PHYSICAL FITNESS TRAINING AND REACTION SPEED IN SPORTS TABLE TENNIS PLAYERS

TREINAMENTO DE APTIDÃO FÍSICA E VELOCIDADE DE REAÇÃO NOS JOGADORES DE TÊNIS DE MESA ESPORTIVO

ENTRENAMIENTO DE APTITUD FÍSICA Y VELOCIDAD DE REACCIÓN EN JUGADORES DE TENIS DE MESA DEPORTIVO

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ABSTRACT

Introduction: Table tennis is demanding in terms of athletes' physical fitness and muscular responsiveness. Excellent physical fitness is important to ensure a high technical level. It can also play an essential role in injury prevention. Objective: Explore the correlation between table tennis players' movements and their displacements. Methods: Volunteer professional competitors underwent a private 16-week quality speed training program. In this experiment, athletes had their speed analyzed before and after training. Mathematical and statistical analyses were performed on the collected data. Some discussions are made to improve the reflex ability of the athletes. Results: The table tennis players' physical fitness and action response capacity were explored. After physical exercise, the players' reflex ability improved. There were statistically significant differences in the data (P<0.05). Conclusion: The results show that special training improves athletes' reaction speed, endurance, strength, coordination, and flexibility. ***Level of evidence II; Therapeutic studies - investigation of treatment outcomes.***

Keywords: Athletes; Fitness Testing, Physical; Reaction Time.

RESUMO

Introdução: O tênis de mesa é um esporte exigente quanto à aptidão física e à capacidade de resposta muscular do atleta. A excelente aptidão física é importante para assegurar o elevado nível técnico. Também pode desempenhar um papel essencial na prevenção de lesões. Objetivo: Explorar a correlação entre os movimentos dos jogadores de tênis de mesa e seus deslocamentos. Métodos: Competidores profissionais voluntários foram submetidos a um programa particular de treinamento de qualidade de velocidade com 16 semanas de duração. Nesta experiência, os atletas tiveram sua velocidade analisada antes e depois do treinamento. Análises matemáticas e estatísticas foram realizadas sobre os dados coletados. Algumas discussões são feitas para melhorar a capacidade no reflexo dos atletas. Resultados: Explorou-se a aptidão física dos jogadores de tênis de mesa e a capacidade de resposta à ação. Após o exercício físico, a capacidade de reflexão dos jogadores melhorou. Houve diferenças estatisticamente significativas nos dados (P<0,05). Conclusão: Os resultados mostram que o treinamento especial desenvolvido melhora a velocidade de reação dos atletas, a resistência, a força, a coordenação e a flexibilidade. ***Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.***

Descritores: *Atletas; Teste de Aptidão; Tempo de Reação.*

RESUMEN

Introducción: El tenis de mesa es un deporte exigente en cuanto a la forma física y la capacidad de respuesta muscular del deportista. Una excelente forma física es importante para garantizar el alto nivel técnico. También puede desempeñar un papel esencial en la prevención de lesiones. Objetivo: Explorar la correlación entre los movimientos de los jugadores de tenis de mesa y sus desplazamientos. Métodos: Se sometió a competidores profesionales voluntarios a un programa de entrenamiento de calidad de velocidad particular de 16 semanas de duración. En este experimento, se analizó la velocidad de los atletas antes y después del entrenamiento. Se realizaron análisis matemáticos y estadísticos de los datos recogidos. Se hacen algunas discusiones para mejorar la capacidad en el reflejo de los atletas. Resultados: Se exploró la aptitud física y la capacidad de respuesta a la acción de los jugadores de tenis de mesa. Tras el ejercicio físico, la capacidad de reflejo de los jugadores mejoró. Hubo diferencias estadísticamente significativas en los datos (P<0,05). Conclusión: Los resultados muestran que el entrenamiento especial desarrollado mejora la velocidad de reacción, la resistencia, la fuerza, la coordinación y la flexibilidad de los atletas. ***Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.***

Descriptores: *Atletas; Pruebas de Aptitud Física; Tiempo de Reacción.*

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INTRODUCTION

The speed of movement is the fundamental prerequisite for athletes to use movement skills. An athlete's reaction time and action time are suitable measures in training. The response period is the period after application to the organism until the organism produces an apparent response. When we act, we perceive, and the action of action is action. In this paper, we tested the reaction rates of table tennis players before and after training. On this basis, two test results are selected: one is reflection time and action time. The article provides an overview of the role and role of table tennis players in motor response. At the same time, this paper also discusses how to improve the athletes' reflection and training effect training.[1]

METHOD

Survey Objects

A survey was conducted with four sports school athletes as examples. RESULTS: The mean life expectancy of the older athlete group was 21.62+0.35. All players are healthy. Each person was given a quiz before and after eight weeks of dedicated practice. Table 1 lists its basic information.[2]

Table 1. Profile of the subjects of this survey.

