

## OBSERVATION ON THE CLINICAL EFFECT OF TCM TONE-BREATHING EXERCISE THERAPY ON HYPERACTIVITY OF LIVER-YANG TYPE OF HYPERTENSION

YAO HUIJUAN<sup>1,#</sup>, YU ZHEXIN<sup>1,#</sup>, CHEN JING<sup>1,\*</sup>, LI PAN<sup>1</sup>, XIAO MIN<sup>2</sup>, DING XINGTING<sup>3</sup>, JIA SHIXUAN<sup>1</sup>

<sup>1</sup>Beijing DongCheng First People's Hospital, No.130 Yong Wai St. DongCheng District Beijing China - <sup>2</sup>Dongzhimen Hospital, No.5 Hai Yun Cang St. DongCheng District Beijing China - <sup>3</sup>Beijing Chaoyangmen Community Health Service Center, No. 31Dengcao Alley, Dongsinan St. DongCheng District Beijing China

<sup>#</sup>Contributed equally to this work and can be considered as co-first authors

### ABSTRACT

**Objective:** To explore the clinical effect of traditional Chinese medicine Tone- Breathing Exercise therapy combined with conventional western medicine on hyperactivity of liver-yang in hypertension.

**Methods:** 60 patients diagnosed with hypertension (hyperactivity of liver-yang syndrome) from the First people's hospital of Dongcheng District were randomly divided into control group and intervention group. The control group (n=30) received conventional treatment, including essential drug therapy and lifestyle education. The intervention group (n=30) was treated with TCM tone-breathing exercise therapy and conventional treatment. The course of treatment was 4 weeks.

**Results:** (1) Intervention group was better than the control group in the TCM syndrome score, the scores of anxiety scale, and the reduction of 24h systolic blood pressure, 24h diastolic blood pressure and 24h standard deviation of systolic blood pressure.

**Conclusion:** On the basis of conventional treatment, TCM tone-breathing exercise therapy can improve clinical efficacy and play an important role in reducing blood pressure, alleviating symptoms and improving anxiety for hyperactive liver-yang type hypertension.

**Keywords:** Hypertension, TCM, jue tone, anxiety, baduanjin exercise.

DOI: 10.19193/0393-6384\_2021\_6\_564

Received March 15, 2021; Accepted October 20, 2021

### Introduction

Hypertension is a disease characterized by elevated blood pressure of the systemic circulation arteries. It is the main cause of cardiovascular diseases and premature death in the world, and the most important risk factor of cardiovascular and cerebrovascular diseases.

It belongs to the category of "vertigo" and "headache" in Chinese medicine. In 2010, it was estimated that 31.1% of adults (1.39 billion people)

worldwide had hypertension<sup>(1)</sup>, and the prevalence is on the rise, placing a significant economic burden on public health. In western medicine, the cause of hypertension is still unclear. Risk factors that can affect hypertension include high sodium intake, low potassium intake, obesity, alcohol consumption, lack of exercise and unhealthy diet. Emerging evidence supports the concept that immune cells become activated and enter target organs, including the vasculature and the kidney, in this disease<sup>(2)</sup>. The concept of treatment gradually began to focus

on the prevention and reversal the new treatment of immune activation, prevention of hypertension and associated cardiovascular diseases in order to achieve long-term sequelae of target.

In traditional Chinese medicine, the incidence of hypertension is closely related to liver, kidney and spleen. Clinically, common syndromes such as hyperactivity of liver fire, hyperactivity of liver Yang, obstruction of phlegm and dampness, deficiency of kidney essence are common, among which, hyperactivity of liver fire and hyperactivity of liver Yang are the most common. In recent years, traditional Chinese medicine (TCM) characteristic therapies<sup>(3)</sup> have been widely used and have achieved certain effects in the treatment of hypertension with hyperactivity of liver fire and liver Yang, such as point application, acupuncture therapy<sup>(4)</sup>, ear-tip bloodletting, foot bath therapy, massage, five-tone therapy, qigong therapy, etc.

Although mean clinical blood pressure is the gold standard for the diagnosis and treatment of hypertension, recent studies in hypertensive subjects have shown the physiological, pathological and prognostic importance of assessing and quantizing blood pressure variability (BPV) in addition to normal blood pressure values<sup>(5)</sup>.

