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Artigo Original

Bem-estar, qualidade de recuperação e efetividade de posse de bola em jogos Oficiais de Futsal com mando de campo

Well-being, total quality of recovery and effectiveness of ball possession in at-home official Futsal games

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Resumo: *Objetivo*: As competições de Futsal podem induzir decréscimos no estado de bem-estar e na recuperação física dos atletas, bem como prejuízos no desempenho técnico. Este trabalho teve como objetivo avaliar o nível de bem-estar (índice de Hooper) e a qualidade total de recuperação física (TQR) de jogadores de Futsal imediatamente antes dos jogos oficiais em casa, durante um período de calendário congestionado. *Métodos*: foram registradas 828 jogadas ofensivas de jogos que terminaram em vitória, derrota ou empate. A manutenção da posse de bola e a marcação de gols foram computadas como a eficácia da posse de bola. O índice de Hooper e TQR foram registrados antes dos jogos e os valores médios para cada jogada foram calculados. As diferenças entre os resultados do jogo foram consideradas diferentes se $p < 0,05$. *Resultados*: Jogadas em jogos que terminaram em derrota apresentaram maior média de IH ($F = 275,3$; $p<0,0001$) e subescalas (sono, $p<0,001$; fadiga, $p < 0,001$, estresse; $p<0,001$ e dor muscular tardia , $p<0,001$) do que valores de jogos com vitória. Não foram observadas diferenças no bem-estar para a manutenção da posse de bola. Jogadores que participaram de jogadas que resultaram em gols relataram menos estresse ($p=0,04$). A TQR média não foi estatisticamente diferente para nenhuma variável. *Conclusão*: melhor estado de bem-estar, principalmente percepção de estresse, foi encontrado em jogadores que participaram de partidas bem-sucedidas e jogadas com gols.

Palavras-chave: Estresse psicológico; Comportamento competitivo; Esportes coletivos.

Abstract: Objective: Futsal competitions can induce decrements in the well-being state and physical recovery of athletes, as well as impairment in technical performance. This work aimed to evaluate the level of well-being (Hooper index) and total quality recovery (TQR) of Futsal players immediately before official at-home games, during a period with a congested calendar. Methods: 828 offensive plays were recorded from games that finished in victory, defeat or draw. The maintenance of ball possession and goal-scoring was computed as the effectiveness of ball possession. The Hooper index and TQR were recorded before games and the mean values for each play were calculated.

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Differences between play outcomes were considered different if p< 0.05. Results: Plays in games that finished in defeat presented a higher mean HI (F = 275.3; p<0.0001) and subscales (sleep, p<0.001; fatigue, p < 0.001, stress; p<0.001, and delayed-onset muscle soreness, p<0.001) values than that finished in victory. No differences in well-being were observed for the maintenance of ball possession. Players who participated in plays resulting in goal-scoring reported less stress (p=0.04). Mean TQR was not statistically different for any variable. Conclusion: a better well-being state, especially stress perception, was found in players participating in successful games and plays with goal scoring.

Keywords: Psychological stress; Competitive behavior; Team sports

1. Introduction

Futsal championships can induce fatigue accumulation, which may lead to decrements in physical performance in professional athletes, making it necessary to monitor the quality of recovery and well-being of athletes during the in-season [1, 2]. In addition to the training load and competition exertion, the stress produced by contextual situations or in anticipation of competition can cause changes in well-being parameters (sleep quality, increased subjective rate of perception of effort in the game, delayed onset muscle soreness, and perception of fatigue) [2-4]. Most of the studies in team sports that investigate athlete´s recovery stressors have focused on physical performance, particularly the distances covered in the game [5-8] and there is little information on the quality of technical tactical actions. Some studies with soccer players suggest that in-season contextual stressors may be correlated with changes in the ball possession time, the number of passes, and tactical behavior [5, 9]. The effect of well-being, including the quality of sleep, fatigue, muscle pain, stress, and perception of recovery on the effectiveness of ball possession (the ability to maintain possession and score goals) has not yet been established in Futsal.

In team sports, squads with better sleep quality or duration show higher physical performance and greater chances of competitive success [10, 11]. However, team sports athletes face situations in competitive seasons that promote disturbances in the quality and quantity of sleep, including games played at night, travel, and a few days of recovery between games [12]. Of concern, in collective modalities, sleep disorders have been shown to alter the ability to perform sprints, reaction speed, and movement accuracy [11, 13, 14]. To maintain a high level of physical performance, athletes must recover and maintain the ability to perform sprints, which is essential for carrying out technical-tactical actions during the Futsal game [15]. Thus, monitoring the quality of sleep in Futsal athletes may be important, due to the possibility that competition schedules can promote sleep disorders and under-recovery, with consequent increases in the chances of loss of performance and failure.

