A LEVEL OF RUNNING SPEED OF ELITE YOUNG SOCCER PLAYERS AT DIFFERENT POSITIONS

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Abstract

The aim of the study was to analyse a level of running speed in 50 meters of soccer players in Slovak national under-21 soccer team (n = 20, goalkeepers = 2, defenders = 4, midfielders = 8, forwards = 6) in the period of classification for the UEFA European Under-21 Football Championship 2011. The level of running speed was diagnosed with the device Fitro Light Gates (FiTRONIC, Bratislava, Slovak Republic). The criteria for the performance assessment was the time obtained in the distance of 50m with the exactness of 0,01s. Differences in the level of running speed were recognised and defined by the subject analysis. The level of running speed of the whole group was presented by the average performance with the figure 6.80±0.13s. The level of running speed of defenders was transformed into the performance 6.90±0.07s, midfielders 6.75±0.12s and forwards 6.73±0.28s, what is adequate to the level of performance and running speed of the whole group. The significantly low level of running speed was determined by goalkeepers, presented by the average value 7.00±0.15s compared to the average level of the whole group. By comparison of the level of running speed of the defenders, one defender achieved significantly low level (6.99s) and another one achieved significantly high level (6.83s) of running speed, in comparison with the average level of running speed of defenders. The special subject analysis of the level of running speed has showed that one midfielder reached significantly low level (6.92s) and another one reached significantly high level (6.50s) of running speed, compared to the average level of running speed of midfielders. The special analysis of the level of running speed has revealed that two forwards had significantly low level (7.03s and 7.10s) and one forward had significantly high level (6.41s) of running speed, compared to the average level of running speed of forwards.

Keywords: *running speed, diagnostics, elite young soccer players*

Introduction

The present professional soccer is characterised mainly by dynamics and constant increase in playing speed. The author Psotta et al. (2006) states that the biggest changes in soccer in last year were especially made in condition figureswhich regard to speed-force assumptions in playing performance. The condition according to Bunc (1999) presents 30-40% of playing performance. We agree with the statement of Reilly (1997), Psotta et al. (2006), Orendurff et al. (2010), who say that soccer is intermittent movement activity which contains very short, usually 1 to 5 seconds continuing intervals of endurance with high to maximum intensity, which alternate with intervals of endurance with lower intensity or inaction continuing from 5 to 10 seconds.

Hipp (2007) declares that in the soccer match we can observe by player around 100 to 150 sprints with different length. The authors Faude, Koch & Meyer (2012) show at the example of professional players that the performance in direct sprint is the most important component in offensive phase of scoring a goal. The most sprints in this activity occur without an opponent and a ball. According to these reasons the authors consider testing of running speed without change of direction as important part of physical readiness of a player. Kollár (2001) writes that average time for ball control by the player in a match is 1.3 – 3.1 minutes. Psotta et al. (2006) declare 1 – 3 minutes. This implies that player moves without a ball next 87 minutes in the match. The most important parts are activities made at high intensity (run at speed more than 15km.h^{-1}) from the point of view of the player in the match. Jovanovic et al. (2011) mention number of meters ran at high intensity as criteria for division of players on elite or lower efficient level. Little & Williams (2005) include the running acceleration, maximal running speed and agility, which exist usually in the match, into movement activities at high intensity. According to Psotta et al. (2006) the active concept of offensive and defensive phase of the game in playing systems is applied more in present soccer. This concept is characterised by involvement of more players in both phases of the game. It means fast switch of groups of players in transition phases from defence to offense and vice versa, movement activity on the large area of the field, which is evident in spatial intersection of players from particular groups and horizontal and vertical circulation of players in offensive phase. Haugen, Tønnessen & Seiler (2012) discovered that Norwegian national soccer players and players of the Norwegian highest league achieved higher performance from the point of view of the acceleration and running speed ($p < 0.05$) than players of 2nd division (difference 1.0-1.4%), 3rd – 5thdivision (difference 3.0-3.8%), junior national team (difference 1.7-2.2%) and junior players (difference 2.8-3.7%).