This research explore the clinical effect of traditional Chinese medicine Tone- Breathing Exercise therapy combined with conventional western medicine on hyperactivity of liver-yang in hypertension. We observed indicators before and after intervention such as the blood pressure, blood pressure variability, TCM syndrome integral. We want to provide a new idea for the application of fitness method of TCM.

## Materials and methods

### General information

The subjects were 60 patients aged 50-90 years old who were diagnosed with hypertension (hyperactivity of liver-yang syndrome) in the First people's hospital of Dongcheng District from May 2020 to December 2020. The study plan was approved by the ethics committee of the hospital, and informed consent was signed with the patients. According to random number table method, they were divided into control group and intervention group, with 30 cases in each group. There were no cases of shedding during the test. There was no statistical significance in the general data between the two groups ( $P>0.05$ ) (Table 1), indicating comparability.

Group	Number	Gender		Age	SBP (mmHg)	SDP (mmHg)
		M	F			
Contro group	30	13	17	78.3±3.87	161.39±10.17	90.6±8.48
Intervention group	30	11	19	76.1±4.97	159.95±11.45	91.7±10.77

**Table 1:** Comparison of general information ( $\bar{x}\pm s$ ).

### Diagnostic criteria

#### Western medicine diagnosis:

According to the Chinese Guidelines for the Prevention and Treatment of Hypertension (2018 Revision)<sup>(6)</sup>, the hypertension definition criteria are as following: when no antihypertensive drugs are used, blood pressure in the clinic is measured three times on different days, and results are  $SBP\geq 140$ mmHg and (or)  $DBP\geq 90$ mmHg.  $SBP\geq 140$ mmHg and  $DBP < 90$ mmHg are considered as simple systolic hypertension. If the patient has a history of hypertension and is currently on antihypertensive medication-hypertension should be diagnosed even if the blood pressure is less than 140/90mmHg. Hypertension was further divided into grades 1, 2 and 3 according to the elevated level of blood pressure.

#### TCM diagnosis:

According to the 2002 Guidelines for Clinical Research on the Treatment of Hypertension with Traditional Chinese Medicine and New Drugs issued by the Ministry of Health<sup>(7)</sup>, the diagnostic criteria for hyperactivity of liver-yang syndrome of hypertension are as follows: main symptoms: vertigo, headache, irritability; secondary symptoms: red face, red eyes, dry mouth, bitter mouth, constipation, yellow urine, red tongue, yellow moss, string and rapid pulse.

### Inclusion and exclusion criteria

#### Inclusion criteria

We received patients who satisfy the following conditions:

- Conform to the diagnostic criteria of traditional Chinese and Western medicine;
- Diagnosed with hypertension in the low-risk group and the medium-risk group;
- 50 to 90 years old; (4) stable vital signs, clear consciousness and normal hearing;
- Voluntarily participate in the research, sign the informed consent, compliance is good.

*Exclusion criteria:*

- Secondary hypertension or severe primary diseases such as heart, brain, kidney, liver and hematopoietic system;
- Dementia, cognitive impairment, hearing impairment and mental illness;
- Pregnancy and lactation patients;
- Serious bone and joint diseases, and unable to cooperate with the test subjects.

*Elimination and shedding criteria:*

- Cases which are not treated according to the protocol;
- Severe adverse events or complications occurred in selected cases and they were unable to continue the study.

**Research methods**

60 patients were randomly divided into the intervention group and the control group. The control group was given routine treatment, including essential medicine therapy (western medicine therapy) and lifestyle education. On the basis of the control group, the intervention group was treated with the traditional Chinese medicine tone-breathing exercise therapy of Ba Duan Jin combined with songs in Jue tone. The 3-5 songs are selected from "Gusu Xing", "Zhegu Fei", "Chunfeng Deyi", "Jiangnan Sizhuyue", "Jiangnan Hao", and so on. Broadcast frequency and time: 19:00-21:00, once a day, 30min each time. Baduanjin Exercise is the version issued by General Administration of Sport of China and is practiced after learning under the guidance of doctors and nurses. The time of exercise is 9:00-11:00, once a day. The course of treatment was 4 weeks. The therapy is operable and repeatable.

