THE EFFECT OF SPORTS IN COLLEGES AND UNIVERSITIES ON RELIEVING HYPERTENSION

EFEITO DE ESPORTES NA REDUÇÃO DA HIPERTENSÃO EM ESCOLAS SECUNDÁRIAS E UNIVERSIDADES

EFECTOS DE LOS DEPORTES EN LA REDUCCIÓN DE LA HIPERTENSIÓN EN ESCUELAS SECUNDARIAS Y UNIVERSIDADES

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Tao Tao[1]
(Physical Education Professional)
Min Lu[2]
(Physical Education Professional)

1. Institute of Physical Education and Sports, Beijing Normal University, Beijing, China.
2. Wushu College, Guangzhou Sport University, Guangzhou, China.

Correspondence:
Tao Tao
Beijing, China, 100089.
zcs3366@126.com

ABSTRACT

Introduction: Studies have shown that different forms of aerobic exercise can lower blood pressure in patients with essential hypertension. Appropriate resistance exercises can also effectively lower blood pressure. Objective: To study the impact of sports on hypertension in colleges and universities. Methods: Several hypertension patients in colleges and universities were selected and randomly divided into two groups. One group (drug-only group) used conventional antihypertensive drugs (nifedipine), while the other (physical exercise group) supplemented drug therapy with physical exercise. There was a comparative analysis of the blood pressure of the two groups of patients. Results: The was a clear effect of sports on the hypertensive patients, with significant differences in the blood pressure reduction of the two groups. Conclusion: Sports can help treat high blood pressure. This method is viable for clinical application. ***Level of evidence II; Therapeutic studies - investigation of treatment results.***

Keywords: Sports; University health service; Hypertension.

RESUMO

Introdução: Estudos mostram que diferentes tipos de exercício aeróbico podem diminuir a pressão sanguínea de pacientes com hipertensão essencial; o mesmo é verdade para exercícios de resistência adequados. Objetivo: Estudar o impacto dos esportes na hipertensão em escolas secundárias e universidades. Métodos: Selecionou-se diversos pacientes com hipertensão em escolas secundárias e universidades, que foram aleatoriamente divididos em dois grupos. Um grupo (grupo terapia medicamentosa exclusiva) usou medicamentos anti-hipertensivos convencionais (nifedipino), enquanto o outro (grupo atividade física) utilizou atividades físicas como complemento à medicação. Realizou-se uma análise comparativa da pressão dos dois grupos de pacientes. Resultados: O esporte teve efeito evidente sobre os pacientes hipertensos, gerando diferenças significativas na pressão sanguínea entre os dois grupos. Conclusão: O esporte pode ajudar a tratar a hipertensão. O método utilizado é viável para aplicação clínica. ***Nível de evidência II; Estudos terapêuticos – investigação de resultados de tratamento.***

Descritores: *Esportes; Serviços de Saúde Universitários; Hipertensão.*

RESUMEN

Introducción: Estudios muestran que diferentes tipos de ejercicio aeróbico pueden disminuir la presión sanguínea de pacientes con hipertensión esencial; lo mismo es verdad para ejercicios de resistencia adecuados. Objetivo: Estudiar el impacto de los deportes en la hipertensión en escuelas secundarias y universidades. Métodos: Se seleccionaron diversos pacientes con hipertensión en escuelas secundarias y universidades, que fueron aleatoriamente divididos en dos grupos. Un grupo (grupo de terapia medicamentosa exclusiva) usó medicamentos anti-hipertensivos convencionales (nifedipino), mientras que el otro (grupo actividad física) utilizó actividades físicas como complemento a la medicación. Se realizó un análisis comparativo de la presión de los dos grupos de pacientes. Resultados: El deporte tuvo efecto evidente sobre los pacientes hipertensos, generando diferencias significativas en la presión sanguínea entre los dos grupos. Conclusión: El deporte puede ayudar a tratar la hipertensión. El método utilizado es viable para aplicación clínica. ***Nivel de evidencia II; Estudiantes terapéuticos – investigación de resultados de tratamiento.***

