

QUALITY OF TRAINING IN COMPETITIVE TENNIS SPORTS

QUALIDADE DO TREINAMENTO NAS COMPETIÇÕES ESPORTIVAS DE TÊNIS

CALIDAD DEL ENTRENAMIENTO EN LAS COMPETICIONES DEPORTIVAS DE TENIS



ORIGINAL ARTICLE
ARTIGO ORIGINAL
ARTÍCULO ORIGINAL

Yihang Zhang¹ 
(Physical Education Professional)

1. Chongqing Institute of Foreign Studies, Chongqing, China.

Correspondence:

Yihang Zhang
Chongqing, China. 401120.
zyh132801@163.com

ABSTRACT

Introduction: The current challenge in tennis training in China is the integration with technology because, with the existing training methods, coaches and players pay little attention to strategies using a simple and retrograde tactical training method. Solutions need to be created to meet the development requirements of modern tennis. **Objective:** This paper aims to analyze tennis players' technical level, tactical characteristics, and training methods in sports competitions. **Methods:** Eight male tennis players were randomly selected as research volunteers. The various tactics employed by the subjects under competition were observed. Based on the collected data, a mathematical-statistical analysis of the tennis players' technical usage and training performance was prepared. **Results:** The athletes in this study could use various offensive tactics during and after the experiment. The athletes have a strong offensive baseline and can use a combination of speed, spin, and positioning to restrict each other during the competition. However, there were significant differences in the players' awareness of offensive tactics on defense ($P < 0.05$). **Conclusion:** Most athletes perform consistently and heterogeneously in stalemate tactics. A weakness noted was that most athletes are not showing good efficiency in scoring when stalemate presents opportunities. The results of this study can improve the scoring rate of tennis players. At the same time, this study's findings may strengthen tennis players' ability to control the game during sports competitions. **Level of evidence II; Therapeutic studies - investigation of treatment outcomes.**

Keywords: Tennis; Physical Education and Training; Athletes; Program, Training.

RESUMO

Introdução: O desafio atual no treinamento de tênis na China é a integração com a tecnologia pois, com os métodos de treinamento existentes, os treinadores e jogadores prestam pouca atenção às estratégias utilizando um método de treinamento tático simples e retrógrado. Sendo necessária a criação de soluções para atender às exigências de desenvolvimento do tênis moderno. **Objetivo:** Este estudo visa analisar o nível técnico, as características táticas e os métodos de treinamento dos jogadores de tênis sob competições esportivas. **Métodos:** Foram selecionados aleatoriamente oito jogadores de tênis masculinos como voluntários de pesquisa. Foram observadas as diversas táticas empregadas pelos sujeitos nas competições. Com base nos dados coletados, uma análise matemática-estatística do uso técnico e do desempenho de treinamento dos tenistas foi elaborada. **Resultados:** Os atletas deste estudo foram capazes de utilizar uma variedade de táticas ofensivas durante e após o experimento. Os atletas têm uma forte linha de base ofensiva, podendo usar uma combinação de velocidade, giro e posicionamento para restringir uns aos outros durante a competição. No entanto, houveram diferenças significativas na conscientização das táticas ofensivas dos jogadores na defesa ($P < 0,05$). **Conclusão:** A maioria dos atletas tem um desempenho constante e heterogêneo em táticas de impasse. Um ponto fraco notado foi de que a maioria dos atletas não é apresentou boa eficiência em pontuar quando o impasse apresenta oportunidades. Os resultados deste estudo podem melhorar a taxa de pontuação dos jogadores de tênis. Ao mesmo tempo, as conclusões deste estudo podem fortalecer a capacidade dos jogadores de tênis de controlar o jogo durante as competições esportivas. **Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.**

Descritores: Tênis; Educação Física e Treinamento; Atletas; Programas de Treinamento.

RESUMEN

Introducción: El reto actual en el entrenamiento del tenis en China es la integración con la tecnología porque, con los métodos de entrenamiento existentes, los entrenadores y los jugadores prestan poca atención a las estrategias utilizando un método de entrenamiento táctico simple y retrógrado. La creación de soluciones para satisfacer los requisitos de desarrollo del tenis moderno es necesaria. **Objetivo:** Este estudio tiene como objetivo analizar el nivel técnico, las características táticas y los métodos de entrenamiento de los tenistas en las competiciones deportivas. **Métodos:** Se seleccionaron al azar ocho tenistas masculinos como voluntarios de la investigación. Se observaron las distintas tácticas empleadas por los sujetos en las competiciones. A partir de los datos recogidos, se elaboró un análisis matemático-estadístico del uso técnico y del rendimiento del entrenamiento de los tenistas. **Resultados:** Los atletas de este estudio pudieron utilizar una variedad de tácticas ofensivas durante y después del experimento. Los atletas tienen una fuerte línea de base ofensiva y pueden utilizar una combinación de velocidad, giro y posicionamiento para restringirse mutuamente durante la competición. Sin embargo, hubo diferencias significativas en el conocimiento de los jugadores de las tácticas ofensivas en defensa ($P < 0,05$). **Conclusión:** La mayoría de los atletas tienen un rendimiento



