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Original Article

Running performance during weekly micro cycles including 2 and 3 matches in elite young soccer players

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Abstract
Despite the fact that a soccer match is very demanding for players body there is extra load with the frequency of matches. The studies had proven that professional soccer players play 1 match per 4.3 days including traveling time. (Kellmann M., 2002).The propose of this study was to record and compare the differences at running performance between two-matches and three-matches in season micro cycles included trainings in order to provide guidelines and information for better management of competition and training load. Ten (n=10) elite youth soccer players of a professional club who participated at Superleague Greece (1st Division) U19 League and Youth League (European u19 championship) with age 18,7±0,67(y), height 1,78±0,4 (m), body weight 69,39±4,16 (kg) and fat tissue 6,74±1,52 (%) constituted the sample of the study. Running performance of each player recorded in all trainings and matches using global position system (GPS) (Viper pod 2, STATSports, Belfast, UK). GPS variables which were selected for analysis included Total Distance (TD), Sprint Distance (SD) vel. >25km/h, High-Speed Running (HSR) vel. > 19,8 km/h, High Metabolic Load Distance (HMLD), Number of Accelerations (Acc) vel. > 3m/s2 and Number of Decelerations (Dec) vel. > 3m/s2. Data from training sessions and matches were collected from two different 7-day periods during Superleague Greece U19 season 2019-2020. Statistical analysis was conducted using SPSS for Windows 15.0 (IBM Corp.). Data were tested with repeated measures analysis and there was significant interaction for Total Distance (TD) with p= ,000 and F= 73,036 also for Number of Decelerations (Dec) with p= ,036 and F= 6,100. In these two variables we continue with paired t test between this two different in season micro cycles. The data analysis showed that two-matches micro cycle had more total distance and decelerations for the players than three-matches micro cycle. These findings reflect the importance of training impact on the players in in-season micro cycles where performance is the main target.
Keywords: Running Performance, Microcycle, GPS, Total Distance, High Speed Running, Sprint Distance, Metabolic Load, Acceleration, Deceleration, Elite Soccer Players.

Introduction

Soccer is a game that winning is affected by space domination on the field. It is characterized by high intensity interval actions that activate anaerobic and aerobic mechanism (Drust, Cable, & Reilly, 2000). During a soccer match, players cover approximately 10-14 km (Bangsbo, Mohr, & Krustrup, 2006; Bloomfield, Polman, & O'Donoghue, 2007; Dellal et al., 2011; Di Salvo et al., 2007; Fernandes, Caixinha, & Malta, 2007). This total distance separated in parts due to different speed used and the most of it is low to medium intensity (vel. 0–19,8 km/h) (Bradley et al., 2009), and high-speed running is (vel.> 19,8 km/h) almost 8% of total distance (Rampinini, Coutts, Castagna, Sassi, & Impellizzeri, 2007).

Specifically, youth players cover approximately 7-10 km during matches (Palucci Vieira et al., 2019). The number of executed accelerations is 52 to 100 and they perform a new action every 4 seconds, with a total number of action change at 1379 to 1459 times (Palucci Vieira et al., 2019).

After analysis of youth soccer matches, the result has indicated that the total distance of shuffle running is 217-549m. (da Silva et al., 2007). According to Stølen et al. (2005), during youth soccer matches, 96% of sprint actions are shorter than 30m. with 49% of them shorter than 10m.

The most critical moments of a soccer game (e.g., ball regaining, goal scoring or saving) are depending on player's ability to perform at high-intensity actions (Ferrete et al., 2014). In contrast to match requirements, physical demands of elite professional soccer players during training are not well documented and are either constraint to weekly reports or average rates of 10 weeks period (Gaudino et al., 2013), or a long-term analysis (Malone et al., 2015).

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Traditionally, management of training load is analyzed in weekly microcycles with one soccer match. However, elite soccer players are play two or three matches during many microcycles of the season, due to their involvement in numerous competitions, such as European Leagues (Champions League, Europa League etc.) and local cups.