Considering that this research lasted more years (1995-2010, n = 939, age = 22.1±4.3 years), the authors had the possibility to determine that players in years 2006-2010 were faster about 1-2% in 20m run in comparison with players in years 1995-1999 and 2000-2005. Given studies suggest the fact that in training process of soccer players are stimulations for development of running speed, which is the part of total performance of a soccer player, very necessary. We know that level and development of running speed is genetically determinated and it depends on neuromuscular coordination and representation of fast muscle fibres. The level of running speed is influenced by the right running technique too. In this study we focused on diagnostics and analysis of the level of running speed in 50m by Slovak national under-21 soccer players in time of qualification for European Under-21 Football Championship 2011.

Methods

Characteristics of the group
The observational group consisted of Slovak national under-21 soccer players (n = 20, goalkeepers = 2, defenders = 4, midfielders = 8, forwards = 6), who fought for classification in the UEFA European Under-21 Football Championship 2011 in Denmark in the 7th qualification group together with U21 national teams from Croatia, Serbia, Norway and Cyprus.

Organizing and terms of research
We made this research on October 8th, 2009 in the morning, when we as well as Jančoková (2000)can speak about first daily peak of performance. Diagnostics of the level of running speed took place in Národné tréningové centrum (NTC) in Senec before qualification match with the national team of Cyprus for European Under-21 Football Championshipon October 14th, 2009 in Achnas. Before diagnostics soccer players went through general warm-up (10 minutes) and speed warm-up (10 minutes).

Applied methods
The running speed was measured with the device Fitro Light Gates (FiTRONIC, Bratislava, Slovak Republic) in 50m run from the middle-standing start at the soccer field with natural grass. Measured soccer player posed a starting position on a start line at the beginning of measurement and started to run with the audio signal „Hop" which was at the same time a tripper of measuring in the computer device. He ran with maximal effort 3 to 5m behind the photocell so that the maximum possible speed could be measured during the whole measured distance of 50m.

Within one measurement the soccer players took two trials. We have chosen a better trial to the evaluation. In presented study we have used periphrastic characteristics of descriptive statistics: arithmetic average (x), standard deviation (SD), maximum of measured values (max) and minimum of measured values (min).

We determined the importance of differences in the level of running speed with special subject analysis: a) between individual groups of players according to playing positions – goalkeepers, defenders, midfielders and forwards.The criterion of subject significance was the value of 1 SD from the whole group. When it came to difference minimum about one value of SD in the playing group including the value of SD compared to average level of the whole group, so we considered it as subject significant difference; b) between individual – goalkeeper (defender, midfielder, forward) and goalkeepers (defenders, midfielders, forwards). The criterion of subject significance was the value of 1 SD from goalkeepers (defenders, midfielders, forwards). When it came to difference minimum about one value of SD by the goalkeeper (defender, midfielder, forward) including the value of SD compared to average level of goalkeepers (defenders, midfielders, forwards), so we considered it as subject significant difference. The criterion for evaluation of the performance was achieved time in the distance of 50m. We evaluate the level of running speed in time with the exactness of 0.01s.

Results

In the study we determined and compared the level of running speed by the whole group of soccer players and by the individual groups of soccer players divided according to playing positions (Table 1). The average level of running speed of the whole group of players was 6.80±0.13s. According to results we state the highest average level of running speed by forwards, then by midfielders, by defenders and the lowest average level of running speed was by goalkeepers. We have discovered with special subject analysis, that the level of running speed of goalkeepers was significantly lower in comparison with the average level of running speed of the whole group.

Table 1 The average level of running speed of the whole group of soccer players and individual groups of soccer players according to playing positions in 50 meters run presented by time (s)

Position	Average time in 50m run (s)
Goalkeepers	7.00±0.15s [v]
Defenders	6.90±0.07s
Midfielders	6.75±0.12s
Forwards	6.73±0.28s
Whole group	6.80s
SD whole group	0.13s
Max.level of whole group	6.73±0.28s
Min.level of whole group	7.00±0.15s

[v] – significantly different level of running speed of individual group of soccer players according to playing positions in comparison with the average level of the whole group

According to subject analysis of the individual level of running speed of goalkeepers presented in the Table 2 we state, that we have not noticed significantly different level.