consistente y heterogéneo en las tácticas de estancamiento. Un punto débil que se observó fue que la mayoría de los atletas no presentan una buena eficacia a la hora de marcar cuando el empate presenta oportunidades. Los resultados de este estudio pueden mejorar el índice de puntuación de los tenistas. Al mismo tiempo, las conclusiones de este estudio pueden reforzar la capacidad de los tenistas para controlar el juego durante las competiciones deportivas.

Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.

Descriptores: Tenis; Educación y Entrenamiento Físico; Atletas; Programas de Capacitación.

DOI: http://dx.doi.org/10.1590/1517-8692202329012022_0603

Article received on 10/31/2022 accepted on 11/30/2022

INTRODUCTION

As a healthy, elegant, and fashionable sport, tennis is more and more popular among people. Tennis has functions that other sports cannot replace in terms of fitness, physical fitness, and promotion of social interaction.¹ Chinese tennis players still have a lot of room for improvement in training methods, training methods, and tactical awareness. Speed endurance depends on the mixed metabolic energy supply of aerobic and anaerobic. This should improve athletes' aerobic metabolism energy supply capacity and improve the anaerobic metabolism energy supply capacity.² Improving and constructing a training content system suitable for the current development of tennis players in China plays a huge role in enriching tennis training theory.

METHOD

Research objects

We selected eight male tennis players as the subjects of this study. We look at the various tactical use of male athletes in the game and the scoring rate of the corresponding tactical use.³ We made detailed field records according to the pre-designed plan and processed the data with conventional statistical methods.

Dynamics Analysis of Tennis Serve Trajectory

1. Gravity $F_g = mg$ for tennis quality. g is the local gravitational acceleration, $F_g = 9.8m/s^2$. During the tennis movement, it is always under the action of gravity and the direction is vertical downward.

2. Air resistance F_d . Air resistance is always in the opposite direction of motion. At this point we get the formula for calculating the air resistance

$$\overline{F}_d = \frac{1}{2} C_d \rho A \|V\| V \tag{4}$$

$$F_d = \frac{1}{2} C_d \rho A \|V\| V \tag{1}$$

C_d is the drag coefficient. ρ is the density of air. A is the windward area of the tennis ball and $A = \frac{\pi d^2}{4}$ (d is the diameter of the tennis ball). V is the tennis speed. The Magnus force is perpendicular to the direction of angular velocity and perpendicular to the direction of motion. So when the tennis ball is topspin, the force is downward.⁴ The formula for calculating the Magnus force is

$$F_m = \frac{1}{2} C_L \rho \frac{d}{2} A \|\omega\| \times \|V\| \frac{\omega \times V}{\|\omega \times V\|} \tag{2}$$

C_L is the lift coefficient. ω is the rotational angular velocity of the tennis ball. A tennis ball in motion is approximated as a spherical rigid body with six degrees of freedom.⁵ Tennis is mainly affected by three forces: Magnus force, gravity, and air resistance. Therefore, the tennis process can be described as

$$m\overline{V} = \overline{F}_d + \overline{F}_m + \overline{F}_g \tag{3}$$

Ethical Compliance

Research experiments conducted in this article with animals or humans were approved by the Ethical Committee and responsible authorities of Chongqing Institute of Foreign Studies following all guidelines, regulations, legal, and ethical standards as required for humans or animals.

RESULTS

Overall Analysis of Players' Playing Styles and Tactical Types

The statistics in Table 1 show that all players in China can score points in front of the net and the bottom line by various means.⁶ Athletes can use a variety of tactics in defense and offense. Players can combine various playstyles and tactics to score and win with their expertise and skills. However, as shown in Table 1, most players used a series of tactics or the net to score a small percentage of the total score. This shows that most young players are players with a bottom-line type of comprehensive play.