Material & Methods

Participants

Ten (n=10) elite youth soccer players of a professional club who participated at Superleague Greece (1st Division) U19 League and Youth League (European u19 championship) with age 18,7±0,67(y), height 1,78±0,4 (m), body weight 69,39±4,16 (kg) and fat tissue 6,74±1,52 (%) constituted the sample of the study. The distribution of the playing positions was 1 Central Defender (CD), 2 Full Backs (FB), 2 Central Midfielders, 2 Attack Midfielders (AM), 2 Wingers (WR) and 1 Striker (ST). Players who didn't complete the total number of team's trainings and matches excluded from the study. Also goalkeepers were excluded from this study.

Materials

Running performance of each player recorded in all trainings and matches using global position system (GPS) (Viper pod 2, STATSports, Belfast, UK). This gadget's outcomes are about velocity and distance recorded at 10 Hz. Every player was wearing a specific vest designed by the manufactured in order to carry the gps unit in players back. This type of system had previously tested about validity and reliability (Castellano, Casamichana, Calleja-Gonzalez, Roman, & Ostojic, 2011; Coutts & Duffield, 2010; Varley, Fairweather, & Aughey, 2012). All gps units was active 30 minutes before the data collection in order to find signal and be syhronized (Maddison & Ni Mhurchu, 2009). After every record the data were downloaded from units using the manufactured software (software Viper PSA, STATSports, Belfast, UK). To prevent mistakes players was wearing the same gps unit in every training and match (Buchheit et al., 2014a; Jennings, Cormack, Coutts, Boyd, & Aughey, 2010).

Procedure

Data from training sessions and matches were collected from two different 7-day periods during Superleague Greece U19 season 2019-2020. These weeks were chosen from the calendar months September and October for the two-matches and three-matches week respectively. The selection of these weeks was made because they include the players who participate the most from all weeks during the entire season (two-match week n=10 and three-match week n=10). These two weeks meet the total essential criteria, as players complete all planned training sessions of the weeks and participate at matches as starters. Two-match week consist of 5 training days, 1 rest-day/day-off, while three-matches week had 4 training days and 1 rest-day/day-off. For the purpose of the study, the total number of training days and matches was observed was 9 and 5, respectively. This study did not affect or change the planned training sessions. Data collection for the study was conducted at training fields of the club, Superleague Greece U19 and European Youth League official fields.

Table 1. Running performance averages in micro cycle with two matches.

TEAM AVG(n=10)	**TWO MATCHES WEEK**							
VARIABLES	**MD**	**MD+1**	**MD+2**	**MD-4**	**MD-3**	**MD-2**	**MD-1**	**MD**
TD(m)	8902	0	6251	4231	5823	4367	3567	10151
SD(m)	116	0	54	12	6	15	7	158
HSR(m)	629	0	151	138	170	118	55	760
HMLD(m)	1051	0	623	609	1024	443	417	1527
ACC(n)	50	0	29	27	54	29	39	52
DEC(n)	52	0	25	29	62	14	35	72

Table 2. Running performance averages in micro cycle with three matches.

TEAM AVG(n=10)	**THREE MATCHES WEEK**							
VARIABLES	**MD**	**MD+1**	**MD-1**	**MD**	**MD+1**	**MD-2**	**MD-1**	**MD**
TD(m)	9185	2620	2760	8240	0	4422	2438	8720
SD(m)	68	2	1	71	0	13	8	91
HSR(m)	489	49	23	513	0	81	13	573
HMLD(m)	1240	473	314	1713	0	413	300	1237
ACC(n)	45	26	31	58	0	31	27	48
DEC(n)	50	24	26	68	0	16	21	57

Data analysis

GPS variables which were selected for analysis included Total Distance (TD), Sprint Distance (SD) vel. >25km/h, High-Speed Running (HSR) vel. > 19,8 km/h, High Metabolic Load Distance (HMLD), Number of Accelerations (Acc) vel. > 3m/s2 and Number of Decelerations (Dec) vel. > 3m/s2.