The short recovery period in a congested competitive calendar (more than one game per week) also promotes increased symptoms of fatigue and delayed onset muscle soreness (DOMS) [12]. A study on professional Futsal players demonstrated that during a congested competitive period (two games a week) training loads can be adjusted to

improve physical recovery and well-being [1]. However, it is not clear how the recovery state and well-being could influence in-game performance in Futsal. For example, in soccer, the accumulation of fatigue promotes reduced physical and tactical performance, including a reduction in the number of technical actions, displacements with ball possession, and competitive success [16]. Authors have also observed that greater perception of fatigue was associated with reduced sleep quality, increased DOMS, and decreased motivation [17]. In soccer, games held less than 96 hours apart showed a worsening in the quality of recovery (TQR) and well-being, demonstrating the need for monitoring strategies for these parameters in team games [6]. Although manipulation of training loads could provide better recovery and well-being in Futsal [1], it is necessary to address whether this could be correlated with competitive success for the prescription of adequate recovery strategies and planning of technical-tactic strategies. Monitoring well-being may help team staff provide adequate psychological and physiological support to Futsal players.

Considering that the well-being and recovery of athletes may influence athletic performance or the chances of success in team games, the current study aimed to assess the level of well-being and total quality recovery reported by athletes engaged in offensive plays that resulted in the effectiveness of ball possession.

2. Methods

Experimental design

The study procedures were approved by the Ethics Committee for Research involving Human Beings at the State University of Londrina (protocol no. 3.389.340), before the start of data collection. Players and coaching staff were informed about the objectives and procedures of the study, and all players and coaching staff signed the Informed Consent Form. All procedures performed have been conducted in accordance with the principles outlined in the Helsinki Declaration.

This is an observational study on the effect of pre-game well-being state and recovery on the effectiveness of ball possession of Futsal players in official matches. Games were analyzed during a period when both the State Futsal Championship, in the 1st division of the state of Paraná, and the Futsal League (first national division), in the National Championship were taking place, between April and July 2019. Only mandatory games were analyzed. The athletes were evaluated during periods of a congested calendar, with two games a week, 3 to 5 day apart. The games were filmed and all plays with ball possession in attacking actions were analyzed by two independent researchers to compute the effectiveness of ball possession actions.

Participants

Twenty male adult Futsal players from a professional Futsal team that competed in the state championship of the first division and National League in 2019 were evaluated.

As inclusion criteria, athletes were required to be members of the starting or reserve team, attend more than 80% of the physical and technical-tactical training sessions, and participate in both championships under analysis. Athletes could not be using any antidepressant or anxiolytic drug. The values reported by players that performed offensive actions with ball possession were included in the analysis.

Analysis of ball possession effectiveness

To assess the effectiveness of ball possession, the games were filmed using two cameras positioned on the sides of the field (side stands), capturing the total area of the court. To standardize image analysis, only at-home games were evaluated. The recording was carried out by the teams, which is a mandatory requirement for participation in the studied championships. The images were made available to the National Futsal League and publicly provided to the opposing teams. The analysis of actions was carried out by two researchers, previously trained and calibrated, with more than 10 years of experience in Futsal and Soccer training, with a kappa correlation coefficient >0.95 for intra- and inter-subject analysis.

The effectiveness of ball possession was established as the maintenance of ball possession at the end of the rally, with or without a goal [18].

Statistical analysis

The normality distribution of the data was evaluated using the Kolmogorov-Smirnov test. Differences between continuous and parametric data groups were evaluated by the Student's t-test and one-way ANOVA test. Differences between variables were considered significant if $p<0.05$. The sample size was estimated based on a 50.4% play failure rate in the effectiveness of ball possession in official games [18] and an absolute error of 5%. A minimum of 384 plays were necessary to achieve a statistical power of 80%, with $\alpha = 0.05$, to discriminate effectiveness and failure in ball possessions.

3. Results

Seven games were evaluated, with 828 plays with ball possession, of which 525 (63.4%) failed, 279 (33.7%) maintained ball possession (partial effectiveness), and 24 goals (2.9%) were scored. All offensive plays were of sufficient quality to be included in the study, without exclusion for any reason.

Players reported increased pre-game HI scores (worse well-being) in plays of games that resulted in defeat (Table 1). Sleep quality and TQR were reported as better in plays from games that finished in a draw (Table 1).

Table 1. Mean well-being (Hooper Index sores) and TQR before games with different results.

	Game outcome			One-way ANOVA
	Victory	Draw	Defeat	F (2;825); P value
Hooper Index	9.89 ± 1.80	9.93 ± 0.16	11.16 ± 0.31$^{V, Dr}$	F = 275.3; p<0.0001
Sleep	2.60 ± 0.10	2.55 ± 0.15^{V}	2.63 ± 0.13 $^{V, Dr}$	F = 24.52; p<0.0001
Fatigue	2.88 ± 0.34	2.92 ± 0.14	3.05 ± 0.27 $^{V, Dr}$	F = 27.08; p<0.0001
Stress	1.77 ± 0.32	1.99 ± 0.06	2.34 ± 0.26 $^{V, Dr}$	F = 397.90; p<0.0001
DOMS	2.62 ± 0.60	2.46 ± 0.13	3.13 ± 0.13 $^{V, Dr}$	F = 196.9; p<0.0001
TQR	14.96 ± 0.97	15.37 ± 0.25^{V}	14.90 ± 0.20^{Dr}	F = 45.32; p<0.0001

^{v} p<0.001 compared to Victory; ^{Dr} p<0.001 compared to Draw; Tukey test. DOMS: delayed-onset muscle soreness. TQR: Total quality recovery.

