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Impact of Consecutive Games on Workload, State of Recovery and Well-Being of Professional Volleyball Players

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ABSTRACT

Timoteo TF, Seixas MB, Falci MFA, Debien PB, Miloski B, Miranda R, Bara Filho MG. Impact of Consecutive Games on Workload, State of Recovery and Well-Being of Volleyball. **JEPonline** 2017;20(3)130-140. The purpose of this study was to evaluate the impact of consecutive games on the workload, state of recovery and well-being of volleyball players. Twelve male professional volleyball players (age, 26.7 ± 5.5 yrs; body mass, 95.8 ± 8.2 kg; and height, 197.0 ± 7.9 cm) participated in this study. Workload, recovery, and well-being were recorded daily during a period of consecutive games. A one way ANOVA with Bonferroni *post hoc* test were used to compare workload, recovery and well-being data. Workload of the first day was statistically higher in relation to day 3, day 5, and day 6 (P = 0.0001, P = 0.0001 and P = 0.021). The same behavior was found for the workload of day 2 (P = 0.0001, P = 0.001, P = 0.014). The recovery presented statistically higher values on the first day comparing to day 3 (P = 0.005), day 4 (P = 0.003), day 5 (P = 0.032), and day 6 (P = 0.021) and was statistically higher on day 2 when compared to day 3 and day 4 (P = 0.011 and P = 0.001). The total well-being was statistically higher on the first day in relation to day 3 (P = 0.004), day 4 (P = 0.000), day 5 (P = 0.002), and day 6 (P = 0.007). There was also a statistically significant difference on day 2 compared to day 3 (P = 0.004), day 4 (P = 0.000), day 5 (P = 0.005), and day 6 (P = 0.016). The results of the present study indicate that consecutive games significantly affect the workload, recovery, and well-being of volleyball players.

Key Words: Competitive Season, Team Sport, Training Load

INTRODUCTION

The competitive season consists of several commitments that involve training sessions and games (16,20). Regarding each commitment, it is essential to achieve an adequate balance between athletes´ training, competition loads, and recovery periods. This is necessary so that the athlete can maintain his level of athletic performance (2,3). However, finding the right balance among the different commitments has not been easy. In fact, it has been a challenge for coaches and researchers, especially when considering the extensive competitive schedule with frequent consecutive games. In addition, there is always the pressure for good results, long journeys, and opponent performance factors among other considerations that may contribute to an increase in the athletes' psychophysiological stress (20).

The likelihood of playing several matches in a single week (consecutive games) is common in many sports such as futsal (10), basketball (24), rugby (18), and soccer (26). The literature indicates that the high physical demand during a game may represent the highest individual loads of the week in different sports (13,29,30). Hence, it is very important to monitor workload both during training and during game days and, with regards to consecutive games, volleyball in particular should be monitored since the matches vary considerably in the number of sets and the duration of the match itself (22). This fact creates difficulty with the organization and distribution of the workload, which may contribute not only to its increase in that period, but also to the reduction of athlete performance, recovery, and well-being. In a recent systematic review, Saw et al., encouraged the use of independent subscales in order to select those that are responsive to training load (27). It is also important to highlight the difficulty of monitoring, since in a period with a large number of games there are players who participate more or less in the games (starters and substitutes) of which they can respond differently to the psychophysical stress.

High workloads associated with insufficient recovery periods can lead to a number of negative results that include a decrease in performance and an increase in injuries (5,17,23). Therefore, it is important to monitor the athletes' workloads, their state of recovery, and their well-being (28). Despite the need for recovery to allow for a good performance (19), the time between games on consecutive days is often not long enough for an adequate recovery. The coaches understanding of the impact of games played on consecutive days allows for an adequate recovery strategy to preserve the athletes' physical integrity and increase game performance (10). Thus, the purpose of this study was to evaluate the impact of consecutive games on the workload, state of recovery, and well-being of volleyball athletes during a week of competition.

METHODS

Subjects

Twelve male professional volleyball players who competed in the Brazilian National League participated in this study. The mean ± SD for age, body mass, and height of the subjects were 26.7 ± 5.5 yrs, 95.8 ± 8.2 kg, and 197.0 ± 7.9 cm, respectively. After receiving an explanation about the objectives and procedures of the study, each subject signed an informed consent form. All subjects were familiar with the instruments, which were used by the coaching staff of the investigated team. The group was divided into starters/experimental (n = 7) and non-starters/control (n = 5). The study was approved by the Human Research Ethics Committee of the Federal University of Juiz de Fora.