Descriptores: *Deportes; Servicios de Salud para Estudiantes; Hipertensión.*

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INTRODUCTION

With the increase of age, the functional activities of the sympathetic nervous system gradually increase, and the functional activities of the parasympathetic nervous system gradually weaken. This causes vascular elasticity to decrease gradually, the compliance becomes smaller, and the peripheral resistance increases. As a result, blood pressure will increase.[1]

At present, more and more research institutions abroad use exercise therapy as a treatment for hypertension, especially as a non-drug treatment for early and simple hypertension. The effect of Tai Chi, a traditional sports event, for strengthening the body and strengthening the body has been reported from time to time in China. However, the application of this method to the treatment of diseases is still in the exploratory stage.

We conducted experimental observations on elderly patients with grade I hypertension through Tai Chi exercises and achieved good results. This provides theoretical guidance for patients with grade I hypertension to control blood pressure better and reduce drug intake.

METHOD

Research object

The article selected 120 patients with grade I hypertension in outpatient clinics from December 2019 to December 2020. Among them, 68 were males, and 52 were females, with an average age of (62.0±2.2) years, average systolic blood pressure (156.33±2.67) mmHg, and average diastolic blood pressure (96.38±3.23) mmHg. We randomly assigned 60 patients to the control group. All patients in this group take antihypertensive drugs routinely. Another 60 patients were set as the experimental group.[2] All patients in this group used pure Chen style Tai Chi exercises under the guidance of professionals. The selected patients are all patients with grade I hypertension. Exclude hypertension caused by liver, kidney, and cardiovascular and cerebrovascular diseases and other organic diseases. There was no difference between the two groups of patients in terms of age, gender, and time of onset.[3] All patients signed the patient's informed consent with the hospital and voluntarily participated in this experiment.

Research methods

Control group treatment

Sixty patients in the control group took Captopril Antihypertensive Tablets (China-US Shanghai Bristol-Myers Pharmaceutical Co., Ltd., specification: 12.5 mg/tablet). The frequency is 12.5 mg/time, 2 to 3 times/d. The patient has a fixed person, and the blood pressure is measured at a fixed time.

Exercise therapy

Sixty patients in the experimental group were using Chen-style Taijiquan to treat hypertension. The patient stopped all antihypertensive drugs and lipid-lowering drugs and stopped supplements that regulate blood pressure. The patient is on a regular diet and has a regular schedule.[4] Under the guidance of a dedicated person, it regulates the essentials of Chen-style Taijiquan and uniformly requires the frequency and posture of Taijiquan. This can ensure the consistency and effectiveness of the movement. Strictly follow the doctor's advice two times/d, and practice for 40 minutes each time for a total of 2 mon.

Blood pressure measurement

Blood pressure measurement is the main method to assess blood pressure levels, diagnose hypertension and observe the effect of antihypertensive. At present, three clinic blood pressure, ambulatory blood pressure, and family blood pressure are mainly used in clinical and population prevention work. This study mainly used the blood pressure measurement in the office.[5] The same person uses a hospital desktop blood pressure meter to measure the patient's blood pressure every day at two fixed times in the morning and afternoon to compare the systolic blood pressure (SBP) and diastolic blood pressure (DBP). Generally, it is measured twice in each time interval, each time is 10 minutes, and the average value is taken as the blood pressure record in the morning or afternoon of the day. The purpose of this is to ensure the accuracy of the measurement.