Player A, Player C, and Player G serve relatively well. Table 1 shows that both the first and second-serve scoring rates are high. The first three shots are also in the forefront of all players. It is also easy to observe in the game that they are very handy with various offensive tactics on the service and after serving. Especially the forehand attack is powerful.⁷ Athletes mainly focus on serving, forehand attack, and related tactics in front of the net to score winning points. Player E and Player B have good basic skills. At the same time, their stalemate ability is powerful. Player F has relatively mature skills before the net. He can use various techniques and tactics to create scoring opportunities and has a solid ability to score at the net.

Analysis of the characteristics of the offensive and defensive tactics of athletes

The development of modern professional tennis determines that offense must be used as the primary means of winning. The use of

Table 1. Statistics of 50 innings for players 1 to 6.

NO.	A	B	C	D	E	F
1st Service Points % of Total Service Points	6.14	69.13	69.82	61.63	6.6	80.66
Second serve points as % of total serve points	3.86	60.88	30.28	38.48	3.3	29.36
Net scoring % of total serving score	14.18	8.61	13.04	8.64	12.38	19.66
The first three shots are scored as a percentage of the total serving score	86.82	39.13	61.46	48.81	68.14	83.91
The stalemate score accounts for % of the total service score	14.18	60.88	38.64	61.29	60.86	26.09
Ace Balls as % of Total Serve Score	8.09	2.6	10.43	4.28	1.9	1.96

professional men's tennis singles tactics always revolves around how to attack and score. The use of offensive tactics by young men is also quite widespread.⁸ The main features presented are as follows:

The serving game mainly uses the first serve to launch a series of tactics to carry out the offense, and the scoring rate is high. This is also the primary offensive scoring means (Table 1). Athletes can use the combination of speed, rotation, and placement in service to control the opponent and start a series of offensive routines to score points. This shows that the offensive tactics of young athletes after the first service are relatively mature.

Athletes score significantly lower on the second serve than on the first serve. This is in line with the winning rules of men's professional tennis. However, during the game, it was observed that players scored very few points in the first three shots after the second serve.⁹ After the second serve, most of the points are obtained in the stalemate after the fourth round. The second serve is still the starting point for a good offense in the pro men's game. Young players' scoring effect of tactical use after the second serve is low. It scored fewer points in the first three shots immediately after the second serve. Only good players can use the second serve to attack. Most other players also use the second serve to attack when leading by a significant score. This fully shows that young athletes in China need to improve the technique and tactical application of the second ball.

The statistics in Table 2 show that the athlete scored significantly higher on the first serve than on the second serve. The scoring rate of receiving the first serve is significantly higher than receiving the second serve. This shows that the player has an excellent ability to return and serve.¹⁰ It can get offensive opportunities and win points through good prediction in receiving and serving. This shows that the athlete's stability when receiving the service needs to be improved.

Except for players A and E, other players have little difference between the first and second serve.¹¹ The scoring ability of the first three shots is far lower than that of Player A and Player E. This shows a big gap between the players' various scoring methods and tactical application abilities. There are differences in all aspects of the ability to score the first and second serve and the first three shots before receiving. At the same time, this also shows that the players' offensive scoring methods and playing styles are different.

DISCUSSION

Analysis of Defensive Tactics

Defense is the key to winning the final game. Defensive tactics are essential in breaking serve to win.¹² Young athletes in China can use various tactical methods to break the opponent's serve during the game. From the interviews with athletes and coaches and the analysis of the game, it is concluded that their defensive tactics show remarkable characteristics: 1) The defensive tactics of young athletes are mainly based on counterattacks, holding the ball, and waiting for the opponent to make mistakes. These include continuous slices, topspin, lobs, and more. 2) The defensive tactics are too conservative and monotonous when

Table 2. Statistics of the 50 innings of the 1st to 6th players.

NO.	A	B	C	D	E	F
Small balls scored as % of total return points	3.3	3.34	6.84	0.93	3.85	3.18
% of total return points scored	65.33	46.06	50.56	54.3	64.51	59.88
Receiving and second serving points accounted for % of total receiving and serving points	34.68	53.94	49.4	45.8	35.49	40.3
The percentage of points scored in the first three shots of the return service as a percentage of the total return service score	63.8	35.95	4.94	40.18	83.1	43.48
After receiving the serve, the stalemate accounts for % of the total receiving score	36.3	64.05	5.06	59.83	36.89	56.53

the critical ball appears. 3) The awareness and ability to counterattack with defensive tactics are not strong. When the offensive quality of the attacker is not good, the athlete can completely turn from passive to active, but hesitating and losing opportunities. The above situation also has a lot to do with the player's style of play.