Procedures

All evaluations were conducted during a period of 5 consecutive games in a 6-day period played by the team an International Tournament. Players who participated in at least 80% of the games were considered starters. Hence the other players were considered substitutes.

Workload

The duration of each training session and game match was recorded. The data were used to calculate the workload. Thirty minutes after the end of training/game, the subjects answered the following question, “How was your training session?” Workload was quantified by Session Rating of Perceived Exertion (RPE), from the multiplication of training duration, in minutes, by the score from RPE scale, ranging from 0 to 10, in which 0 means resting and 10 maximum effort (6). A daily workload (sum of the workload of training sessions and games performed on the day) was used for analysis.

State of Recovery

To assess the state of recovery, the subjects answered the Total Quality Recovery Scale (TQR) as presented by Kentta and Hassmen (21). Each subject answered the following question: “How do you feel about your recovery?” The scale ranged from 6 to 20, 6 corresponding to “no recovery at all” and 20 to “fully recovered”. The data were collected at the same time and always before the first training session or game day.

Well-Being

To evaluate the athletes' well-being, the Well-Being Questionnaire (WBQ) proposed by Hooper and Mackinnon (14) was used. This psychophysiological instrument evaluated, on a scale of 1 to 5, the following aspects: (a) Fatigue; (b) Sleep Quality; (c) General Muscle Soreness; (d) Stress Levels; and (e) Mood. The questionnaire was applied daily, always before the first training session or game.

Statistical Analyses

The results are presented as mean ± SD. In order to compare the workload, recovery and well-being data were evaluated by a one way ANOVA with Bonferroni *post hoc* test. The Pearson Product Moment Correlation was used to test the association of workload, TQR, and WBQ. The following descriptors were assigned to the correlations; between 0 and 0.1 = trivial; between 0.1 and 0.3 = small; between 0.3 and 0.5 = moderate; between 0.5 and 0.7 = high; between 0.7 and 0.9 = very high, and between 0.9 and 1 = almost perfect (15). An Independent *t*-test was used to compare starters and substitute players. Data were analyzed using the IBM SPSS Statistics 20.0. Statistical significance was set at $P \leq 0.05$.

RESULTS

The planning of athletes' activities during the period evaluated is described in Table 1.

Table 1. Description of Training Content during Consecutive Games.

Period	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
Morning	Technical + strength	Technical + strength	Morning Off	Day Off	Technical	Morning Off
Afternoon	Game 1	Game 2	Game 3	Day off	Game 4	Game 5

Workload of the first day was statistically higher in relation to day 3, day 5, and day 6 (P = 0.0001, P = 0.0001 and P = 0.021). The same behavior was found for the workload of day 2 (P = 0.0001, P = 0.001, P = 0.014) (Figure 1).

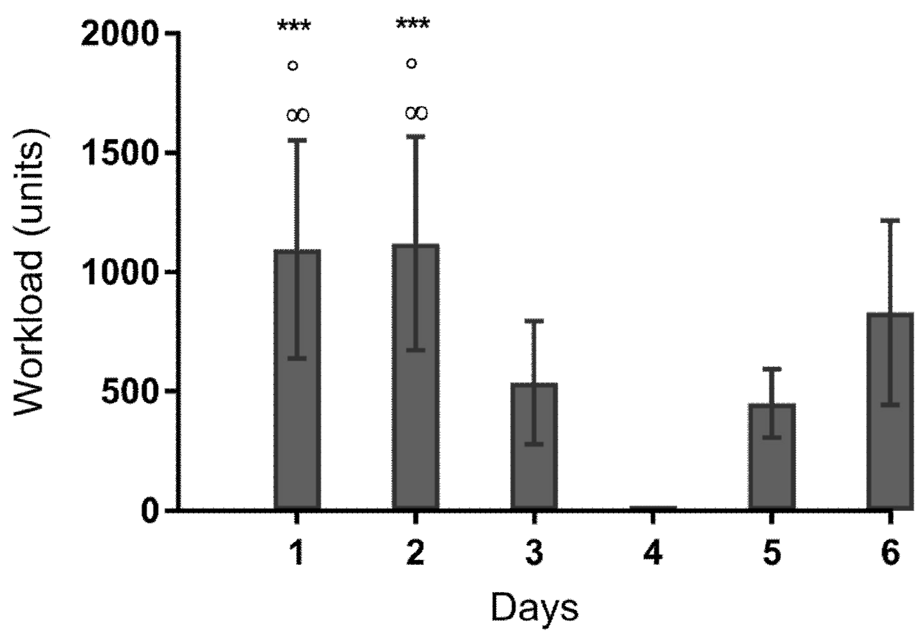

Figure 1. Workload during Consecutive Games. ***Significantly different from day 3, °Significantly different from day 4, ∞Significantly different from day 5

