Level of speed abilities of young football players in various training periods

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Abstract

Purpose: At the highest level of the competition, the players tend to have a comprehensive motor, technical-tactical and mental preparation. It is assumed that in the training process of young players, speed is an important factor determining sports success. Therefore, the aim of the study was to try to compare the speed abilities indicator of young footballers during the summer and winter preparatory period.

Material and methods: The research was conducted in July 2019 and January 2020 in Poznań. The research subject consisted of 23 young players of the Warta Poznań club in the age category of the junior football players (U14).

Results: The results were statistically processed, basic descriptive characteristics were made, the normality of the distribution of differences was checked using the Shapiro-Wilk test, and the collected results from two tests dates were compared using the Student’s t-test for dependent samples. Based on the the conducted research, no significant change in the starting speed level was observed at the distance of 5 meters and 15 meters, while an improvement in the level of speed abilities in terms of locomotion at the distance of 30 meters was noted.

Conclusions. The level of running speed at a distance of 30 meters in the tested competitors changed in the six-month preparation cycle. There was no change in the starting speed level over the distance of 5 and 15 meters in the competition season between the preparatory period and the end of the autumn round in the competitors of the Poznań Warta club. On the basis of the conducted research, it is worth conducting experimental research based on individualized speed training on a group of 13 - 14 year old players.

Key words: training load, individualization, speed, football
Аннотация

Калиновский П., Ершинский Д., Новаковская М. Уровень скоростных способностей юных футболистов в разные периоды подготовки.

Цель: на высшем уровне соревнований игроки имеют тенденцию к всесторонней моторной, технико-тактической и психологической подготовке. Предполагается, что в тренировочном процессе юных футболистов скорость является важным фактором, определяющим спортивные успехи. Поэтому целью исследования было попытаться сравнить показатель скоростных способностей юных футболистов в летний и зимний подготовительный периоды.

Материал и методы: Исследование проводилось в июле 2019 г. и январе 2020 г. в Познани. Объектом исследования выступили 23 юных игрока клуба «Варта Познань» в возрастной категории юных футболистов (до 14 лет).

Результаты: результаты были статистически обработаны, составлены основные описательные характеристики, нормальность распределения различий проверена с помощью критерия Шапиро-Уилка, а полученные результаты по двум датам тестирования сравниваются с использованием t-критерия Стьюдента для зависимых выборок. По результатам проведенного исследования, существенного изменения уровня стартовой скорости на дистанции 5 и 15 метров не наблюдалось, а на дистанции 30 метров отмечено улучшение уровня скоростных способностей в части передвижения.

Выводы. Уровень скорости бега на дистанции 30 метров у тестируемых спортсменов изменился в шестимесячном цикле подготовки. Уровень стартовой скорости на дистанции 5 и 15 метров в сезоне соревнований между подготовительным периодом и концом осеннего тура у участников клуба «Варта Познань» не изменился. На основании проведенного исследования целесообразно провести экспериментальное исследование на основе индивидуализированной скоростной тренировки в группе игроков 13-14 лет.

Ключевые слова: тренировочная нагрузка, индивидуализация, скорость, футбол.
Introduction

The popularity of football in the world today is unquestionable [1-2]. The constant development of the discipline leads to looking for new solutions and increases the importance of comprehensive preparation of players [3]. Nowadays, there is no place for focusing on selected elements of the material structure. It should be noted that only comprehensive motor, technical-tactical and psychological preparation is a predictor for achieving high sports results [2]. Increasing requirements, changing conditions or other factors occurring during the game, direct the attention of sports practitioners and theorists to monitoring the players' work using modern technologies [4]. In addition to technical activities in specific systems, modern methods allow to determine energy expenditure, distances covered or determine the intensity of the players' efforts [5].

While earlier scientific reports informed about the volume of effort through the covered distance, which ranged from 10-13 km [6-7], nowadays it can be assumed that this information is insufficient. The specificity of the players' movement on the pitch is intertwined with low and high intensity running, taking into account a large number of jerks, starts, accelerations, brakes, jumps, turns, running on various sections, sudden changes of direction and performing motor tasks with the ball at the leg. Therefore, the intensity of movement seems to be important. Some authors consider high-intensity running values above 4 m·s⁻¹ [8-9], while other authors take values above 5 m·s⁻¹ [10-11]. In studies it is estimated that the ratio of low-intensity tasks to high-intensity tasks is 7: 1 or 5: 2 [5, 12]. Another important criterion for training footballers is the number of sprints, which, according to Di Salvo et al. [13], ranges from 3 to 40. Another criterion highlights the importance of speed requirements in modern football. Obviously, without proper aerobic preparation [14] and training of organisms, the maximum possibilities of anaerobic efforts are not possible. It is worth noting that speed plays a very important role in modern football [15].

