FITNESS ACTIVITIES BASED ON THE PHYSICAL FITNESS OF SPORTS ATHLETES

ATIVIDADES DE APTIDÃO FÍSICA BASEADAS NA CONDIÇÃO FÍSICA DOS ATLETAS ESPORTIVOS

ACTIVIDADES DE APTITUD FÍSICA BASADAS EN LA CONDICIÓN FÍSICA DE LOS DEPORTISTAS

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ABSTRACT

Introduction: Nowadays, physical activities have become an important way for people to improve their physical fitness. Running is considered to be an exercise option with low investment, low consumption, and no space restrictions. It can play a role in physical fitness, entertainment, and communication. Objective: Analyze the impact of running activities on athletes' physical fitness. Methods: Volunteer athletes were randomly divided into two groups (experimental and control groups). The experimental group performed running activities for eight weeks while the control group did not participate in running. Key physiological and biochemical indicators such as height, weight, blood pressure, blood lipids, etc. were recorded. The data were collected and processed according to the mathematical statistics method to analyze the data. Results: There is no significant difference in height after the experiment (P>0.05). The value of body weight curve was changed after the increment of running exercise (P<0.05). There was no significant difference in bust size between the two tests (P>0.05). Waist circumference, hip circumference and upper limb circumference were significantly different after the test (P<0.05). The subjects' blood pressure and heart rate before and after the test were significantly different, proportional to the changes in mean vital capacity (P<0.01). Conclusion: Long-term running training impacts athletes' physical and mental health. ***Level of evidence II; Therapeutic studies - investigation of treatment outcomes.***

Keywords: Physical Fitness; Running; Sports; Athletes; Exercise Test.

RESUMO

Introdução: Atualmente, as atividades físicas tornaram-se uma importante forma das pessoas aperfeiçoarem seu condicionamento físico. A corrida é considerada uma opção de exercício com baixo investimento, baixo consumo e sem restrições de espaço. Ela pode desempenhar um papel na aptidão física, no entretenimento e na comunicação. Objetivo: Analisar o impacto das atividades de corrida sobre a aptidão física dos atletas. Métodos: Atletas voluntários foram divididos aleatoriamente em dois grupos (grupos experimentais e grupos de controle). O grupo experimental realizou atividades de corrida durante oito semanas enquanto o grupo de controle não participava da corrida. Foram registrados os indicadores fisiológicos e bioquímicos fundamentais, tais como altura, peso, pressão arterial, lipídios no sangue, etc. Os dados foram coletados e processados segundo o método de estatística matemática para analisar os dados. Resultados: Não há diferença significativa em altura após o experimento (P>0,05). O valor da curva de peso corporal foi alterado após o incremento do exercício de corrida (P<0,05). Não houve diferença significativa no tamanho do busto entre os dois testes (P>0,05). A circunferência da cintura, circunferência do quadril e circunferência dos membros superiores foram significativamente diferentes depois do teste (P<0,05). A pressão arterial e a frequência cardíaca dos sujeitos antes e depois do teste foram significativamente diferentes, proporcional às alterações da capacidade vital média (P<0,01). Conclusão: O treinamento de corrida de longo prazo gera impactos sobre a saúde física e mental dos atletas. ***Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.***