The HI and HI scales were not significantly different in plays that resulted in failure or maintenance of ball possession (table 2).

Table 2. Analysis of differences between plays with failure and maintenance of ball possession with well-being (HI scores) and TQR.

	Total (n=828)	**Failure (n=525)**	**Effectiveness (n= 303)**	**P value**
Hooper Index	10.29 ± 0.91	10.32 ± 0.90	10.24 ± 0.91	0.25
Sleep	2.59 ± 0.13	2.59 ± 0.13	2.60 ± 0.13	0.52
Fatigue	2.94 ± 0.28	2.95 ± 0.28	2.94 ± 0.28	0.71
Stress	2.01 ± 0.33	2.02 ± 0.34	1.99 ± 0.32	0.29
DOMS	2.73 ± 0.48	2.75 ± 0.47	2.70 ± 0.48	0.42
TQR	15.04 ± 0.77	15.01 ± 0.68	15.10 ± 0.63	0.06

DOMS: delayed-onset muscle soreness. TQR: Total quality recovery.

The stress score of HI was lower in players involved in plays that resulted in a goal (Table 3).

Table 3. Analysis of differences between plays with goals and other plays in relation to sources of stress associated with the championship.

	No Goal (n=804)	**Goal (n=24)**	**P value**
Hooper index	10.30 ± 0.91	10.08 ± 0.90	0.26
Sleep	2.63 ± 0.13	2.59 ± 0.10	0.11
Fatigue	2.94 ± 0.28	2.91 ± 0.28	0.51
Stress	2.02 ± 0.33	1.88 ± 0.33	0.04*
DOMS	2.73 ± 0.48	2.65 ± 0.50	0.06
TQR	15.04 ± 0.67	15.10 ± 0.65	0.91

DOMS: delayed-onset muscle soreness. TQR: Total quality recovery.

4. Discussion

The main results of the study demonstrate that in at-home games, which finished in defeat, the mean well-being scores of athletes involved in plays were lower than reported in games that finished in victory or draw. The level of well-being and recovery were not different in athletes engaged in plays with maintenance (effectiveness) or loss of ball possession (failures). On the other hand, a lower level of stress was reported in athletes participating in plays that resulted in goal scoring. These results suggest that well-being state may have some positive influence on game performance. Moreover, the mean level of stress of the athletes participating in play was lower when they achieved goal scoring.

The present study did not find differences between the well-being index and recovery when players maintained ball possession or not. This may suggest that being better recovered or less stressed was not mandatory to achieve effectiveness in ball possession. A study in an international tournament organized by FIFA, with games on four consecutive days, showed that regardless of the game performance and the intensity of the games throughout the competition, there was no significant decrement in the quality of recovery and changes in the well-being of players [2]. Another study reported that Futsal athletes did not present significant changes in well-being and recovery state in the three days of recovery after games, during weeks of a congested competitive calendar [1]. However, these studies did not report the pre-game competition well-being and recovery or their relationship with team performance. The overall well-being score may be associated with team performance, since all HI scores were increased in plays of games that resulted in defeat. It should be taken into account that contextual factors of the competition could have contributed to increased levels of stress during the competition calendar. The results of the present study suggest that the perception of stress may be an important factor contributing to better technical-tactical organization that result in goals.

Poor sleep quality is correlated with pre-competitive stress in professional athletes in individual and team modalities [19, 20]. Sleep quality and duration have been recognized as important determinants of sports performance [21-23]. Some factors that may contribute to poor sleep quality before games include travel, competitive stress, and fatigue [24]. In the present study, the travel impact and away effect could not have contributed to sleep disturbance since all games were performed at home. However, poor sleep quality may be one factor that contributed to increased perception of fatigue and stress. In agreement with this, plays in defeat games were performed by athletes who reported higher levels of poor sleep and stress, as well as fatigue and DOMS. This suggests that the athletes were less well-recovered in defeat games than in victory games. Contrary to the study hypothesis, TQR was not significantly different in victory and defeat situations. In this way, HI seems to be more appropriate than the TQR scale to monitor the pre-game recovery state in Futsal.

Anticipation of the competition can cause increased stress in athletes, reported in the literature as psychological and physiological signs and symptoms, such as anxiety [25-27], low heart rate variability [27, 28], and salivary cortisol [29, 30]. Stress symptoms, such as anxiety and high levels of pre-competition cortisol have been associated with impaired competition performance [25, 26, 29, 30]. In the present study, the perceived stress was reported to increase before games that finished in defeat. However, it was not significantly different in players who performed effective and failed ball possessions. On the other hand, athletes engaged in successful ball possessions scoring a goal reported a low level of stress. Future studies should address whether a lower level of perceived stress is correlated with increased accuracy of technical actions, better team organization, and more efficient teammate interactions, and if it is related to the professional experience of Futsal athletes.

5. Conclusion

The results suggest that well-being state is an important factor in Futsal team performance. Moreover, players reporting a lower level of stress before games may have more chances of achieving goal scoring.

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