International Journal of Psychosocial Rehabilitation, Vol. 24, Issue 09, 2020
ISSN: 1475-7192

The Effect of 6-weeks of Practicing Balance Exercises on Developing Agility for Youth Tennis Players

Sura Mahmoud Ali[1], Sama Mahmoud Ali,

Abstract:

Objectives: *the aims of the study were the preparation of balance exercises to develop the agility for young tennis players, and to identify the effect of practicing balance exercise on developing the agility for young tennis players.* ***Design:*** *an experimental design was used.* ***Setting****: Subject was randomly divided into two groups; the control group and the experimental group.* ***Participants:*** *Twenty-four participants were chosen from x Tennis Federation's Players and their mean age 19.86 ± 1.81 years.* ***Measures:*** *Pre- and post-test included: Planned Agility test.* ***Measures:*** *Pre- and post-test included: Planned Agility test.* ***Results:*** *that there was a significant difference between experimental group and control group in agility.* ***Conclusions:*** *The results showed the benefits of balance exercises on developing agility for youth tennis players.*

Keywords*: exercises; practicing; balance; agility; tennis.*

I. INTRODUCTION

Tennis is considered as one of the highly demanding sport. In order to be competitive and successful, a tennis player will need a mixture of agility, speed, and power combined with medium to high aerobic abilities (Fernandez et al., 2009). The tennis game can be defined as a multi-directional, explosive, stop and start activity with a player maintaining dynamic balance and control so he can hit the ball effectively (Pearson, 2006). For Paul and Todd (2007), one of the most important things in becoming a good tennis player is to be in the suitable position to hit the ball. The tennis player is required to change direction, decelerate, stop immediately and start again, jump into the air, land and immediately move off in another direction, all the time maintaining balance and control in order to hit the ball with efficient and effective balance (Pearson, 2006).

The most important elements of tennis are balance and agility. The tennis players have good agility if the players will have not only the best all-round court skills possible with the greatest control and speed, but also the least amount of wasted movement and energy (Pearson, 2006). Balance, on the other hand, is the process of maintaining the position of the tennis player body's centre of gravity vertically over the base of support (Hrysomallis, 2011). It can be broken down into two different categories, static balance and dynamic balance. Static balance is defined as the capacity to maintain a base of support with minimal movement (Patla & Frank, 1990). Dynamic balance is the capability to perform a task during regaining or maintaining a stable position (Paillard & Noe, 2006). To maintain the balance ability 'relies on rapid' continuous feedback from visual, vestibular and somatosensory structures (Hrysomallis, 2011). Somatosensory input supplies information concerning the body parts orientation to another one and to the support

Ph.D, Al Iraqia University, Department of Student Activities, Iraq [1]
Administrative Affairs Office, Al-Esraa University College, Iraq
Lulaperla23@gmail.com

surface (Lephart & Fu, 2000). The vision system measures the eyes and head orientation in relation to surrounding objects. The vestibular system provides information that measure linear, angular, and gravitational accelerations of the head in relation to inertial space (Lephart & Fu, 2000). Repetitive training experiences that influence motor responses can be improved by balance (Balter, et al., 2004). By partaking in balance training it is hoped that the balance of a tennis player will improve and thus reduce the likelihood of injury.

Agility is defined as a player's capability to swiftly accelerate and decelerate and quickly change directions whilst a game. It is uneasy set of interdependent skills that converge for the player to respond to an external stimulus with a rapid deceleration, change of direction, and reacceleration (Tudor et al., 2017). The agility development is often the strength and conditioning coach responsibility. Agility has relationship with cognitive components as visual scanning speed, visual scanning techniques and anticipation. Moreover, it has a good relationship with trainable physical qualities like power, strength and technique (Sheppard & Young, 2006). The tennis player, during a point in a match, can make just one movement or more than 15 directional changes while a very long period (Kovasc, 2009). Agility deals not only with the changes in direction, but also with the capability to effectively couple eccentric and concentric actions in ballistic movements (Miller et al., 2001). The player would be more prone to injury whilst playing tennis if he was not able to deal with these changes in direction and effectively couple eccentric and concentric actions.

The important fitness components in tennis are balance and agility. There is little research into whether balance training can improve agility. The importance of these relationships with trainable physical qualities may help the coach in developing training strategies to maximize the agility development and reducing injury rates (Sheppard & Young, 2006). In the current study, the balance exercises will be used to develop agility for youth tennis players.

