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THE EVALUATION OF SPECIFIC PHYSICAL PREPARATION FOR U-14 AGE GROUP TENNIS PLAYERS

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Abstract. During the last quarter of a century, tennis players have become faster and stronger, the way of the game has changed accordingly. Being successful in tennis and achieving high results in national and international competitions, it's requires a high level of specific physical preparation. During the specific physical preparation training process is necessary to increase and evaluate the physical qualities of tennis players in preparation, competition, and transition period. In this article, with the method of literature and document analysis, were selected control exercises and tests, which can be used to evaluate the specific physical preparation dynamics of U14 age group tennis players.

Keywords: tennis; tennis training process; tennis specific physical preparation; evaluation

INTRODUCTION

The training process is a pedagogical process aimed at developing people's physical and mental qualities, tactical and technical skills, acquiring theoretical knowledge to achieve the high result in a sport. The training process is carried out in accordance with specific goals and tasks, the coach develops a training plan based on the groups or players sensitive age period, physical preparation, and training process periodization. The training process of tennis includes general and specific, technical, tactical, and psychological preparation. The general physical training process is aimed of a general, harmonious development of a person and health strengthening, general conditioning as the basic for developing specific physical training. The specific physical preparation training process is aimed to increase the physical qualities for tennis to achieve high results in national and international competitions. Also, each age has its own characteristics, which must be taken into account when implementing the training process. The players of the U14 group go through puberty at this age, when the body undergoes changes. At this age, it's important to improve and evaluate the physical qualities, that are most important to tennis players. The special physical training process involves a gradual increase in training and competitions, solving tasks related to strengthening the health, developing special physical qualities, learning complex technical activities, instilling an interest in competing in tennis.

During the last quarter of a century, tennis players have become faster and stronger, the way of the game has changed accordingly (International Tennis Federation, 2019). Tennis players need a high level of physical preparation to endure a tough and sometimes exhausting game. A tennis player needs physical qualities such as endurance, speed, agility, strength, power, and flexibility. Tennis requires high endurance; the game is unpredictable and can last up to 4 hours. Tennis players need a high level of aerobic conditioning to avoid fatigue, aerobic conditioning can determine their ability to withstand high intensity loads during a match and can influence a player's technical and tactical performance, allowing them to make better decisions when fatigued (Genevois, 2019). Speed is necessary in game situations when the player executes a shot and quickly changes direction or, conversely, reduces speed to create optimal contact with the ball (ITF, Fitness training, 2019). During a tennis game, it's important to navigate in space, execute shots from different positions, move quickly on the court. Also, during the game, tennis players are required to: run, stop, turn, jump, slide, hit in different directions of movement (International Tennis Federation, 2019). Dexterity manifests itself in the ability to quickly reduce running speed, maximally accelerate in the opposite direction and change running direction. A tennis player must make shots at different points of the court, decide in time, and take the necessary starting position before executing the shot (Genevois, 2019). Body strength it's very important for tennis players. Arm strength is important for any sport that involves catching, throwing, or holding an object (Badminton Australia, 2008). A tennis player must perform shots at different heights, sometimes even in a semi-squat, this requires the strength of the leg muscles. Arm strength is needed to execute a strong shot or serve, which requires a firm grip on the racket. Tennis is an asymmetric sport, to prevent possible muscle imbalances and reduce the risk of injuries in time, the specific physical training process should include strength exercises aimed at developing the strength endurance of the muscles of the legs, back, abdomen, chest, and arms (Roetert, 2015). Strength training increases the expression of muscle strength and power, as well as the level of muscle endurance. The game of tennis has evolved into a fast-paced game based on endurance and power (Fernandez-Fernandez, Ulbricht, Ferrauti, 2014). Tennis players must be able to use power effectively, execute fast, powerful shots and serves (International Tennis Federation, 2019). Flexibility is the ability to perform movements with the necessary amplitude, it's lack limits the range of movements in the joint, speed, accuracy, causes muscle tension. Poor flexibility is one of the main causes of injuries not only in tennis. Flexibility exercises should be included in the comprehensive and specific training process for tennis, because with age, flexibility begins to decrease in all people.

The International Tennis Federation emphasizes that well planned specific physical training has become the main success factor in tennis (International Tennis Federation, 2019). In the training process, it's important for the coach to be

able to first determine the suitability of the exercises and recognize the shortcomings, then develop an appropriate training plan for increasing physical conditioning (International Tennis Federation, 2019). The training plan for the year is divided into three periods: preparation, competition, and transition period, so that the coach can make conclusions about what has been done in each period and determine the aims of tennis player specific physical preparation, as well as control exercises and tests should be included in each period. The latest research emphasize that it's important to adapt the type of periodization during the tour according to the needs of each player, as well as to establish physical routines that will allow them to reach their optimal physical, mental and tennis condition (Garcia, 2022).