The recovery presented statistically higher values on the first day comparing to day 3 (P = 0.005), day 4 (P = 0.003), day 5 (P = 0.032), and day 6 (P = 0.021). Yet, players' recovery status was statistically higher on day 2 compared to day 3 and day 4 (P = 0.011 and P = 0.001). Furthermore, recovery was statistically lower on day 3 compared to day 4 (P = 0.013). On the other hand, the values of the fourth day were smaller in relation to the two following days (day 5, P = 0.021 and day 6, P = 0.034) (Figure 2).

The total score of the well-being questionnaire showed statistically higher values on the first day in relation to day 3 (P = 0.004), day 4 (P = 0.000), day 5 (P = 0.002), and day 6 (P = 0.007). There was also a statistically significant difference on day 2 compared to day 3 (P = 0.004), day 4 (P = 0.000), day 5 (P = 0.005), and day 6 (P = 0.016). Fourth day was also statistically lower than day 5 (P = 0.046).

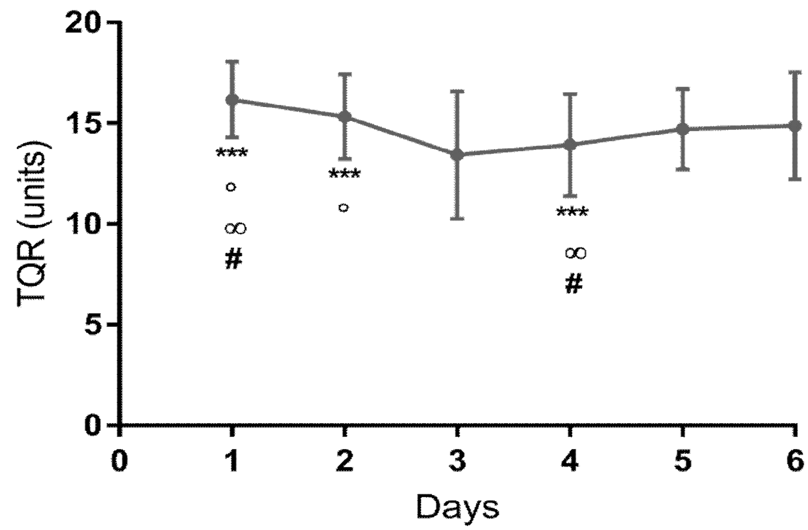

Figure 2. Total Quality Recovery during Consecutive Games. ***Significantly different from day 3, °Significantly different from day 4, ∞Significantly different from day 5, #different from day 6

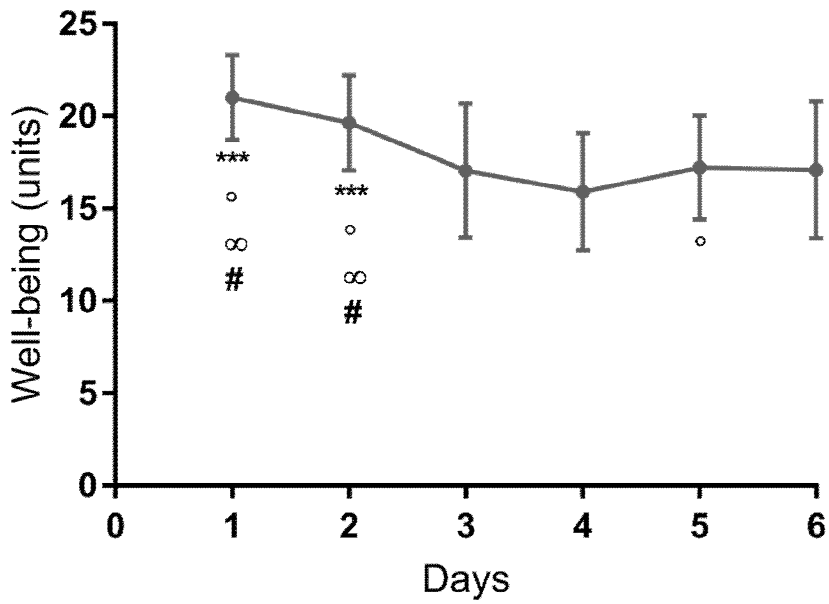

Figure 3. Well-Being Questionnaire during Consecutive Games. ***Significantly different from day 3, °Significantly different from day 4, ∞Significantly different from day 5, #Significantly different from day 6

As to the comparison between the starters and the substitute players, statistically significant differences were observed for: Workload, TQR, Well-Being (Total Score, Fatigue, Sleep Quality, and General Muscle Soreness) (Figure 4).