Statistical analysis

Statistical analysis was conducted using SPSS for Windows 15.0 (IBM Corp.). Data were tested with repeated measures analysis and there was significant interaction for Total Distance (TD) with p= ,000 and F= 73,036 also for Number of Decelerations (Dec) with p= ,036 and F= 6,100. In these two variables we continue with paired t test between this two different in season micro cycles.

No significant interaction was observed in the rest variables Sprint Distance (SD) with p= ,765 and F=,095, High-Speed Running (HSR) with p= ,778 and F=,084, High Metabolic Load Distance (HMLD) with p= ,948 and F=,004, Number of Accelerations (Acc) with p= ,558 and F=,370.

Level of significance was set at $P \leq 0,05$

Descriptive values are presented as means ± standard deviations.

Results

In the following table there are the averages of the variables that evaluated

Table 3. Variables averages

		Mean	Std. Deviation
Pair 1	total distance 1	44987,20	2409,683
	total ddistance 2	34292,60	3830,620
Pair 2	sprint distance 1	298,80	228,025
	sprint distance 2	310,00	158,958
Pair 3	hight speed running 1	1812,10	841,580
	hight speed running 2	1849,80	719,162
Pair 4	hight metabolic load distance 1	5551,40	1388,047
	hight metabolic load distance 2	5582,70	982,529
Pair 5	acceleration 1	276,80	78,307
	accelerетion 2	262,00	33,944
Pair 6	decceleration 1	288,20	65,285
	decceleration 2	236,80	38,395

There was a significant effect of Total Distance (TD) variables between two matches-week and three matches-week with p=0,000, t (9) =8,546.

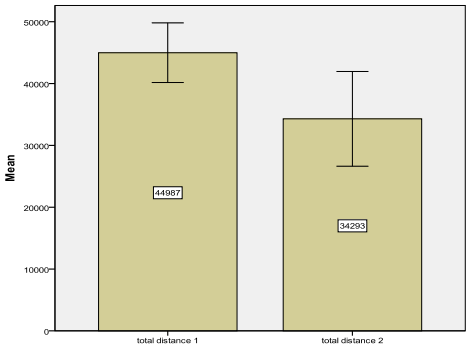

Figure 1. Total Distance (TD) comparison.

There was a significant effect of Number of Decelerations (Dec) variables between two matches-week and three matches-week with p=0,036, t (9) =2,470.

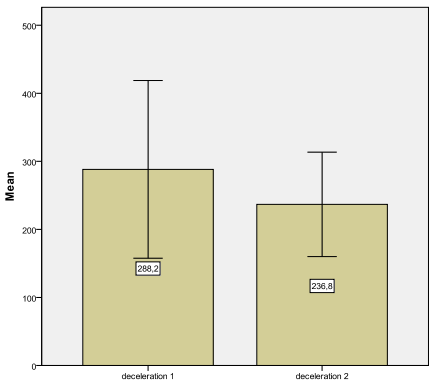

Figure 2. Number of Decelerations (Dec) comparison.

No significant difference was observed for Sprint Distance (SD) variables between two matches-week and three matches-week with p= 0,765, t (9) = -,308.

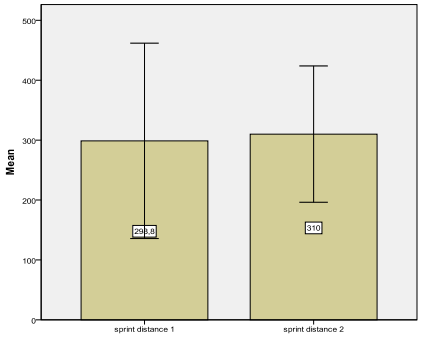

Figure 3. Sprint Distance (SD) comparison.

No significant difference was observed for High-Speed Running (HSR) variables between two matches-week and three matches-week with p=0,778, t (9) = -,290.

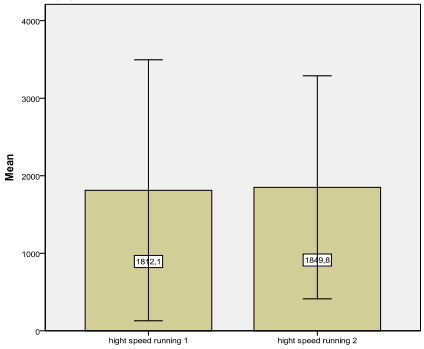

Figure 4. High-Speed Running (HSR) comparison.

