Activity Patterns, Lactate Profiles and Ratings of Perceived Exertion (RPE) During a Professional Tennis Singles Tournament

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Introduction

Knowledge about physiological responses to match play is essential for the design of effective training programmes in a complex sport such as tennis. Patterns of physical activity and recovery (described by the duration of rallies and the effective playing time) and the stage of play (service or return games) have been reported to influence physiological mediators such as heart rate, blood lactate and oxygen uptake (Smekal et al., 2001). The purpose of this study was to examine activity patterns, blood lactate concentrations and perceived exertion responses during a match in a professional tennis tournament.

Methods

8 well-trained, professional male tennis players (four ATP tournament winners and one Davis Cup winner) (mean ± s: age, 27.0 ± 4.4 years; height, 182.9 ± 5.2 cm; body mass, 89.6 ± 7.5 kg) participated in the study. All subjects were fully informed of the experimental procedures prior to providing written informed consent to participate in the study, which was approved by the Institutional Research Ethics Committee. The variables describing the characteristics of the matches; a) duration of rallies (DR); b) rest time (RT); c) work: rest (W:R); d) effective playing time (EPT); e) shots per rally (SR), were determined from video recordings (Samsung, Vp-d80, Korea). Several blood samples (n = 52) were taken from the earlobe at selected changeovers after a game. Also, RPE (n = 113) was obtained using the 15-category Borg RPE scale (Borg, 1998). All measurements were taken from players during a three-day invitational professional singles tennis tournament held in a local tennis club. The matches were conducted on an outdoor clay court.

Results and Discussion

We analysed 132 games played in 6 matches. The variables describing the characteristics of the matches (Table 1) and the physiological-perceptual responses (Table 2) of tennis match play were calculated as mean values for all games performed by all players (264 games).

Work (s)	Rest (s)	W:R	EPT (%)	SR (n)
7.5 ± 7.3	16.2 ± 5.2	1:2.2	18.2 ± 5.2	2.8 ± 2.1

Table 1.Tennis match analyses. (Mean ± s).

Variables	Service Games	Return Games	Significance
LA (mmo.L^{-1})	4.61 ± 2.50	3.20 ± 1.35	P = 0.02
RPE	13.4 ± 1.9	12.00 ± 2.0	P = 0.0002

Table 2. Blood lactate concentration (LA) and ratings of perceived exertion (RPE) of service and return games. (Mean ± s).

To the best of our knowledge, this is the first investigation reporting the physical stress associated with single tennis match play in a professional tournament. The patterns of physical activity obtained are in agreement with previous data obtained during a simulated tennis match play (Smekal et al., 2001). Stage of play (serve or return play) influenced the physiological-perceptual responses of tennis match play. LA

and RPE values were higher in service games than in return games (P = 0.02 and P = 0.0002, respectively). These results extend previous findings reporting higher physiological stress (i.e., HR) in service games than return games (Reilly and Palmer. 1993; Smekal et al., 2001; König et al, 2001).

Conclusion

Some results (i.e., work:rest ratio) can be used to refine the design of intermittent exercise training protocols for tournament tennis players. The differences in RPE between serve and return games obtained in this study indicate that RPE is a potentially valuable tool to measure physical stress during tennis match play, and this deserves further investigation.

References

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