Establish a prediction model for potential hypertension

It is known that the penalty coefficient C of the support vector machine determines the degree of compromise between the maximum classification interval and the minimum training error of various physiological data of the human body.[6] Suppose the number of positive categories in human physiological data classification result is far less than that of negative categories. In that case, the sum of the errors of the positive category is very small, and the sum of the errors of the negative category is very large. We use the most optimized conditions to get

$$\begin{aligned} &a_i(y_i(\omega\varphi(x_i)+b)-1+\xi)=0 \\ &\beta_i\xi_i=(C-a_i)\xi_i=0 \end{aligned} \tag{1}$$

It is reasonable $\alpha_i = 0$, $\xi = 0$ when the classification result of the physiological sample data of the person to be predicted is correct. Assume $0 < \alpha_i < C$ then

$$y_i(\omega\varphi(x_i)+b)-1+\xi_i=0,\xi_i=0 \tag{2}$$

Explain that x_i is on the classification interval surface. When $\alpha_i = C$ has

$$y_i(\omega\varphi(x_i)+b)-1+\xi_i=0,\xi_i\geq 0 \tag{3}$$

$$\sum_{i=1}^{N}\alpha_i=\sum_{y_i=+1}\alpha_i=\sum_{y_i=-1}\alpha_i=A,\sum_{y_i=+1}\alpha_i=\sum_{y_i=-1}\alpha_i \tag{4}$$

The problem of unbalanced sample data in the human physiological parameter data set can be solved by the following formula

$$\begin{aligned} &\min\tau(W,\xi)\frac{1}{2}W^2+C\lambda\sum_{i=1}^{l}s_i\xi_i \\ &s.t.y_i(Wx_i)+b)+\xi_j\geq 1 \\ &\xi_i\geq 0,i=1,2,\cdots,m \end{aligned} \tag{5}$$

The weight of the sample class y_i is $\lambda \geq 1$. The weight of the sample s_i is $s_i > 0$. If $0 < s_i < 1$, it means that the role of human physiological parameter sample data in predicting potential hypertension is not important. If $s_i = 1$, it means that the role played by the sample data of human physiological parameters is generally important. If $s_i > 1$, it means that the sample data of human physiological parameters play an important role in predicting potential hypertension.[7] According to the principle of support vector machine, the weighted dual expression is obtained as

$$\begin{aligned} &\max L(\alpha)=\sum_{j=1}^{l}a_i-\frac{1}{2}\sum_{i=1}^{l}\sum_{j=1}^{l}a_ia_jy_iy_jK(x_i,x_j) \\ &s.t.0\leq a_i\leq C\lambda,\sum_{j=1}^{l}a_iy_i=0,i=1,2,\cdots,m \end{aligned} \tag{6}$$

The corresponding discriminant function $f(x)$ can be described by the following formula

$$f(x)=\mathrm{sgn}(\sum_{j=1}^{l}a_iy_iK(x_ix)+b) \tag{7}$$

Suppose the training set is represented by $S = \{(x_1, y_1, s_1),\cdots, (x_m, y_m, s_m)\}$. Meet $x_1 \in R^n, y_1 \in \{-1,1\}, \sigma \leq s_i \leq 1$. Among them, the weight index of the training point y_i = 1/-1.

Statistical analysis

We used SPSS17.0 software for statistical analysis. The measurement data is described by $(\bar{x} \pm s)$. The t-test was used to compare before and after treatment, and P<0.05 indicated that the difference was statistically significant.

RESULTS

The patient's blood pressure changes before and after exercise therapy

We compared the average systolic and diastolic blood pressure of 60 patients in the first and afternoon of 2 months with the systolic and diastolic blood pressure at admission. SBP decreased (18.08±2.31) mmHg (P<0.05), and DBP decreased (7.12±2.56) mmHg (P<0.05). (Table 1)

Comparison of blood pressure between the treatment group and the experimental group after exercise treatment

After two months of exercise therapy, we compared the average systolic and diastolic blood pressures measured in the morning and afternoon between the control and experiment groups. We found that the difference was not significant.[8] This shows that Tai Chi exercises significantly lowers blood pressure in patients with grade I hypertension. It has the same effect of lowering blood pressure without Tai Chi exercise and regular medication. (Table 2)