According to this, it is worth considering when speed abilities can be shaped. When are there sensitive periods in human ontogenesis, during which there is an increase in the dynamics of the natural development of speed abilities? Osiński [16] indicates the second phase of acquiring new movements at the age of 12-13 by boys. During this period, the author indicates the ability to concentrate on a given activity and the willingness to undertake additional work on oneself. It should be emphasized here that motor skills do not develop simultaneously, they are characterized by high variability depending on age or experience [17]. In practice, there are various methods used to increase the speed level. Numerous authors point to the legitimacy of using resistance or isolated training [15, 18].

The influence of functional loads on the ability to speed was demonstrated in of e.g. Haycraft et al. [19] in the study on players of the Australian league in the U14 and U16 category and Köklüa et al. [20] in the study on players training in Turkey in a selected U16 team. In the study on Tunisian athletes conducted by Chaalali et al. [21], a positive effect of functional training on the improvement of speed abilities results based on the 5-0-5 test [22] was presented in a 6-week program aimed at changing direction and acceleration. All of these methods demonstrate the need for speed training. In response to numerous publications, it was decided to perform a diagnostic evaluation over the course of a 6-month macrocycle in the group of competitors without the use of additional classes aimed at additional speed training. Hence, the aim of the work is to try to compare the running and starting speed indicator at the beginning of the preparatory period of the 2019/2020 season and after the end of the autumn round of league games, at the beginning of the winter preparatory period of young players of the Poznań club.

Materials and Methods

The research was conducted in July 2019 and in January 2020 in Poznań. The research group consisted of 23 players of Warta Poznań U14 in the junior footballers category, playing at the highest league level. The team took first place in the 2019/2020 season. Warta Poznań club is a two-time Polish Champion. In the annual preparation cycle, the team was in the starting period with 5 training units in a microcycle and a championship match. Parents
and trainers consent was obtained for the research. The players were subjected to tests aimed at assessing the level of motion speed on the distance of 5 m, 15 m and 30 m from a high start with a slope of 0.5 m [23]. Measurements were made using Microgate Witty photocells. The tested player covered the distance twice, and the better result was used for analysis. The obtained results were statistically processed in the Statistica 13.3 program, the mean (X), minimum (min) and maximum (max) values, standard deviations (SD), normality of the distribution of differences were determined using the Shapiro-Wilk test, and the collected results from two tests were compared using t - Student test for dependent samples.

**Results**

While measuring the starting speed at a distance of 5 meters, the average result was 1.04 seconds in the 1st test period, while after 6 months in the 2nd test period, the average result was 1.02 seconds. On the basis of the conducted research, no statistically significant differences were observed in the level of starting speed at a distance of 5 meters in the tests carried out in the six months training cycle (Table 1).

<table>
<thead>
<tr>
<th>Variable</th>
<th>t – Student test for dependent samples; Warta Poznań club; 5 meters p &lt; 0,05</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>Stand. Dev.</td>
</tr>
<tr>
<td>Test I</td>
<td>1.04</td>
</tr>
<tr>
<td>Test II</td>
<td>1.02</td>
</tr>
</tbody>
</table>

Based on the speed test at a distance of 15 meters, the average result in the 1-st test was 2.61 seconds, while after 6 months in the 2-nd test, the average result was 2.58 seconds. On the basis of the conducted research, no statistically significant differences were observed in the level of speed at a distance of 15 meters in the tests carried out in the six-month training cycle (Table 2).

<table>
<thead>
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<th>Variable</th>
<th>t – Student test for dependent samples; Warta Poznań club, 15 meters, p &lt; 0,05</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>Stand. Dev.</td>
</tr>
<tr>
<td>Test I</td>
<td>2.61</td>
</tr>
<tr>
<td>Test II</td>
<td>2.58</td>
</tr>
</tbody>
</table>

Based on the speed test at a distance of 30 meters, the average result was 4.85 seconds in the 1st test, while after 6 months in the 2nd test, the average result was 4.72 seconds. On the basis of the conducted research, an improvement in the level of speed was noted at a distance of 30 meters in the tests carried out over a six months training cycle (Table 3).
Table 3

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Stand. Dev.</th>
<th>N</th>
<th>Difference</th>
<th>St.dev. Difference</th>
<th>t</th>
<th>df</th>
<th>p</th>
<th>Confidence -95,000%</th>
<th>Confidence +95,000%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test I</td>
<td>4,85</td>
<td>0,23</td>
<td>23</td>
<td>-0,13</td>
<td>-</td>
<td>0,13</td>
<td>22</td>
<td>0,000</td>
<td>-0,19</td>
<td>-0,07</td>
</tr>
<tr>
<td>Test II</td>
<td>4,72</td>
<td>0,24</td>
<td>23</td>
<td>-0,13</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Discussion