The mentioned result is influenced by the fact that goalkeepers were just two. The average level of running speed of goalkeepers was 7.00±0.15s.

Table 2 The individual and average level of running speed of goalkeepers presented by time (s)

Goalkeeper	Position	Time in
1	Goalkeeper	6.89s
2	Goalkeeper	7.10s
x	Goalkeepers	7.00s
SD	Goalkeepers	0.15s
max	Goalkeepers	6.89s
min	Goalkeepers	7.10s

[v] – significantly different level of running speed of the individual – defender in comparison with the average level of other defenders

We evaluated the level of running speed of defenders presented in Table 3 with special subject analysis. The level of running speed put on the average performance of defenders was 6.90±0.07s. We can state that significantly higher level of running speed in comparison with the average level of running speed of defenders was noticed by defender Nr. 3 with the value of his performance 6.83s. Two defenders (Nr. 4 and 5) have not achieved significantly different level of running speed in comparison with "the norm" which was the average performance of all defenders. The defender Nr. 6 has reached significantly lower level of running speed.

Table 3 The individual and average level of running speed of defenders presented by time (s)

Defender	Position	Time in 50m
3	Defender	6.83s [v]
4	Defender	6.89s
5	Defender	6.89s
6	Defender	6.99s [v]
x	Defenders	6.90s
SD	Defenders	0.07s
max	Defenders	6.83s
min	Defenders	6.99s

[v] – significantly different level of running speed of the individual – defender in comparison with the average level of other defenders

According to special subject analysis of the level of running speed of midfielders presented in Table 4 we state that midfielder Nr. 9 have reached significantly higher level of running speed with his performance 6.50s in comparison with the average level of running speed of all midfielders with the value of 6.75±0.12s. On the other hand the midfielder Nr. 14 has achieved significantly lower level of running speed with his performance with the value of 6.92s. The other midfielders have not reached significantly different level of running speed in comparison with the average level of running speed of all midfielders. It is necessary to mention that midfielders Nr. 11 and 12 have reached limiting values and it will be essential to focus also on the stimulation of their running speed in the training process.

We have found out with the special subject analysis by the forward Nr. 17 significantly higher level of running speed in his performance with the value of 6.41 in comparison with the average level of running speed of all forwards 6.73±0.28s. Per contra forwards Nr. 18 and 20 have achieved significantly lower level of running speed.

Table 4 The individual and average level of running speed of midfielders presented by time (s)

Midfielder	Position	Time in 50m
7	Midfielder	6.77s
8	Midfielder	6.70s
9	Midfielder	6.50s [v]
10	Midfielder	6.76s
11	Midfielder	6.81s
12	Midfielder	6.84s
13	Midfielder	6.73s
14	Midfielder	6.92s [v]
x	Midfielders	6.75s
SD	Midfielders	0.12s
max	Midfielders	6.50s
min	Midfielders	6.92s

[v] – significantly different level of running speed of the individual – midfielder in comparison with the average level of other midfielders

The other forwards have not reached significantly different level of running speed compared to the average level of running speed of the whole group of forwards.

Table 5 The individual and average level of running speed of forwards presented by time (s)

Forward	Position	Time in
15	Forward	6.73s
16	Forward	6.55s
17	Forward	6.41s [v]
18	Forward	7.03s [v]
19	Forward	6.54s
20	Forward	7.10s [v]
x	Forwards	6.73s
SD	Forwards	0.28s
max	Forwards	6.41s
min	Forwards	7.10s

[v] – significantly different level of running speed of the individual – forward in comparison with the average level of other forwards

Discussion

We agree with statements of Psotta et al. (2006) that objective diagnostics of training of players is based on model endurance and the individual must be able to handle it.The model endurance in compliance with authors hides difficulties joined with the interpretation of achieved results, so the basic assumption of successful diagnostics is to make clear the intentions of diagnostics and adequate selection of diagnostical methods. In our study we have used the device Fitro Light Gates (FiTRONIC, Bratislava, Slovak Republic) for the diagnostics of running speed. We tested 50m run from middle-standing start on an audible signal.