DISCUSSION

Hypertension is one of the main manifestations of abnormal cardiovascular function. Studies have reported that the prevalence of hypertension in the 35-74-year-old population in China is 27.3%. With the increase of age, the prevalence has shown a significant increase trend.[9] Despite the continuous development of medicine and increasingly advanced medical technology, there is still no effective cure for hypertension. Long-term use of antihypertensive drugs to damage the liver and kidneys and have side effects on the body has always been a problem that needs to be overcome. Tai Chi exercise mainly treats hypertension by balancing yin and yang, adjusting qi and blood, and reducing symptoms. This treatment emphasizes "heart calm and body relaxation, mind conductor." Cultivate "internal qi" and "internal strength" under exercise. Use your mind to guide your movements, squeeze and massage the cardiovascular system rhythmically. This can improve blood vessel tension and reduce blood circulation resistance. In particular, the movement of the waist and the formation of abdominal pressure can increase the blood flow rate, stimulate the endothelial cell receptors and increase the ventilation function of the alveoli.

Table 1. Comparison of changes in blood pressure of patients before and after exercise treatment.

Factor	SBP	DBP
Before exercise therapy	156.33±2.67	96.38±3.23
After exercise therapy	138.25±3.46	89.26±2.18
Blood pressure drop	18.08±2.31	7.12±2.56
P	<0.05	<0.05

Table 2. Comparison of blood pressure changes between the two groups of patients after exercise treatment.

Factor	SBP	DBP
Control group	137.58±3.32	88.48±2.22
test group	138.25±3.46	89.26±2.18
P	>0.05	>0.05

Some scholars analyze the effect of Tai Chi exercise on the blood rheology changes in patients with mild to moderate essential hypertension. The study found that the patient's hematocrit and whole blood viscosity decreased significantly.[10] If you stop exercising, the antihypertensive effect that has been achieved will disappear within two weeks. Therefore, although exercise therapy is effective, it must be persistent. If the patient stops exercising in the middle of the treatment, the patient should continue to take antihypertensive drugs according to the doctor's advice.

The etiology of elderly hypertensive patients is more complicated. Long-term medication can easily cause liver and kidney damage. Physical exercise can effectively improve the health of elderly patients. Some scholars have found that Tai Chi exercise can relieve stress, delight the body and mind, and enhance heart function. Stretching, twisting, and massage during exercise can soothe the liver, replenish qi, and strengthen the kidney qi. This has a better therapeutic effect on hypertension caused by deficiency of liver and kidney yin. Through observation, some scholars have observed that exercise can adjust the mind and breath to adjust the internal functions of the motivation. This can achieve the effect of reducing blood pressure. Some scholars believe that exercise intervention can effectively control blood pressure, especially grade I hypertension.

Degenerative diseases and lack of exercise in the elderly caused muscle atrophy and decreased coordination ability will aggravate the decline of respiratory and circulatory system functions. Many experts have recognized exercise therapy and supported by statistical data in significantly enhancing muscle strength and blood oxygen content. However, patients with moderate to severe hypertension must first be treated with drugs to lower blood pressure when taking exercise therapy. Only when the blood pressure is controlled at <158/98mmHg can the dosage be gradually reduced, and exercise therapy can be used. The medication can be stopped completely when the blood pressure stabilizes at <140/90mmHg.

CONCLUSION

Lowering blood pressure is the most direct way to protect blood vessels and target organs such as the heart, brain, and kidneys from harm. Whether medication or exercise therapy is used, a reasonable choice should be made when medical staff strictly monitor blood pressure. At the same time, we should strengthen our life management and avoid some risky lifestyles that lead to increased blood pressure. For example, quit smoking, quit drinking, abstain from irritability, and choose a light diet and other lifestyles. Only in this way can we fundamentally improve vascular function and reduce the risk of cardiovascular disease.

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