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SEATED VOLLEYBALL: THE INFLUENCE OF MOTOR DEFICIENCY TYPE ON PLAYERS' TACTICAL ROLES

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ABSTRACT

Introduction: Sitting volleyball is an adapted sport played by players in the seated position, due to impaired mobility or amputations. Court dimensions are adjusted to the players' average height, and during the games, the actions performed are similar to those of traditional volleyball. Objective: To analyze the tactical performance of lower limb amputees and physically disabled athletes during seated volleyball games. Methods: Data were collected from video footage, by a single observer, of twelve games of the Brazilian north-northeast championship 2017. The analysis investigated: i) average length of rallies; ii) frequency of attack actions; iii) game actions by amputation type; iv) outcomes of the actions by amputation type; v) direction and frequency of movements by disability. Results: The average duration was 70 rallies per game, with the minimum disabled athletes performing the highest number of attack actions (43). Transfemoral amputees performed the highest number of blocking actions per game (10.5, in average). Conclusion: Sitting volleyball has characteristics that are determined mainly by the type of disability. Players with minimal disabilities perform more attack actions and have higher performance per action, while amputees perform actions closer to the net, such as blocking and blocking points. The results also suggest that the type of amputation influences the direction of movement.

Keywords: Physical disability; Performance; Volleyball; Paralympic athletes

Introdução: O voleibol sentado é uma adaptação praticada pelos jogadores em sedestação devido a mobilidade prejudicada ou amputações. As dimensões da quadra são ajustadas à altura média dos jogadores e, durante os jogos, as ações realizadas são

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semelhantes às do vôlei tradicional. Objetivo: Analisar o desempenho tático de amputados de membros inferiores e deficientes físicos durante jogos de voleibol sentado. Métodos: Os dados foram coletados em 12 jogos do campeonato brasileiro norte-nordeste de 2017 a partir de imagens de vídeo, por um único observador. A análise investigou: i) duração média dos ralis; ii) frequência de ações de ataque; iii) ações de jogo por tipo de amputação; iv) resultados das ações por tipo de amputação; v) direção e frequência de deslocamentos por deficiência. Resultados: A duração média dos ralis foi de 70 ralis por jogo, sendo o deficiente mínimo responsável pela maior frequência de ações de ataque (43), enquanto os amputados transfemorais foram responsáveis pelo maior número de ações de bloqueio por jogo (em média, 10,5). Conclusão: As características do voleibol sentado são determinadas principalmente pelo tipo de deficiência. Jogadores com deficiência mínima são responsáveis pelas ações de ataque e maior desempenho por ação, enquanto os amputados são responsáveis por ações mais próximas da rede, como bloqueio e pontos de bloqueio. Os resultados sugerem ainda que o tipo de amputação influencia a direção do deslocamento. Introducción: El voleibol sentado es una adaptación practicada por los jugadores en sedestación debido a movilidad reducida o amputaciones. Las dimensiones de la cancha se ajustan a la altura promedio de los jugadores y, durante los juegos, las acciones realizadas son similares a las del voleibol tradicional. Objetivo: Analizar el desempeño táctico de los amputados de miembros inferiores y personas con discapacidades físicas durante los juegos de voleibol sentado. Métodos: Un solo observador recopiló datos en 12 juegos del campeonato brasileño norte-nordeste de 2017 a partir de imágenes de video. El análisis investigó: i) duración promedio de los rallies; ii) frecuencia de las acciones de ataque; iii) acciones del juego por tipo de amputación; iv) resultados de las acciones por tipo de amputación; v) dirección y frecuencia de los desplazamientos por deficiencia. Resultados: La duración promedio de los rallies fue de 70 rallies por juego, y los discapacitados mínimos fueran responsables por la mayor frecuencia de acciones de ataque (43), mientras que los amputados transfemorales fueron responsables por el mayor número de acciones de

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bloqueo por juego (promedio de 10,5). Conclusión: Las características del voleibol sentado están determinadas principalmente por el tipo de discapacidad. Los jugadores con discapacidades mínimas son responsables por las acciones de ataque SEATED VOLLEYBALL: THE INFLUENCE OF MOTOR DEFICIENCY TYPE ON PLAYERS' TACTICAL ROLES VOLEIBOL SENTADO: INFLUÊNCIA DA DEFICIÊNCIA MOTORA NOS PAPÉIS TÁTICOS DOS JOGADORES VOLEIBOL SENTADO: INFLUENCIA DE LA DISCAPACIDAD MOTORA EN LAS FUNCIONES TÁCTICAS DE LOS JUGADORES Bruna da Silva Sousa[1] (Physiotherapist) Vera Regina Fernandes da Silva Marães[2] (Physiotherapist) Marília Miranda Forte Gomes2 (Statistician) Leonardo Lamas3 (Physical Educational Professional) 1. Universidade de Brasília (UnB), Master's Degree Program in Biomedical Engineering, Gama, DF, Brazil. 2. Universidade de Brasília (UnB), Master's Degree Program in Biomedical Engineering, Gama, DF, Brazil. 3. Universidade de Brasília (UnB), Faculdade de Educação Física (FEF), Brasília, DF, Brazil. Correspondence: Bruna da Silva Sousa. QR 402, Conj. 29, casa 12, Samambaia Norte, Brasília, DF, Brazil. 72318-030. sousabrunadasilva@gmail.com Original Article Artigo Original Artículo Original Rev Bras Med Esporte – Vol. 26, No 4 – Jul/Ago, 2020 343 INTRODUCTION Seated volleyball is an adapted sport that since the first Paralympic Games, in 1960, has gained practitioners all over the world, including in Brazil. The sport is practiced with all the players seated on a court with 10 meters x 6 meters. Net is 1.15 meter and 1.05-meter height, respectively, for men and women.1,2 Each team has six players, with mobility disorders, amputations, or healthy individuals who commit to play according to the rules of the game.1 Players classification encompasses a minimum disability or deficiency and other deficiency classes, according to the level of amputation in the lower limbs. The most frequent amputations are: I) hip disarticulation (medial height incision of 1.5 cm medial to the anterior superior iliac spine), II) transfemoral amputation (cut between knee disarticulation and hip), III) transtibial amputation (disarticulation of the ankle and preservation of the knee joint) 1,3 Another class of deficiencies are permanent or