Descritores: *Aptidão Física; Corrida; Esportes; Atletas; Teste de Esforço.*

RESUMEN

Introducción: En la actualidad, las actividades físicas se han convertido en un medio importante para que las personas mejoren su estado físico. Correr se considera una opción de ejercicio con baja inversión, bajo consumo y sin restricciones de espacio. Puede desempeñar un papel en la forma física, el entretenimiento y la comunicación. Objetivo: Analizar el impacto de las actividades de carrera en la condición física de los atletas. Métodos: Los atletas voluntarios fueron divididos aleatoriamente en dos grupos (grupo experimental y grupo de control). El grupo experimental realizó actividades de carrera durante ocho semanas, mientras que el grupo de control no participó en la carrera. Se registraron indicadores fisiológicos y bioquímicos clave como la altura, el peso, la presión arterial, los lípidos en sangre, etc. Los datos se recogieron y se procesaron según el método estadístico matemático para analizarlos. Resultados: No hay diferencias significativas en la altura después del experimento (P>0,05). El valor de la curva de peso corporal se modificó tras el incremento del ejercicio de carrera (P<0,05). No hubo diferencias significativas en el tamaño del busto entre las dos pruebas (P>0,05). La circunferencia de la cintura, la circunferencia de la cadera y la circunferencia de los miembros superiores fueron significativamente diferentes después de la prueba (P<0,05). La presión arterial y la frecuencia cardíaca de los sujetos antes y después de la prueba fueron significativamente diferentes, proporcionales

a los cambios en la capacidad vital media (P<0,01). Conclusión: El entrenamiento de carrera a largo plazo genera impactos en la salud física y mental de los atletas. ***Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.***

Descriptores: *Aptitud Física; Carrera; Deportes; Atletas; Prueba de esfuerzo.*

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INTRODUCTION

Running exercise was introduced into China in the early 1960s. Running has become a new type of sport that many city dwellers are keen on. Running has long gone beyond the mere physical exercise. The interviews with athletes in this article all mentioned positive experiences such as pleasure and enjoyment during running. These positive mental experiences are very similar to exercise's fluid experiences.[1] This paper studies the effect of running activities on the physical fitness of athletes. This paper aims to study the effect of running on the physical level of athletes. This can provide a scientific basis for more athletes to choose running exercise.

METHOD

Research objects

A total of 12 high-level athletes were randomly selected as the research object in this study. In addition, 12 athletes who did not participate in running exercises were selected as the control group.[2] The experimental group exercised every morning at about seven o'clock. The duration of each exercise is generally less than one hour. The intensity of the exercise is moderate. We completed the test of the experimental indicators one day before the test and eight weeks after the fitness exercise.

Recognition method of running fitness action

This paper aims to obtain the motion and skeleton information under the projection of the central coordinate system of the human body through the projection transformation method.[3] The coordinate projection of the athlete's body center in the homogeneous coordinate projection is shown in formula (1):

$$(u_{i,j}, v_{i,j}, \eta_{i,j}) = (x_{i,j}, y_{i,j}, z_{i,j}) \begin{bmatrix} x & y & y \\ y & x & y \\ -x & -y & x \end{bmatrix} \quad (1)$$

$(u_{i,j}, v_{i,j}, \eta_{i,j})$ and $(x_{i,j}, y_{i,j}, z_{i,j})$ correspond to the coordinates of the j joint point in the i frame in the three-dimensional coordinate system of the human body center and the image coordinate system, respectively. Suppose there exists any such origin of the coordinate system. It is a square area Q within the range of the intersection of the two diagonals.[4] This range can simultaneously contain the joint coordinates $(u_{i,j}, v_{i,j}, \eta_{i,j})$ of any of the following two points. They all satisfy the formula (2) respectively:

$$\begin{cases} u_{i,j} \in [-l/3, l/3] \\ v_{i,j} \in [-l/3, l/3] \\ \eta_{i,j} \in [-l/3, l/3] \end{cases} \quad (2)$$

Where l is the side length of the feature area. Its value is shown in formula (3):

$$l = \max\left(\frac{\max(u_{i,j}) - u_{i,j}}{u_{i,j} - \min(u_{i,j})}, \frac{\max(v_{i,j}) - v_{i,j}}{v_{i,j} - \min(v_{i,j})}, \frac{\max(\eta_{i,j}) - \eta_{i,j}}{\eta_{i,j} - \min(\eta_{i,j})}\right) \quad (3)$$

Assuming that the feature area Q' contains K motion trajectory feature points, the scaling projection area transformation is shown in formula (4):

$$\begin{bmatrix} u_k \\ v_k \\ \eta_k \end{bmatrix} = \begin{bmatrix} l'/l & l & 0 \\ l' & l'/l & l \\ 0 & l' & 1 \end{bmatrix} \begin{bmatrix} u_{i,j} \\ v_{i,j} \\ \eta_{i,j} \end{bmatrix} \quad (4)$$

Among them, (u_k, v_k, η_k) represents the coordinates of the $k(1 \le k \le K)$ action feature point.

