related to strength and they are divided into 2 bands. Figure 3A represents the actions on different force application vectors above >2ms², and figure 3B represents the actions above >3ms². In both bands there was no difference between the matches played at home or away.

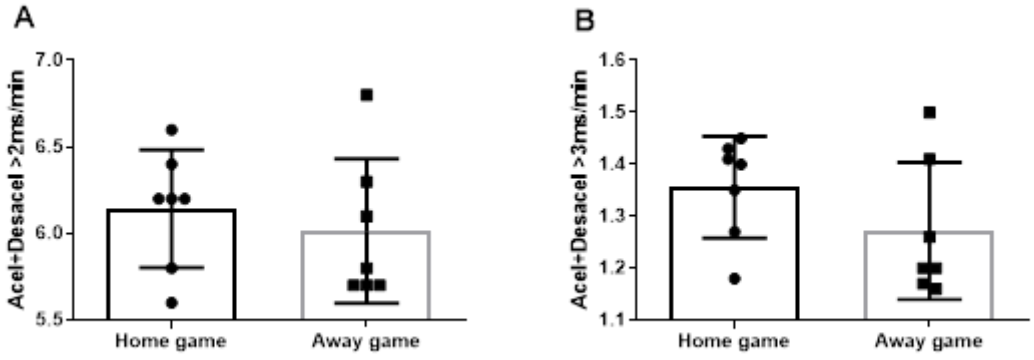

Figure 3. Comparison of locomotor actions related to strength in the Brazilian U-20 soccer championship in home matches versus the opponent's home.

A) Moderate strength covered in the match adjusted by the time of each athlete on the field. B) High strength adjusted by the time of each athlete on the field. (n=7 matches at home and 8 away from home).

Finally, Figure 4 shows the result of multiple actions (> 3 actions within a 21-second interval). There is no significant difference between home and away matches.

Figure 4. Comparison of locomotor actions related to strength resistance in the Brazilian under-20 soccer championship in home matches versus the opponent's home.

Strength resistance adjusted by the time of each athlete on the field.

4. DISCUSSION

The three main causes of home advantage are believed to be crowd effects, avoidance of travel fatigue, and familiarity with the playing location -other causes such as referee bias, territoriality, special tactics, rules and psychological factors can also influence the outcome [5]. The main objective of this study was to evaluate the influence of locomotor behavior on the results of the matches of a soccer team in the Brazilian Under-20 championship in home and away matches. The locomotion results presented in the graphs above, show similarity in locomotor behavior in home matches compared to the opponent's home matches.

There is an advantage in matches won at home through goals scored by penalties and players ejected from the visiting team. A large number of fans can influence the visiting team to suffer more punishments and thus facilitate the positive result of the home team [1]. In our study, it was not possible to verify whether the fans could exert any influence on the result or the locomotion metrics, since the analyzes were carried out during the pandemic with the absence of fans.

Compared to other team sports, although there is an advantage for all sports, this factor is much more evident in soccer than in other sports. Home teams score over 64% of all points in the soccer league. To put it another way, this means that wins in home matches represent more than 75% compared to away matches. Soccer managers have long been aware of the advantage of playing at home and this supposed effect with a reduction in the number of goals has been associated with defensive tactical behavior by visiting teams [5]. Our data corroborate the data mentioned above, considering that when playing at home the team achieved 4 wins, 0 losses and 3 ties in 7 matches

with a 57% success rate and when playing away from home the team obtained 2 wins, 1 defeat and 5 ties with an advantage of 25%, as shown in Table 2.

The team's offensive behavior and courage in home matches may have contributed to achieving 57% success. In home matches, coaches decide for greater offensive dominance and greater courage to play tactically at the beginning of the second half [7]. Therefore, it can be noticed that in away matches the coaches do not decide to play defensively, but to a lesser degree of significance of dominance and offensive tactics. Future changes to the rules of soccer may have an even greater impact on the results of the matches. Technical changes and a new organization suggested by FIFA® are expected, these factors can have a massive impact on the psychological and physiological demands on players and staff [10]. The tactical evolution is based on high-intensity pressure, counter-pressure and counter-attack models, which will result in high exposure to intensity, acceleration and decelerations interspersed between moments of high-speed running. Within this line of reasoning, it was observed that over the years there was a reduction in the total distance covered and an increase in highintensity runs and motor actions [11]. These factors can contribute to the result in both away and at home matches.

This work was limited to the analysis of locomotion metrics and results of the matches. In this way, future research should be conducted to explain the home advantage. Some important points that could be taken into consideration for future research are the crowd factor, psychological influences and tactical behavior.

5. CONCLUSION

The results found in the present research indicate that there is an advantage to playing at home to achieve a positive outcome, but it did not find a relationship between results and locomotion metrics.

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