	Gender	N	Age (age)	Height (cm)	Weight (kg)
Group	Male	2	22.72±0.92	176.49±4.65	70.22±7.59
	Female	2	22.43±0.95	163.79±4.29	56.59±6.54

Research methods

This test uses the time measuring device of SANLINGEP206-P. The measurement standards to be detected in this article include height (H, cm), weight, weight, reaction time, and exercise time. Students complete eight weeks of special training under the leadership of professional class teachers. Classes every Saturday. Exercise for about 90 minutes at a time. The results were measured before and after eight weeks of special training.[3] The paper placed the instrument on a level table at 1.10 meters in the experiment. Trials were set to 10. The gauge's red indicator lighted up when the subject placed their finger on the sensor. The subject moves away from the sensing area and touches the corresponding red button as soon as possible. Please put it in the induction area as soon as you are done. The number of reaction hours was measured from the red light of the indicator light to the time when the subject came out of the induction area. The period from the athlete's exit from the sensing area to when he touches the keyboard is a value in action. The length of reaction time is the speed at which the body receives information, and the length of time is the time of reaction.[4]

Models of muscle reflex control

A pure muscle reflex control method was used in the experiment. It is essentially similar to PD (PD) - Differential Feedback (PD). The length adjustment of the muscle stretch is the same as the proportional adjustment. The speed of the stretching muscle exercise is a movement similar to differential movement.[5] Use the length change value of the muscle fiber as the input to the controller. The mathematical formula for the control mode of muscle-response is as follows:

$$U(t) = K_p(l(t) - l_0) + K_d v(t) \quad (1)$$

$$v(t) = [l(t_n) - l(t_{n-1})]/(t_n - t_{n-1}) \quad (2)$$

K_p is the coefficient of variation in muscle fiber length. K_d is the coefficient of variation of muscle fiber velocity. $U(t)$ is the control value of muscle activation degree at time t. $v(t)$ is the rate of change in muscle fiber length. $l(t)$ is the change in muscle fiber length at time t.

Is the coefficient of variation in muscle fiber length. Is the coefficient of variation of muscle fiber velocity. Control value for muscle activation level at the time. Is the rate of change in muscle fiber length. Is the change in muscle fiber length over time.[5]

Data processing

All data are expressed as mean deviation plus proportional.[6] Statistical analysis of the data was carried out using Excel 2016. This paper mainly discusses whether the difference between the two groups is statistically significant. The P-value was tested with one-way variance, and there was a significant difference in the P-value between the groups.[7]

There is no need for a code of ethics for this type of study.

RESULTS

After eight weeks of dedicated practice, the relationship between the athlete's reaction time and exercise time is shown in Table 2 below. By analyzing the test results of athletes A, B, C, and D, the results show that before and after the test, the reaction time values of athletes in groups A, B, C, and D all decreased significantly. This is the speed of reaction.[8] The athletes in group A had significant statistical significance in improving their reaction speed of the athletes ($P<0.05$). Athletes C and D followed ($P>0.05$) without statistical significance.[9] On this basis, this paper proposes the analysis result of changing condition=pre-exercise test result-post-exercise test result. After statistical treatment with single-factor variance, $P>0.05$. This shows no significant difference between the different players in improving the reaction rate.[10]

Differences between male and female athletes' reactions and movements after table tennis training

The results showed that reaction times were consistent between male and female athletes prior to physical activity. All response times decreased. Male athletes declined in response to the same extent as female athletes. Men are less likely to exercise than women before exercising.[11] After physical activity, male athletes spent less physical time than female athletes, but female athletes spent a little more time than male athletes.[12] The results showed that both men and women, after the training, their changes in movement time and movement time were significantly improved. Between different reaction times, the response time values of male athletes decreased more than female athletes, and during exercise, female athletes decreased more than male athletes.