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irreversible pathologies in terms of muscle power, tone and muscle coordination. Regarding the minimum deficiencies, mobility is reduced due to injuries in ligaments or tendons, affecting mainly knees and ankles.4 A main trend in the literature about seated volleyball is to approach the game through the perspective of basic teaching guidelines,5 rules of the game6,7 and analysis of the main technical demands of the players.8,9 Only a few studies aimed to approach performance analysis from a tactical perspective.7,8,10 In one of them,8 the authors investigated the proportions of points, errors and adversary errors in seated volleyball games. Findings indicated a predominance of points. Additionally, the influence of positioning in the serve success has been also investigated.10 The study evidenced that players usually choose the position that favor the hip push to perform the service movement. Finally, Haiachi et al.7 investigated the influence of the serve and the attack in the team success. Results indicated that serve is determinant and attack can also present a major contribution, in some cases. Although these studies approached some general tactical features of seated volleyball, it is still missing investigations focused on the details of the players' tactical roles. In this sense, game analysis centered in the players' actions seems to be an efficient approach to provide feedback for improving team performance11-13 and the overall knowledge about the game. Therefore, the goal of the present study was to investigate the relation between players' deficiency and their tactical roles in seated volleyball. MATERIALS AND METHODS The sample consisted of six teams participating in the Brazilian North-Northeast Seated Volleyball Championship - 2017. Fifteen games were y un mayor rendimiento por acción, mientras que los amputados son responsables por acciones más cercanas a la red, como el bloqueo y los puntos de bloqueo. Los resultados también sugieren que el tipo de amputación influye en la dirección del desplazamiento analyzed, with 33 sets and 837 rallies. Video footage obtained from the Brazilian Volleyball Confederation (CBVD) was used to collect the dataset for analysis. The present study was approved by the Ethics Committee of the Faculty of Health Sciences (FS), with CAAE 38386714.8.0000.0030. For determining tactical performance and its interaction with deficiency type, the following variables

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were annotated for every player: I) type of deficiency, II) game actions performed, III) outcome of game actions, IV) direction and frequency of displacement. Type of deficiency was categorized as follows: I) Right Transfemoral (RTF), ii) Left Transfemoral (LTF), III) Right Transtibial (RTT), iv) Left Transtibial (LT), V) Right Hip Amputation (RHA), VI) Left Hip Amputation (LHA), VII) Transtibial Bilateral Amputation (TBA), VIII) Bilateral Transfemoral Amputation (BTA), IX) Transtibial and Transfemoral Amputation (TTA), x) Bilateral Hip and Transfemoral Amputation (BHTA), XI) Hip and Transtibial Amputation (HTA), XII) Bilateral Hip Amputation (BHA), XIII) Minimal Deficit (MD). Game actions were divided in two types: point actions and regular actions. Point actions: I) ace point (generated by correct serves), II) wrong pass, leading to a point of the opposing team, III) defensive turnover (wrong action during opponent's defense), IV) lock point, V) point from an attack, VI) wrong attack (opponents' serve errors). Regular actions: I) pass, II) touch, III) block, IV) reception, V) serve, VI) defense and VII) attack. Game actions' outcomes were categorized as: I) continuity (possession maintenance), II) pointless attack (attack action received by the other team), III) point. Direction of displacements was categorized as: front, back, right, left and none. Based on these annotations, we analyzed: I) average length of rallies; II) frequency of attack actions; III) game actions per amputation type; IV) direction and frequency of displacements per deficiency; V) success rate of actions per amputation (outcomes assessment); VI) lineups that resulted in points for the team. Statistical analysis Descriptive statistics and Pearson correlations were calculated (pvalue≤0, 05). All data were analyzed in the Statistical Package for Social Sciences (SPSS) software. RESULTS We analyzed 837 rallies, during 12 games, with an average of 70 rallies per game, distributed in 33 sets, with the participation of 43 players. Table 1 displays the frequencies of game actions per rally, for each amputation type.

CONCLUSION Sitting volleyball tactics represent a challenging research field with several subtleties derived from the interaction between the disability of players and their tactical tendencies, besides inter-individual abilities. Methodological

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frameworks applied to volleyball and even to other sports may be progressively adapted to sitting volleyball to assess its particularities and increase the knowledge that may support the practice of this sport. Future works may focus, for instance, in the relevance of the distinct game complexes to the team performance in order to increase the understanding of the game dynamics. Sitting volleyball tactics represent a challenging research field with several subtleties derived from the interaction between the disability of players and their tactical tendencies, besides inter-individual abilities. Methodological frameworks applied to volleyball and even to other sports may be progressively adapted to sitting volleyball to assess its particularities and increase the knowledge that may support the practice of this sport. Future works may focus, for instance, in the relevance of the distinct game complexes to the team performance in order to increase the understanding of the game dynamics.

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