II. THE AIMS OF THIS STUDY

- Preparation of balance exercises to develop the agility for young tennis players,
- Identify the effect of practicing balance exercise on developing the agility for young tennis players.

III. HYPOTHESIS

- There are statistically significant differences between the pre-tests and post-tests of the study variable.

Subjects

Twenty-four participants were chosen from Iraqi Tennis Federation Players. Tennis players mean age was 19.86 ± 1.81 years, mean height 1.70 ± 07 m, and mean mass 60.36 ± 13.74 kg. Randomly, the Subject was classified into two groups; the control group and experimental group.

Procedure

During the study, the subject agreed not to change their current exercise habits. As shown in table 1, the balance exercises group was trained three times per week for six weeks, performing a variety of balance exercises. The duration of each experimental session was 20-25 minutes. The exercises were progressed every two weeks by increasing the difficulty of the exercise (Thomas, 2013). The control group did not participate in any balance exercises.

Table (1)

Balance training program

Balance exercises	session duration: 20-25 minutes	
exercises	(Repetitions & duration × Sets)	Rest between exercises
1. Double leg stance on balance ball	30 se × 4	1:30 minutes
2. Single leg stance on balance ball	10 se × 3 Each side	1 minute

3.Standing reaches whilst on balance cushion	20 × 3	1 minute
4.Single leg reach on bosu board	15 × 2 Each side	1:30 minutes
5. Bosu Single leg Squat	10 × 2 Each side	1 minute
6.Standing on balance cushion (eyes closed)	10 se × 3	1 minute
7.Single leg stance on balance cushion with eyes closed	10 se × 3 Each side	1 minute
8. Sideways lunges off bosu board onto balance cushion with hands behind back	10 × 3 Each side	1 minute
9. Single leg stance on balance cushion whilst xtending free leg forwards, backwards and sideways	10se × 3 Each side	1:30 minutes

Testing procedure

To determine the study outcomes, agility test was conducted for both pre and post testing. The T-test (planned agility test) was used to measure the capacity of a player to be able to move effectively and quickly into a position of predetermined play. The test was chosen not only based upon established criteria data for males, but also because of its reproducibility and reported validity of the test (International Tennis Federation [ITF], 2019).

Planned Agility Test

The aim of the test

-to measure the capacity of a player to be able to move effectively and quickly into a position of predetermined play. For instance, Serve and run into the net.

The Equipment of the test

-tennis court, masking tape, stopwatch and measuring tape.

The Directions of the test

1. The tennis player begins at the center mark on the baseline. He sprints to doubles sideline to touch a cone placed at the center of the line upon the "go" command of his coach. Then, he returns back to the starting position on the center mark. When the player touches each cone he runs to, he should simulate the correct foot positions that he use on the court for example; for backhand: side on and right foot in front.

1. Then, from the center mark, he runs to the singles sideline and again touches the cone before returning to the starting position.
2. The short diagonal at the intersection of the singles sideline and service line on the right-hand side, again returning back to the starting position is the next sprint.
3. Then, the player sprints forwards to touch the net and return back to the baseline keeping an eye on his opponent and the ball down the other end.
4. The next direction is the long diagonal to the left (intersection of the net plus left singles sideline).
5. Then, it is along the baseline to the left singles sideline and back to the start. The player falling short of the 20m line twice in succession has his test terminated and his score recorded when near exhaustion. His score is his level and number of shuttles immediately previous to the bleep on which he was eliminated.

6. The last sprint is out to the doubles sideline as fast as possible. As the player crosses the doubles sideline, the stopwatch is stopped.

The Test note:

- One trial is performed typically.

Statistic

Descriptive statistics like mean, standard deviation, and t-test was used, and the level of significance was set at 0.05. To analyze the data, SPSS statistical software package was used.

IV. RESULTS

***Table 2**: Descriptive Statistics and T-Test (Pre-Test) Results of Experimental Group and Control Group for Planned Agility*

Variables	Experimental Group		Control Group		dr	T	Sig
	Mean	SD	Mean	SD			
Agility	31.7475	1.45355	30.3733	2.24007	22	1.783	.088

As shown in table 2, it is found that the results of agility t-test for the experimental group were (Mean ±SD= 31.7475 ± 1.45355) and control group were (Mean ±SD= 30.3733 ±. 2.24007), (t = 1.783, df = 22, sig = .088, p< 0.05). These results indicated that there are no statistically significant differences in pre-tests in the experimental group and control group scores of agility.