DISCUSSION

It can be seen from the above results that in the reaction time test, the rate and the precision are two essential variables, and these two variables are the focus of this paper. In the trade-off between speed and precision, attention should be paid to the regulatory function of the nervous system. After prolonged physical training, muscle spindles feel very sensitive stretches in skeletal muscles. Muscle spindles are also stretched during stretching of skeletal muscle, and muscle spindles

Table 2. Changes in reaction time and exercise time before and after stunt training.

Special	Reaction time(s)		During exercise(s)	
	Before training	After training	Before training	After training
Athlete A	0.305±0.020	0.289±0.025	0.259±0.058	0.230±0.033
Athlete B	0.299±0.033	0.273±0.029	0.263±0.055	0.233±0.035
Athlete C	0.299±0.038	0.288±0.031	0.237±0.061	0.233±0.053
Athlete D	0.293±0.032	0.287±0.033	0.252±0.036	0.253±0.036

respond immediately after stretching, causing the stretched muscle to contract. This method can increase your muscle strength.[13] Some experts believe that building muscle strength increases the rate of movement. When the load remains constant, the rate of movement increases with increasing strength. Therefore, during daily training, the central nervous system will improve its muscle strength by adjusting the number of active units, and it will also affect the movements that control skeletal muscles. In addition, the adjustment of the nervous system can enhance the coordination between the agonist, synergist, antagonist, and support muscles, thereby improving neuromuscular coordination, sensitivity, and precision.[14] In the test, some players ignored the accuracy of the movements to be fast. Some players are more careful. He even slowed down his movements to keep his reflexes precise. After eight weeks of specialized training, the athletes' reflexes improved.[15]

The development of table tennis technology depends on the interaction of No. 1 and No. 2 signals, long-term training, and dynamic formation. Players can quickly respond to the opponent's incoming ball and respond accordingly, which has entered a stage of automation. It is a very structured response. In order to respond in the first place, they need to make judgments in advance. They can predict a ping pong ball's route, placement, spin, and rhythm. This prophecy is decisive throughout the game. Players must have strong adaptability to make accurate judgments and preparations for incoming balls. There are many training methods to improve the athlete's reaction ability in some special table tennis events, such as weightlifting swing and quick recovery after hitting the ball back. After one or more training sessions, students' visual responses will improve significantly. In addition, there is much regular information on table tennis. Practitioners have made predictions about their expectations based on their own experiences and these inherent laws before responding. If the desired discrimination matches the actual signal, the central nervous system's processing is significantly reduced.

The exercise time values of athletes A, B, and C all showed a significant decrease in comparing exercise time and exercise time. Through specific exercises, athletes can reduce the number of movements and improve their body's response. Specialized exercise can promote the central nervous system. In regulating the frequency of motor nerve impulses that control skeletal muscle, the central nervous system changes the number of active units, increasing muscle strength. Therefore, the exercise time values of athletes A, B, and C all decreased after training. Athletes experienced the most significant reduction in exercise duration after exercise training. Because of the differences in the training levels of athletes in various professions, their load and intensity are also different.

The results showed that: in table tennis, athletes showed a significant decrease in the response time of athletes. Women outperform men in exercise. An important reason for the impact factor is the physical and psychological differences between men and women. Outside of practice, male athletes are more competitive than female athletes, and their mentality is more stable. Men's muscles are more substantial than women's. Her attack and recovery abilities are more substantial than female athletes. In addition, because the female athletes participating in the competition are better than male athletes when doing table tennis, they must be fast and precise when doing movements. This change caused women's physical activity to decline more than men's.

CONCLUSION

While improving the movement, there is also a significant impact on improving the reaction ability of the movement. After the end of table tennis training, the decrease in reaction time and action time of male athletes and female athletes is very different, mainly reflected in the physical fitness of the athletes. Through analysis, the influence of table tennis on the reaction time and exercise time of male and female athletes is obtained. When doing physical exercise, attention should be paid to overall coordination. Athletes should combine their actual situation and the sports they want to improve. When improving their reaction ability, athletes should carry out corresponding training according to their situation.

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