Mathematical and statistical methods

The data presented herein can be expressed as mean and standard deviation.[5] This paper mainly uses SPSS statistical analysis software and Excel to complete the summary, processing, and extensive data analysis of statistical data.

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

RESULTS

The effect of running on the body shape of athletes

There was no significant difference in height before and after the experiment (P>0.05). Height is an indicator of the growth and development of the body skeleton and the technical level of the longitudinal growth and development of the body in human growth and development.[6] However, most healthy people no longer grow and develop after the skeletal years. Therefore, the primary significance of measuring the healthy height index is to grasp the change rule of their BMI index. The average weight after the test dropped from 59.93kg to 57.7kg. Overall weight has also dropped significantly. This was a significant change before the test (P<0.05). This also suggests that eight weeks of running training is more beneficial to the overall weight loss of the athletes. (Table 1)

There was no significant difference in the bust size between the two tests (P>0.05). Waist circumference, hip circumference, and forearm circumference were significantly different up and down the test (P<0.05). The upper thigh circumference changed significantly before and after the experiment (P<0.05). We use the morphological index in Table 1 to show that long-distance running exhausts most of the muscles and

Table 1. Analysis of body morphology before and after the experiment.

Index	Test group	
	Before experiment	After the experiment
Height (cm)	165.7±5.30	165.7±5.32
Weight (kg)	55.93±6.48	53.7±6.29
BMI (kg/m²)	21.3±2.01	18.79±2.00
Bust (cm)	80.46±3.83	80.42±3.85
Waist (cm)	72.61±2.84	71.4±3.25
Hips (cm)	89.61±4.56	88.44±4.64
Upper arm circumference (cm)	26.93±1.56	25.79±1.51
Thigh circumference (cm)	44.27±2.03	42.93±2.22

loses weight, and reduces the upper body circumference accordingly.[7] This shows that long-distance running can help avoid body fat, rapid body growth, etc.

The effect of running on the physical function of athletes

Resting heart rate decreased by 3.08 bpm before and after the test. The change was significant (P<0.05). This shows that the heart rate per minute gradually slows down after eight weeks of running. It can also further reduce the burden on the heart of exercise patients. Moderate systemic aerobic exercise can promote arterial blood circulation in patients in the short term.[8] Only this way can the peripheral blood vessels expand for a long time. This also keeps it in a stable physiological state.

The average systolic blood pressure of the athletes in the trial was 117.99 mmHg. After eight weeks of training, the average systolic blood pressure dropped to 115.11 mmHg. This indicated that the systolic and diastolic blood pressure changed significantly before and after the test (P<0.01). This shows that eight weeks of long-distance running training can significantly reduce blood pressure.[9] At the end of the test, the average lung capacity is about 3565.35ml per second. This predicted value was significantly changed from the pre-trial comparison (P<0.01). This indicates that long-distance running training can significantly promote the lung function of athletes. (Table 2)

The effect of running on the physical fitness of athletes

It can be seen from Table 3 that the average grip strength after the test is 42.47kg. Compared with the experiment, it changed significantly (P<0.05). This suggests that training for long-distance running can enhance the runner's muscle capacity. The single-leg closed-eye standing test can better reflect the balance ability.[10] The mean value after the one-leg closed-eye standing test was 13.44s. Compared with that before the test, there was a significant change (P<0.05). This also shows that long-term running training has a necessary promoting effect on enhancing the physical fitness of athletes. Running increases the training of muscle capacity and dramatically improves the coordination function of the body.