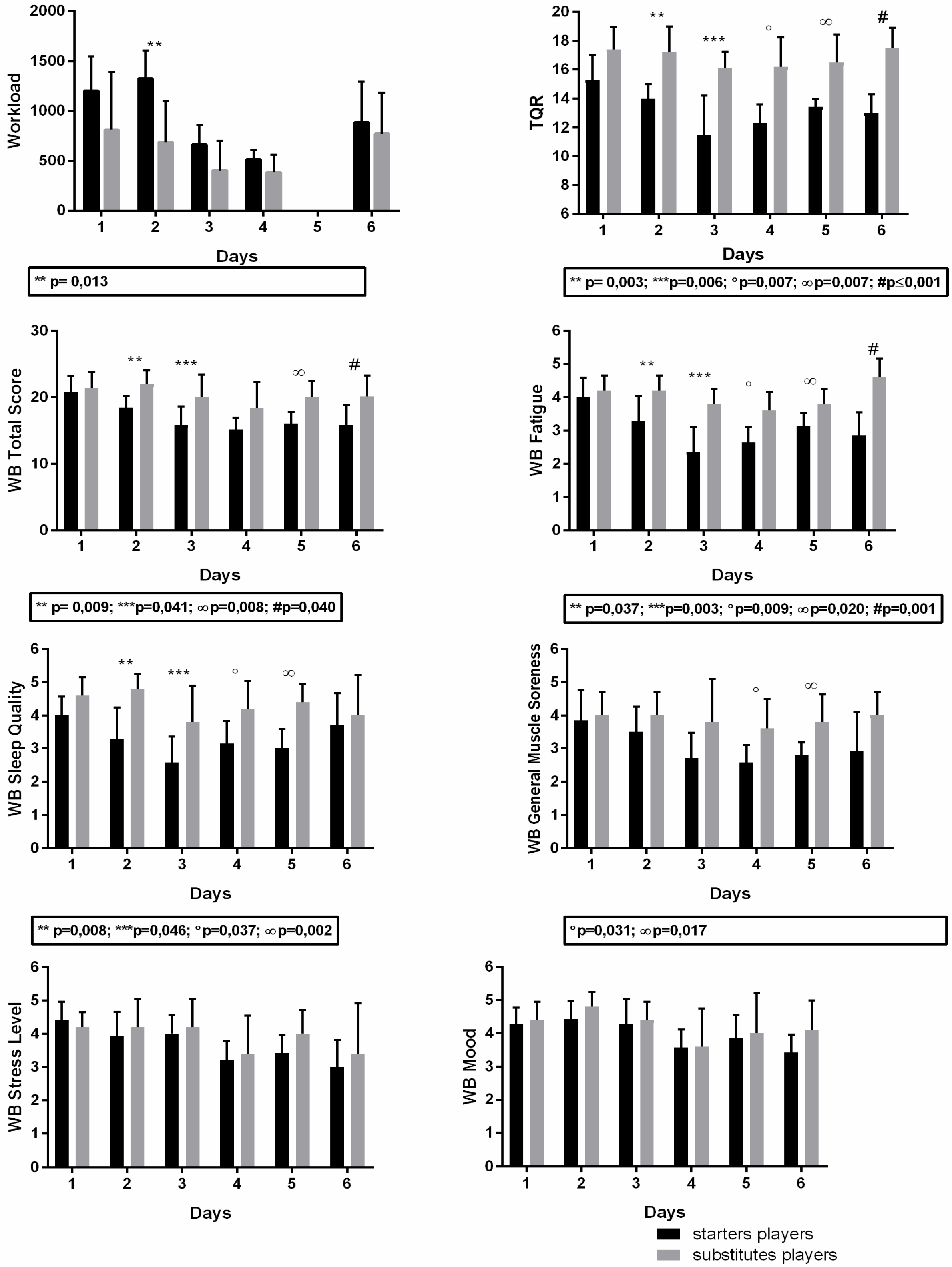

Figure 4. Comparison Between Starters and Substitutes Players. *Significantly different in day 1, **Significantly different in day 2, ***Significantly different in day 3, °Significantly different in day 4, ∞Significantly different in day 5, #Significantly different in day 6

DISCUSSION

The purpose of this study was to observe the behavior of workload, recovery, and well-being of the volleyball players on consecutive game days. The findings indicated higher and statistically larger workloads during the first two days in relation to the other days of the same period. Consequently, there was a decrease in the subjects' recovery over the days, with the same behavior verified for the scores of the well-being questionnaire.