We have intentionally included, together with start on audible signal, the reaction speed to final level of running speed of tested soccer players, what comes with game demands. On the other side it is necessary to mention that majority of impulses in the game have a visual character. In spite of high demands from the point of view of speed abilities during the match dividing at accelerating, decelerating and maximal speed and agility, it is necessary to perceive these components integrated. Fast come-backs into defence, sprint tendencies behind the defence line, offensive backup of outside players (mostly defenders) and fast "switching" from defence to offense (or vice versa) have a complementary character from the point of view of speed pres up positions of players. We have not determined any significant differences of players in the field in the comparison of groups according to playing positions. Rampinini, Sassi & Impellizzeri (2003) did not determine significant differences between the groups of defenders, midfielders, forwards and goalkeepers at professional or amateur level (n = 78, age = 21.0±4.9 years) from the point of view of running speed in 30m.

Taşkin (2008) came to the same result by professional soccer players (n = 243), who did not determine significant differences between groups of players according to playing positions in 30m sprint. In our study we have noticed significant lower level of running speed only by goalkeepers compared to the average level of players of the whole group. The position of goalkeepers is specific regarding the demands of the game and it does not require the level of running speed of other players in the field, so we do not consider mentioned results as negative. Pivovarniček et al. (2011a) determined by soccer players, who were tested in presented study, the equal level of accelerating speed in 10m, only goalkeepers achieved significantly lower level. As well as in studies of Pupiš et al. (2011) and Pivovarniček et al. (2011b) were discovered equal levels of special endurance of players in the field. There was determined significantly lower level by goalkeepers only.

From the point of view of comparison of motion performance by individual players at different playing positions, forwards have achieved the best time (6.73±0.28s), although it was not significantly better than time of the whole group (6.80±0.13s). This result corresponds with finding of authors Sporiš et al. (2011) who present the best results by forwards. The reason can be their adaptability on offensive and impulsive activities for short and long distance (e.g. place selection, pressing, re-pressing) during the match with sufficient recovery by come-back to defence position. High level of running speed of midfielders in the whole group can be indicated by demands of the game especially by outside midfielders who should fulfil the demands of fast rotation of game situations in a defensive and offensive phase and vice versa at long direct sprints on outside vertical lines of the field.

From the individual point of view we have found out in the analysis of the level of running speed of defenders that one defender has achieved significantly higher and another one significantly lower level in comparison with the average level of running speed of all defenders. At the comparison of the level of running speed of midfielders we have discovered that one midfielder has reached significantly lower level of running speed and another one significantly higher level of running speed compared to the average level of running speed of all midfielders.

When we compared the level of running speed of forwards, we could see that one forward has achieved significantly higher and two forwards have reached significantly lower level of running speed compared to the average level of running speed of all forwards. We have found out by two midfielders that their level of running speed was at the limiting level and their results were slightly different as significantly low level of running speed. Soccer players who achieve significantly higher and appropriate level of running speed should keep this level. Soccer players who reach significantly lower level of running speed should stimulate movement presuppositions of running speed in the training process and beyond it too. We agree with statements of Reilly, Bangsbo & Franks (2000) that soccer players do not have to dispose with extraordinary performance in any field of physical performance but they have to have appropriate high level in all fields. The authors Bunc & Psotta (2001) mention that physiological presuppositions and norms represent necessary reasons for success at the professional level. We notice together with interpretation of results that if we defined the determination of subject significance with other criteria as was the value of one decisive divergence, so the results would be interpreted differently.

Presented study introduces partial part of complex diagnostics of movement abilities of tested soccer players. Other movement abilities were also diagnosed but they are not the matter of presented study. Knowing of anthropometric indicators and the level of movement abilities of individuals made it possible not only to reveal and eliminate found defects in the training process but it allowed us to specify tactical variants against individual rivals together with preparing for qualification matches in European Football Championship. It is also necessary to mention the limits of carried research. The matter of study was direct running speed in 50m. It is necessary to notice that the performance in direct sprint is only certain precondition because playing performance of a soccer player is influenced by variability of game conditions and actual game demands. The specific movement ability becomes evident with changes of frequency, changes in length of step and also changes in running direction because the player is forced to regulate constantly its direct movement on the ground of perception of external conditions.