The impact of running on athletes' psychology

The Mood State Inventory is a form of self-assessment of emotions. The confidence level index is generally between 0.60 and 0.82. The average indicator is around 0.71. It is a table that includes seven psychological and emotional components: tension and anxiety, anger and depression, physical fatigue, depression and anxiety, panic and powerlessness, energy and fatigue, self-esteem, and frustrated self--esteem. We conducted a psychological survey of the runners after eight weeks of long-distance running training.[11] By understanding the psychological and emotional changes after the long-distance running training, it is possible to detect the changes in the athletes' mentality. Table 4 shows the subjective assessment of the players on their psychological states.

Table 2. Research analysis of the effects of physical function before and after the experiment.

Index	Test group	
	Before experiment	After the experiment
Resting heart rate (beats/min)	64.66±3.42	61.58±3.45
Systolic blood pressure (mmHg)	117.99±11.79	115.11±15
Diastolic blood pressure (mmHg)	70.38±8.01	67.82±9.08
Lung capacity (ml)	3416.42±370.44	3565.35±583.14

Table 3. Research analysis of the effect of physical fitness before and after the experiment.

Index	Test group	
	Before experiment	After the experiment
Grip Strength (kg)	42.47±2.77	39.25±3.18
Standing on one leg with eyes closed (s)	10.25±3.22	13.44±5.27

Table 4. Athlete mood change survey.

Project	Changes	N	Changes	N	Changes	N
Nervous feeling	Increase	4	Constant	3	Reduce	5
Anger	Increase	1	Constant	7	Reduce	9
Fatigue	Increase	2	Constant	5	Reduce	7
Depression	Increase	3	Constant	1	Reduce	4
Panic	Increase	1	Constant	5	Reduce	6
Sense of energy	Increase	9	Constant	2	Reduce	2
Self-esteem	Increase	9	Constant	1	Reduce	2

DISCUSSION

The process of urbanization in China is gradually deepening. A passive and immobile state and lifestyle have become common among Chinese urban office workers. A survey report shows that a sinful lifestyle, especially the sedentary lifestyle of more and more people, is one of the main culprits of obesity and sub-health. Being overweight and obese have also become an essential part of Chinese cities' new fast-paced urban lifestyle. Running has created an excellent solution to urban health problems.[12] The flexibility and convenience of running have significantly increased people's autonomy in the running. Runners are unconstrained mainly by time and others like other sports or exercise programs. They are also able to exercise their physical rights fully. This also allows runners to feel in complete control throughout their long run. This fulfills the requirement for individual autonomy.

The training time of female players must emphasize the scientific nature. Players must also adjust the appropriate amount of exercise and training content for different age groups, physiques, body types, health conditions, and training time. Only this way can the maximum training benefit be achieved.[13] The coach should also pay attention to the strength of the trainer's professional guidance and the affinity with the trainer. This achieves a healthy and benign interactive leap in sports. Only in this way can the development trend of Chinese mass sports gradually become universal, lifestyle, scientific and social. The study also pointed out that healthy scientific exercise can reduce the incidence of chronic diseases and improve the quality of life of athletes. Athletes should also cooperate with a healthy diet with balanced nutrition while exercising.

CONCLUSION

There was no significant difference in the bust circumference of the contestants during the test period. During the experiment, there were significant differences in waist, hip, and upper arm circumferences. Changes in leg circumference were particularly pronounced during the trial period. This shows that running for a long time can consume a lot of fat and reduce weight. During the test, there were significant differences in resting heart rate indicators, systolic blood pressure, and diastolic blood pressure. This shows that running for a long time can reduce the myocardial load of athletes and reduce blood pressure. Changes in vital capacity were particularly pronounced during the trial. The mean lung capacity increased. The increase in lung capacity to a considerable extent indicates that the function of the player's respiratory system is

enhanced. It effectively prevents the occurrence of respiratory diseases. There were significant differences in grip strength during the test. This shows that running for a long time can enhance the physical ability of athletes. There was a significant difference between sitting up with one leg and closed eyes before and after the experiment. This shows that running for a long time can improve the coordination of the runners. It also plays an essential role in increasing the physique of the players.

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