***Table 3**: Descriptive Statistics and T-Test Results of Experimental Group for Planned Agility*

Variables	Pre-test		Post-test		Mean Difference	df	T	Sig
	Mean	SD	Mean	SD				
Agility	31.7475	1.45355	27.7075	.81371	4.04000	11	12.187	.000

*p< 0.05

As shown in table 3, it is found that the results of agility pre-test for the experimental group were (Mean ±SD= 31.7475 ± 1.45355) and post-test were (Mean ±SD= 27.7075 ± .81371), (t = 12.187*, df = 11, sig = .000, p< 0.05). The mean difference of agility in pre-test and post-test was (4.04000). These results showed that there are statistically significant differences in pre-test to post-test scores of agility for the experimental group.

***Table 4:** Descriptive Statistics and T-Test Results of Control Group for Planned Agility*

Variables	Pre-test		Post-test		Mean Difference	df	T	Sig
	Mean	SD	Mean	SD				
Agility	30.3733	2.24007	29.9717	2.43582	.40167	11	.676	.513

*p< 0.05

As shown in table 4, it is found that the results of agility pre-test for the control group were (Mean ±SD= 30.3733 ± 2.24007) and post-test were (Mean ±SD= 29.9717 ± 2.43582), (t = .676, df = 11, sig = .676, p< 0.05). The mean difference of agility in pre-test and post-test was (.40167). These results showed that there are statistically no significant differences in pre-test to post-test scores of agility of the control group.

***Table 5**: Descriptive Statistics and T-Test (Post-Test) Results of Experimental Group and Control Group for Planned Agility*

Variables	Experimental Group		Control Group		dr	T	Sig
	Mean	SD	Mean	SD			

Agility	27.7075	.81371	29.9717	2.43582	22	3.054	.006

As shown in table 5, it is found that the results of agility t-test for the experimental group were (Mean ±SD= 27.7075 ± .81371) and control group were (Mean ±SD= 29.9717 ± 2.43582), (t = 3.054, df = 22, sig = .006, p< 0.05). These results showed that there are statistically significant differences in post-tests in favor of the experimental group scores of agility.

V. DISCUSSION :

The study aimed to find out the preparation of balance exercises to develop the agility for young tennis players, and identify the effect of practicing balance exercise on developing the agility for young tennis players. The findings of the study revealed that there were significant differences between the experimental group balance exercises and control group in the agility planned test. This showed that the balance exercises were more effective practice on developing the agility for young tennis players. Cug et al., (2012) stated that the balance training program content used equipment like wobble boards, bosu balance trainers and balance cushions which are known to challenge balance. Moreover, training on these unstable devices might enhance performance by improving proprioception. In Thomas's study (2013) mentioned that the tennis player's participant would have better proprioceptive control that could help him with balance plus agility performance. Twist & Benicky (1996) illustrated that balance training is a very important component in the tennis game. The tennis players will be able to move fast and change direction more quickly by having high levels of coordination and balance while maintaining control. Furthermore, Hrysomallis (2011) clarified that improving balance could decrease the muscle's proportions allocated to stabilization and allow it to contribute more to the motive force, and that could improve the movement time and agility.

Verstegen and Marcello (2001) mentioned that agility is a complex ability that depends on coordination, the joint system mobility, dynamic balance, stabilizing strength, elasticity, suppressing strength, speed, the locomotors apparatus stability and on the optimal biomechanical structure of movement. They stated that balance training lead to task-specific neural adaptations not only at the spinal levels but also supraspinal levels. According to Taube et al. (2008) agility may suppress spinal reflex excitability like the muscle stretch reflex during postural tasks which leads to less destabilizing movements. That’s why Miller et al. (2006) mentioned that agility should improve when balance and control of body positions is enhanced during movement.

The findings of the study are supported by Heitkamp et al., (2001) had significant results from balance training after six weeks of training. This indicates that six weeks of balance practicing is a substantial time for significant results to develop. Moreover, in McKeon et al., 2008; Heitkamp et al., (2001) studies has shown improvements at or prior to six weeks. In their studies, the participants carried out 12 training units in the allocated time. This study is also supported by Thomas study (2013) which declared that the program of balance devised for six weeks showed that a trend towards effectiveness in gaining improvements in agility within tennis.

VI. CONCLUSION

The findings indicated that practicing balance exercises for six weeks were more effective training on developing the agility for the youth tennis players (experimental group). Thus, the results have to be taken into consideration by trainers in order to better understand and implicated of these concepts in training sessions and lessons.

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