Tennis coaches must regularly obtain data of the tennis player's specific physical preparation. The regularly obtained information about players specific physical preparation will allow the coach to evaluate the strengths and weaknesses, to adjust the training plan in time, to implement the specific physical training process more effectively, so to achieve higher results in tennis. The International Tennis Federation states that regular control exercises and tests provide feedback on the effectiveness of the training plan and allow the coach to monitor tennis players' progress (International Tennis Federation, 2019). Tennis coach need a simple, clear to understand and easy to perform control exercises and tests to objectively evaluate tennis players specific physical preparation.

The aim: to develop a set of control exercises and tests to evaluate the specific physical preparation dynamic for tennis players of the U14 age group, during the tennis preparation training period.

Research object: tennis specific physical preparation process.

THE RESEARCH METHOD

To develop a set of control exercises and tests to evaluate specific physical preparation dynamics for tennis players of the U14 age group, were applied methods such as the analysis of literature, sources, scientific research, The National Tennis Federation, and other sports documents. Selected control exercises and tests can be performed on the tennis court, in the gym, in the stadium or at home, with the main advantage that they can be performed both face to face and remotely.

CONTROL EXERCISES AND TESTS TO EVALUATE THE SPECIFIC PHYSICAL PREPARATION

1) 20-meter run test (Beep test)

The 20-meter shuttle "Beep test" is a popular fitness test to evaluate an athlete's endurance (Badminton Australia, 2008). The test is especially useful for tennis players because the movements are similar to tennis, such as stopping and changing direction of movement (International Tennis Federation, 2019). Consisting of 20-meter shuttle runs (see Fig. 1) performed at increasing speeds until exhaustion, the test has become a standard test, a regular part of testing by various National Tennis Federations (Fernandez-Fernandez, Ulbricht, Ferrauti, 2014). The test can be performed for the entire training group at the same time, as a result dividing the athletes into many levels of physical preparation, providing the coach with a real, quantitative assessment of individual and team physical preparation (Beep test, 2006). Recommended to perform the test using the "Beep test" mobile application, which can be used to simultaneously determine the distance, time, and participants endurance level. The test involves continuous running between two cones located 20 meters apart until the recorded beeps, the "Beep test" mobile application emits one beep at regular intervals, after the beep the test participants must be at the cone, until the next beep. After each minute, the time interval between the signal decreases, so the test participant must increase his running speed. Test can be performed in tennis court, in stadium and backyard.

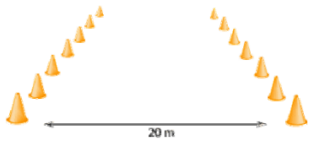

Figure 1. **20 meter run test (Beep test)**.

2) The spider test

Tennis requires players to repeatedly generate powerful strokes and rapid movements on the court for a long period of time; therefore, to meet and endure these challenging physiological conditions, modern-day players need a mixture of physical qualities such as speed, agility, and power combined with well-developed aerobic fitness (Durmus, Odemis, Sogut, 2022). A shuttle run with balls is called the "Spider test" (Сергиенко, 2013). During the test, it's necessary to accelerate and quickly return to the starting position. During the test, the tennis balls must be moved from point A, B, C, D, E to the middle point of the end line as quickly as possible (United States Tennis Association, 2005). The test participant is allowed three attempts, the best time is recorded in seconds (Amirul Bin Zaini, Pawa Pitil, 2017). For test, tennis coach have to draw a rectangle 8.23 metres long and 5.49 metres wide, place the balls on point A, B, C, D, E and draw a rectangle 45 centimetres long and 30 centimetres wide behind the end line (Fig. 2). The test can be performed in tennis court or on the sports field.

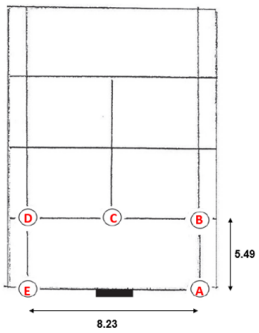

Figure 2. **Spider run test**.

3) Hexagon test

The hexagon test is a measure of agility and balance (Beekhuizen, Davis, Kolber, Cheng, 2009). Agility is the ability to quickly change direction, to react quickly, to adapt to the changing conditions of the tennis game. Tennis players demonstrate dexterity when they perform several shots in the shortest possible time or adapt to specific game conditions (International Tennis Federation, 2019). The test participant performs continuous jumps with both legs in a counterclockwise direction outside the hexagon line (Fig. 3). During the test, it is necessary to quickly change direction and stop, as well as maintain balance dynamically and statically. For the test, tennis coach have to draw a hexagon on the floor, all sides are 60.5 centimetres long, each corner must have an angle of 120 degrees. The test taker stands in the middle of the hexagon, looking towards line A. After the command, the timer is started and the test participant performs a jump with both feet over line A and back to the middle of the hexagon, then over line B and back to the middle of the hexagon, then over line C and back to the middle of the hexagon, etc. If the attempt is unsuccessful, the test must be restarted. The test participant must complete three laps, as quickly as possible, after three laps the time is stopped, and the result is recorded after three attempts.