Analysis of stalemate tactics

Chinese young players have shown good stability in the game, and their stalemate ability is generally high. This is inseparable from the regular hard training to form good basic skills. In the stalemate, the batting methods and tactics are diverse and varied. The characteristics of the stalemate tactics used by the young players in the game are as follows: 1) The control of the ball includes flat hitting, chipping, topspin, lifting, or a combination of the three. 2) Front and back control refer to the combination of the bottom line and the front of the net to mobilize the opponent. 3) The control of the line includes repeated straight lines or slashes; more commonly, slashes and straight lines are stalemates. However, some athletes cannot immediately and decisively take the initiative to score offensively when an opportunity arises in the stalemate, and their ability to win is not strong.

CONCLUSION

There is a significant difference in Chinese technical and tactical levels of young tennis players. Most athletes participate in fewer competitions in their regular training, and the low level of participation leads to less experience. Coaches should encourage athletes like Playe to sign long-term contracts with foreign companies. Athletes often participate in foreign youth competitions and learn advanced techniques and tactics. This way, you get more game experience. There are significant differences in the awareness of the players' anti-offense tactics in defense. Coaches should improve athletes' ability to take chances, create chances, and defend against counterattacks in games or training.

The author declare no potential conflict of interest related to this article

AUTHORS' CONTRIBUTIONS: The author made significant contributions to this manuscript. Yihang Zhang: writing, data analysis, article review and intellectual concept of the article.

REFERENCES

- Iordan DA, Mocanu GD, Mocanu MD, Munteanu C, Constantin GB, Ilie ONU, et al. Age-Related, Sport-Specific Dysfunctions of the Shoulder and Pelvic Girdle in Athletes Table Tennis Players. *Observational Study. Balneo PRM Res. J.* 2021;12(4):337-44.
- Mocrousov-Cuciuc E. Factors determining the level of high qualification and sports achievements in long-term training of female tennis players (diagnostic aspect). *Știința Culturii Fizice.* 2021;1(37):109-16.
- Wei X. Video Sequence Analysis for On-Table Tennis Player Ranking and Analysis. *Int J Mob Comput Multimedia Commun.* 2022;13(2):1-9.
- Yefremenko A, Pyatisotskaya S, Pavlenko V, Shutieieva T, Kraynik Y, Nasonkina O. Effectiveness of physical training of tennis players for competitions using elements of athletics. *Slobozhanskyi Her Sci Sport.* 2021;9(4):5-17.
- Guo W, Liang M, Xiao D, Hao W. A systematic and comparative study on the line-changing strategies in top-level table tennis players. *Int J Perform Anal Sport.* 2020;20(6):1018-34.
- Lupo C, Ungureanu AN, Brustio PR. Session-rpe is a valuable internal load evaluation method in beach volleyball for both genders, elite and amateur players, conditioning and technical sessions, but limited

for tactical training and games: Session-RPE in beach volleyball. *Kinesiology*. 2020;52(01):30-8.

7. Filipčić A, Leskosek B, Crespo M, Filipčić T. Matchplay characteristics and performance indicators of male junior and entry professional tennis players. *Int J Sports Sci Coach*. 2021;16(3):768-76.
8. Moya-Ramon M, Nakamura FY, Teixeira AS, Granacher U, Santos-Rosa FJ, Sanz-Rivas D, et al. Effects of resisted vs. conventional sprint training on physical fitness in young elite tennis players. *J Hum Kinet*. 2020;73(1):181-92.
9. Yevtyfiieva II, Korobeinik VA, Kolisnychenko AO. The influence of training loads of technical and tactical training on the cardiovascular system of tennis players 10-12 years. *Health Sport Rehabil*. 2020;5(4):23-32.
10. Sánchez-Pay A, Sanz-Rivas D. Physical and technical demand in professional wheelchair tennis on hard, clay and grass surfaces: implication for training. *Int J Perform Anal Sport*. 2021;21(4):463-76.
11. Fernandez-Fernandez J, García-Tormo V, Santos-Rosa FJ, Teixeira AS, Nakamura FY, Granacher U, et al. The effect of a neuromuscular vs. dynamic warm-up on physical performance in young tennis players. *J Strength Cond Res*. 2020;34(10):2776-84.
12. Zırhlı O, Demirci N. The Influence of functional training on biomotor skills in girl tennis players aged 10–12. *Baltic Journal of Health and Physical Activity*. 2020;12(4):33-45.