The latest scientific reports support the claims about the significant influence of speed on the actions taken on the pitch by players [12]. It is worth emphasizing the importance of the number of sprints performed during the entire meeting. These dependencies highlight the function of motor skills in football. Ekblom [24] noticed that it is the covered distance but the maximum speed of the covered distance that differentiates the players in certain levels. It can be assumed that speed will determine the final success [25]. Nevertheless, it is worth noting that it will depend on the level of the game. As the research of Kalinowski et al. [26] shows on a group of 83 players from Berlin clubs, at the regional level, they observed that speed was not related to efficiency. In this study, the players of a club aspiring to the highest league were tested.

Hence, it can be assumed that with a similar, very high level of skills, speed will be important for high sports results. There are many experimental studies informing about the advantages of using additional speed training [17]. In numerous studies, the authors indicate the advantages of using individualization. In own research on young players of Warta Poznań club, attempts were made to determine changes resulting from natural development during sensitive periods. The speed level only improved for the distance of 30 meters. It can be assumed that at this age it is the only distance that can be improved in training. Similar observations were demonstrated by Chmura et al. [27], who noted an improvement in speed thanks to training 30 and 40 meter distances. In his research, the author shows that the ball training used is more beneficial and increases the level of motor coordination skills in cooperation with a partner.

Hence, it can be assumed that the 6-month training period of young Warta Poznań players had a positive effect on the improvement of the speed level at the distance of 30 meters. In the future, It would be worth checking the changes using the experimental method by introducing elements of speed training. The research by Andrzejewski et al. [17] emphasized the great importance of individualization of training for speed training. In his work, the author divided the players according to the endurance and speed type. This is another confirmation of the individualized view on speed training, which confirms the validity of extending the research in the future.

Andrzejewski et al. [17] noted an increase in the speed level in the same period of 6-month tests, both in speed and endurance athletes. In own research on young players of the Poznań team, it was shown that in different starting periods in the 6-month cycle, the starting speed level at 5 meters and 15 meters did not differ from each other, while the speed level at a distance of 30 meters was improved. The competitors, in line with the assumptions of the training program, obtained better results after the autumn round, compared to the measurements from the preparatory summer period in one trial. Nevertheless, it is worth verifying whether in the same training period, after the introduction of the element of speed training, there would be a favorable change in the level at a distance of 5 and 15 meters? Based on the collected data, it can be concluded that the results obtained by the players in the 5-meter starting speed test compared to the research of 124 players aged 13 years participating in the Polisch Soccer Skills program, whose average level was 1.17 seconds, are high and they can predispose the players of Warta Poznań to play at the highest level in the senior categories. The comparison of the results is similar compared to the amateur team of KS...
A similar tendency was also found when comparing the results at 15 and 30 meters. Analyzing the results of the starting speed at 5 mmore precisely, we observe the average time of 1.02 seconds, which is a high level result, which only confirms that the competitors have high speed abilities. The results of own research and that of numerous authors confirm the validity of the use of systematic diagnostic tests in various training periods. Thanks to the results, it is possible to plan work in the annual training cycle more precisely, taking into account the sensitive periods which is so important for children. Nowadays, an average distance that players run during the match is about twice as long as it was in the 1950s, where a player ran about 5 km during the match [29] with increasing intensity. In the research of Kalinowski and Andrzejewski [30] on the players of Borussia Dortmund, the number of runs with high intensity was at the level of 47.68 per match [30]. The results of own research and the results of professional players are identical to the research of the outstanding physiologist Chmura [25], who claimed that a footballer "is a few centimeters closer to the ball, a few milliseconds faster than the opponent on the ball, he can score the decisive goal or stop the opponent from scoring one".

Based on the collected material, it can be assumed that effective diagnostics with the use of modern sports equipment in youth football is conducive to the optimization of sports training. This shows how dynamic changes football are. Motor skills play an important role not only during the recruitment of young footballers, but first of all in senior football at the highest level, which shows the need for proper diagnostics at all stages of training.

**Conclusions**

1. The level of running speed at a distance of 30 meters in the tested competitors changed in the six-month preparation cycle.
2. There was no change in the starting speed level over the distance of 5 and 15 meters in the competition season between the preparatory period and the end of the autumn round in the competitors of the Poznań Warta club.
3. On the basis of the conducted research, it is worth conducting experimental research based on individualized speed training on a group of 13 - 14 year old players.

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**Conflicts of interest**

The authors certify that there was no conflict of interest with any financial organization regarding the material discussed in this study.

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