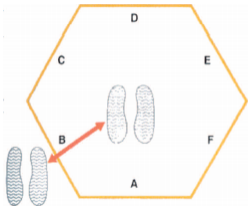

Figure 3. **Hexagon test**.

4) Forearm grip strength determination test (dynamometry)

Tennis players who have the strength of hand grip and arm length in servicing in playing tennis will be better prepared and easier to do service accuracy (Mangolo, Makadada, 2020). To evaluate the strength of the muscles of the right and left hand, a hand dynamometer is needed (Fig. 4). The dynamometry method is necessary to measure the strength of tennis players arm muscles. Determination of static hand grip strength with a hand dynamometer is also included in the popular Eurofit fitness test. The dynamometry test can be performed supervision physician or experienced person to make sure test is performed similar with both hands. The non-dominant hand usually scores less than 10% (Badminton Australia, 2008).

Figure 4. **Hand dynamometer**.

5) Control exercise for bending and straightening the arms (Push-up test)

Push-up test allows to evaluate the strength of the arm and chest muscles (ITF, Fitness testing, 2019, p. 7). The purpose of the control exercise is to assess upper body muscle strength (Mackienze, 2005). The control exercise develops the power endurance of the shoulder and chest muscles, as a result, increases the speed of the shot during the game. The test participant is given 60 seconds to complete as many repetitions as possible (Fig. 5). It's important to have the correct exercise technique when performing the push-up test. The test can be performed on a tennis court, gym, or sports field.

Figure 5. **Push-up test**.

6) Vertical jump test

Plyometric training has been shown to be an important stimulus for improving explosive actions in junior tennis players (Durmus, Odemis, Sogut, 2022). Including plyometric exercises in the training process is one of the best ways to train power (Crespo, Miley, 1998). Jumps from a place, height, distance allow to evaluate the speed of leg muscles. Power development is determined by horizontal or vertical jumps. Various jumps with maximal effort develop power by strengthening the strength of the leg, back and abdominal muscles. The test involves jumping from a standing position with arm strokes from a half-squat. The test allows to evaluate the power of the lower body (International Tennis Federation, 2019) (Fig. 6).

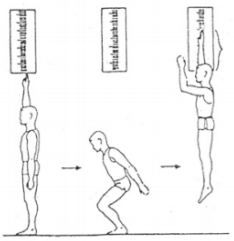

Figure 6. **Vertical jump test**.

7) Control exercise for determining the power of the upper body with a medicine ball - imitation of a forehand and backhand stroke

Exercises that simulate the real game will help obtain the most appropriate conditions to observe, evaluate, and train hitting stability at impact. This is due to the fact that since each decision on how much power to hit the ball and body position will be unique and differ from shot to shot (Lopez, 2020). Power development is determined by throw control exercises (Ski and snowboard Australia, 2015). Throwing or pushing exercises with balls are used to develop upper body power. Control exercises with medicine ball develop upper body muscle power, when performing a stroke from a standing position, the upper body performs a rotation, this movement is similar to a tennis stroke. Tennis coach can assess the technical execution of exercises, the speed of execution and compare the dominant and non-dominant side of the upper body. The test can be performed with a tennis player on a tennis court, gym, or sports field.

8) Flexibility test – sit and stretch

If the arms and wrists are not strong or flexible, the power produced throughout the lower body and core will not efficiently transition into the ball (Roetert, Kovacs, 2011). Tennis players should place on flexibility development during training, as flexibility enhances muscle strength and movement range (Xiao, Geok, Bai, Bu, Wazir, Talib, Liu, Zhan, 2022). The test is designed to assess the flexibility of the legs and lower back muscles (Ski and snowboard Australia, 2015). It's possible to evaluate the flexibility with classic stretching exercises, one of which is to bend forward or down while sitting or standing (Fig. 7). During the test, the tennis player must reach forward and move the fingers forward as far as possible, hold for two seconds and return to the starting position. The test participant repeats the test three times, the tennis coach records the best result. If the player is unable to reach the toes, the distance is expressed as a negative result. During the tennis game, tennis player has to reach the balls from different positions, it's also possible to reach forward with the racket and execute a shot, for a tennis player whose muscles are flexible, there are practically no unreachable balls.

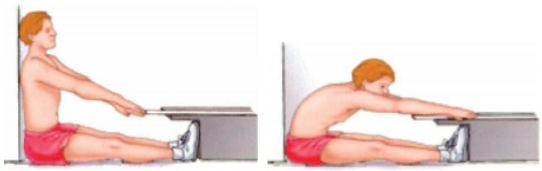

Figure 7. **Flexibility test - sit and stretch**.

CONCLUSIONS

It's important for the tennis players of the U14 group to improve and evaluate the physical qualities - endurance, speed, agility, strength, power, and flexibility that are important to tennis players. The aim of the study has been achieved, has been developed a set of control exercises and tests to evaluate the specific physical preparation dynamic for tennis players of the U14 age group, during the tennis preparation training period. Control exercises and tests provide regular feedback on the training process and allow the tennis coach to monitor the tennis player's progress.

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