It is cooperation with teammates for example, perception of opponents and realising of running sprint with a ball. As well as by realizing of shooting the player is forced to adjust the sprint technique before shooting. All these reasons can be necessary for creating of specific field test in the future which will be valid for accelerating speed and will compare with the test we present in this study. The unrepeated testing is certain limitation too and it is joined with limitation in reliability. The unrepeated measurement can be influenced by external conditions but also actual internal disposals of tested individual. On one hand the diagnostics of movement abilities can be a decisive index of the level of an individual, especially limiting movement abilities can be decisive for coaches and realization teams in football. On the other hand an excellent level of movement abilities do not mean automatical transfer into individual playing performance of a player and thereby also playing performance of a team. The insufficient level of movement abilities limits the playing performance of a player at the professional level where details decide the matches. This study is evidence that even young soccer players of national team are not the exception and there are significant individual differences in the whole group from the point of view of the level of movement abilities. The study can be an inspiration for condition and athletic coaches of football teams in order to reveal and eliminate weak aspects of their young players, especially in condition trainings in preparatory seasons and individual trainings according to actual results of diagnostics during entire annual training cycle. Given data can serve as certain norm or standard of elite young soccer players from the point of view of the level of running speed. The results of study can be a valuable material for scientists, but for experts and persons interested in soccer too.

Conclusion

The results of special subject analysis have showed that soccer players in the Slovak national under-21 soccer team have almost equal performance within running speed in comparison with all groups which were divided according to playing positions. The exception is the group of goalkeepers who had significantly lower performance in comparison with the average performance of the whole group of soccer players. From the individual point of view, we have discovered that 3 soccer players (1 defender, 1 midfielder and 1 forward) achieved significantly lower lever of running speed compared to other groups, which were divided according to playing positions. We have found out that 4 soccer players (1 defender, 1 midfielderand 2forwards) had significantly lower level of running speed in comparison with individual groups, which were divided according to playing positions. According to our subject analysis, other soccer players from all groups of different playing positions haven´t reached significantly different level of running speed. On the other hand, we have found out that two midfielders have a tendency to lower level of running speed because their performance at the diagnostics has achieved limiting figures.

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RAZINA BRZINE TRČANJA ELITNIH MLADIH NOGOMETAŠA RAZLIČITIH POZICIJA U MOMČADI

Sažetak

Cilj ovog istraživanja bio je analiza razine brzine trčanja na 50 m nogometaša slovačkog reprezentativnog sastava U-21 (n = 20, golmana = 2, igrači obrane = 4, igrači sredine = 8, napadači = 6) u razdoblju kvalifikacija za UEFA Prevenstvo Europe za U-21 2011 godine. Razina brzine trčanja dijagnosticirana je uz pomoć uređaja Fitro Light Gates (FiTRONIC, Bratislava, Slovačka). Kriterij uspješnosti izvođenja bilo je postignuto vrijeme na udaljenosti od 50 m s točnošću od 0.01 sekunde. Razlike u razini brzine trčanja su prepoznate i definirane subjektivnom analizom. Razina brzine trčanja za cijelu grupu iskazana je sa 6.80±0.13s. Razina brzine trčanja za igrače obrane iskazana je sa 6.90±0.07s, igrače sredine sa 6.75±0.12s i napadače sa 6.73±0.28s, što je odgovarajuće i usklađeno s rezultatima cijele grupe. Očito niska razina brzine trčanja je zabilježena kod golmana iskazana s prosječnom vrijednossću od 7.00±0.15s u usporedbi s prosjekom cijele grupe. Također, kod igrača obrane, jedan od njih je iskazao znakovito slab rezultat (6.99s) a drugi izrazito dobar rezultat (6.83s) u odnosu na grupu igrača obrane. Takva posebna subjektivna analiza razine brzine trčanja pokazala je da je jedan igrač sredine bio izrazito loš (6.92s) a drugi iznimno dobar (6.52s) u odnosu na grupu igrača sredine. Kod napadača dvojica sui mala znakovito slab rezultat (7.03s i 7.10s) a jedna je ima znakovito dobar rezultat (6.41s) u odnosu na sve napadače.

Ključne riječi: *brzina trčanja, dijagnostika, elitni mladi nogometaši*

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