Workload

The literature indicates that the high physical demand in a game may represent the highest individual loads of the week in different sports (13,29,30). We verified that the workload analyzed in this study was ~3647 AU, which is a higher value found in a previous study by Freitas et al. (9) during the pre-season training weeks of a volleyball team. They reported that the weekly average workload of the most intense period lasting 5 wks was 1987 AU. The largest workload found in the first 2 days can be explained by the team's own schedule since there were daily training and games during this period. This fact may also explain the changes in the recovery status of the athletes.

State of Recovery

There is a well-known relationship between workload and state of recovery in the literature (3,8,25). This relationship was observed in the present study, since a negative relationship was found between the variables (i.e., the higher the workload, the lower the athletes' recovery). In addition, it is important to highlight a decrease in recovery after the first 2 days of competition that was characterized by the highest workloads. This finding corroborates the study by Freitas et al. (10) who concluded that futsal players' competitions with consecutive games may lead to a reduction in the players' perception of recovery. They used the RESTQ-Sport to show a decrease in the "physical recovery" scale and an increase in the "fatigue" scale (10).

Despite the improvement in the recovery levels of the athletes after the day-off in day 4, the cumulative effect of the workloads in this period explains the fall in recovery compared to the beginning period. Thus, the time and/or other training activities between the games on consecutive days may be insufficient to promote adequate recovery for the players. This shows that sports competitions with consecutive matches can compromise the athletes' physical performance, as well as upset the relation between stress and recovery. Despite evaluating different domains, the recovery state also presented similar behavior to the well-being questionnaire in this specific period.

Well-Being

Monitoring of the athletes' well-being is an indication of an important feature of the state of the athlete that enables a proper adjustment to the training prescription. Changes in the well-being variable often occur simultaneously with the athlete's poor adaptation to training (7,11). McLean et al. (23) found a significant reduction of well-being in the 48 hrs after periods of greater workload in Rugby athletes. The same was observed in the present study, since on day 3 and day 4 the athletes' well-being questionnaire values were statistically lower when compared to days with higher training loads (e.g., day 1 and day 2). Similarly, a study of soccer players by Buchheit et al. (4) reported the well-being questionnaire is a tool sensitive to load changes in elite football players. The authors concluded that wellness measures are the best simple measures for monitoring training responses to an intensified training camp.

Gastin et al. (12) noted a drop in the well-being of Australian football players in the days following the game. It is noted that this study was not performed on days of consecutive games, with training sessions in the days after the game. The day off scheduled for day 4 may have influenced the athletes' Improvement of the subjective well-being data. Well-being improvements associated with reduced training loads have also been found in other studies (5,14). It is estimated that athletes may need up to 4 days after a match to return to their initial well-being levels (12), which does not occur in the present study even 5 days after the first game due to the large number of consecutive games.

Comparison between Starters and Substitutes Players

Starters and substitute players presented different average workload values, especially in the first 2 days, highlighting the statistical difference in the second day. This may have influenced the athletes' performance in the rest of the tournament. While the study by Algrøy et al. (1) showed no difference between the weekly training load of starters and substitute soccer players, there research was not done in a period of consecutive games. As far as recovery is concerned, there was a decrease during the week of consecutive games and the substitutes showed a better recovery compared to the starters. The starters presented very low recovery values on day 3, with values close to 11 points (poor recovery). Similar behavior was observed for well-being questionnaire scores. As expected, starters presented worse levels in the subscales "fatigue", "quality of sleep", and "general muscle soreness" when compared to the substitute players. The "stress level" and "mood" subscales did not show significant differences between the two groups. This may be related to the characteristics of those variables, which can be more related to other general aspects rather than psychophysical stress. As a result, therefore, the variables responded very similar in both groups in the competition with consecutive games.

CONCLUSIONS

The results of the present study indicate that consecutive games significantly affect the workload, recovery, and well-being of volleyball players. The TQR was responsive to the change in workload, given the high loads with poor recovery and the reduction of in loads that generated an improvement. The subjective well-being of the athletes, despite not being directly related to the workload, presented a similar behavior to the athletes' state of recovery. Thus, the use of wellness and recovery tools should be encouraged as an important way of adapting the athletes' to the training prescription. Decisions such as continuing regular training, investigating training loads, and/or modifying the training program can be based on these tools.

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