No significant difference was observed for High Metabolic Load Distance (HMLD) variables between two matches-week and three matches-week with p=0,948, t (9) = -0,067.

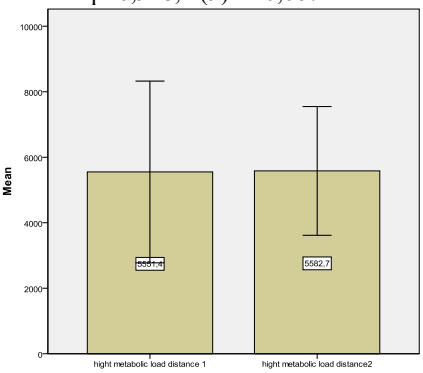

Figure 5. High Metabolic Load Distance (HMLD) comparison.

No significant difference was observed for Number of Accelerations (Acc) variables between two matches-week and three matches-week with p=0,558, t (9) = 0,608.

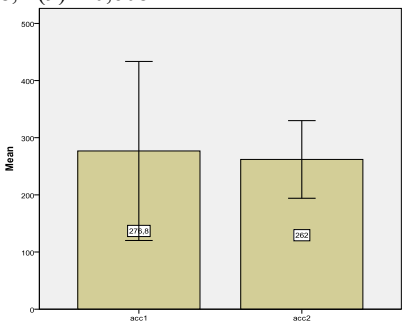

Figure 6. Number of Accelerations (Acc) comparison.

Discussion

Despite the fact that a soccer match is very demanding for players body there is extra load with the frequency of matches. The studies had proven that professional soccer players play 1 match per 4.3 days including traveling time (Kellmann M., 2002). In total, a soccer team is possible to participate in more than 60 matches in a single in season period (Carling C., Le Gall F. & Dupont G., 2012).

If we also consider that the most critical moments of a soccer game (e.g., ball regaining, goal scoring or saving) are depending on player's ability to perform at high-intensity actions (Ferrete et al., 2014) load management during in season is very crucial.

The propose of this study was to record and compare the differences at running performance between two-matches and three-matches in season micro cycles included trainings.

Observing the compared results between this two in season micro cycles there wasn't significant difference in the most of the variables as high-speed running (HSR), sprint distance (SD), accelerations (Acc) and in high metabolic load distance (HMLD). Although, total distance (TD) and decelerations (Dec) were significant more in micro cycle with two matches instead of micro cycle with three matches.

In the two-matches micro cycle there were five trainings with total distance (TD) avg per training 4039m and decelerations (Dec) avg per training 27,5n.

On the other hand, in three-matches micro cycle there were four trainings which two of them were dedicate to recovery with TD avg per training 2448m and Dec avg per training 17,4n.

This data agrees with many researchers which proven that in the trainings closer to the match (MD) total distance (TD) decrease (Aguiar et al., 2013; Owen et al., 2017; Martin-Garcia et al., 2018; Swallow et al.,2020).

Also, match related running performance is affected from many factors such as the opponent, so it very common to record different running performances by the same team due to these complex factors (Paul el al.,2015; Trewin et al.,2018).

Therefore, coaches have to wonder about better evaluation and management of training load during in season in order to maximise the performance of their players.

The findings are referring in this particular team and in this certain age group. May not be representative of the usual training demands of other teams (Gaudino et al., 2013).

Conclusion

In summary, this study recorded daily trainings and official matches from two in season micro cycles with different schedule liabilities.

The data analysis showed that two-matches micro cycle had more total distance and decelerations for the players than three-matches micro cycle. These findings reflect the importance of training impact on the players in in-season micro cycles where performance is the target.

Also, will be a useful tool for coaches in terms of planning and periodisation for in season micro cycles.

Future studies providing more detailed measures of weekly load and guidelines in micro cycles with different number of matches for elite-level soccer players.

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