*Observation indexes:*

- Dynamic blood pressure monitoring: 24h average blood pressure value, blood pressure variability (24h mean blood pressure standard deviation was selected) and clinical effect were evaluated for blood pressure changes;
- Chinese medicine symptom grading quantification table and syndromes curative effect judgment.

**Statistical analysis**

SPSS 20.0 statistical software was used to analyze the data, and the quantitative data were expressed as mean ± standard deviation. The t test or non-parametric statistical methods were used

to compare and analyze before and after treatment between groups or within groups. P<0.05 was considered statistically significant.

**Results**

**TCM clinical efficacy**

After 4 weeks of intervention, TCM syndrome score evaluation showed that the scores of both groups decreased, and the intervention group was lower than the control group, with statistical difference (P<0.05) (Table 2). The total effective rate was 90.0% in the intervention group and 63.33% in the control group. (Table 3).

Group	Before intervention	After intervention
Control group (n=30)	23.97±7.32	11.31±5.79 <sup>△</sup>
Intervention group (n=30)	24.59±7.12	7.17±5.66 <sup>△*</sup>

**Table 2:** Comparison of TCM syndrome scores between 2 groups (score,  $\bar{x} \pm s$ ).

Group	Exllent	Effective	Invalid	Aggravated	Total effective rate
Control group (n=30)	2	17	11	0	63.33%
Intervention group (n=30)	5	22	3	0	90.0%

**Table 3:** Comparison of curative effect of TCM syndromes between 2 groups (number,  $\bar{x} \pm s$ ).

**Clinical efficacy of western medicine**

After 4 weeks of intervention, compared with before treatment, 24h systolic blood pressure, 24h standard deviation of systolic blood pressure and 24h diastolic blood pressure in 2 groups all decreased, the intervention group decreased more than the control group, the difference was statistically significant (P<0.05); 24h standard deviation of diastolic blood pressure decreased in both groups, but there was no statistical difference between the two groups (P>0.05). (Table 4 and 5). The total effective rate was 86.67% in the intervention group and 66.67% in the control group. (Table 6).

Group	Time	24hSBP	24hDBP
Control group (n=30)	1	158.98±9.91	87.67±7.39
	2	131.51±10.68 <sup>△</sup>	76.27±7.43 <sup>△</sup>
Intervention group (n=30)	1	159.13±12.45	89.83±9.12
	2	128.57±8.48 <sup>△*</sup>	76.23±7.31 <sup>△</sup>

**Table 4:** Comparison of blood pressure between 2 groups (mmHg,  $\bar{x} \pm s$ ).

Before intervention=1; after intervention=2; Compared with before intervention <sup>△</sup>P<0.05; Compared with the control group \*P<0.05.

Group	Time	24hSSD	24hDSD
Control group (n=30)	1	17.12±4.27	12.19±2.35
	2	14.10±3.79 <sup>△</sup>	9.26±2.38 <sup>△</sup>
Intervention group (n=30)	1	18.70±4.77	12.02±3.42
	2	10.95±3.20 <sup>△*</sup>	8.86±1.73 <sup>△</sup>

**Table 5:** Comparison of blood pressure variability between 2 groups (mmHg,  $\bar{x}\pm s$ ). Before intervention=1; after intervention=2; Compared with before intervention <sup>△</sup> $P<0.05$ ; Compared with the control group \* $P<0.05$ .

Group	Exllent	Effective	Invalid	Total effective rate
Control group (n=30)	1	19	10	66.67%
Intervention group (n=30)	4	22	4	86.67%

**Table 6:** Comparison of curative effect between 2 groups (number,  $\bar{x}\pm s$ ).

**Results of hamilton anxiety and depression scale**

After intervention, the scores of anxiety scale in the two groups were lower than before, and the scores of the intervention group were lower than that of the control group, with statistical significance ( $P<0.05$ ) There was no significant difference in depression scale scores between the two groups before and after intervention. (Table 7).

Group	Time	Anxiety scores	Depression scores
Control group (n=30)	1	25.56±5.77	3.12±0.23
	2	15.61±4.12 <sup>△</sup>	2.11±1.43 <sup>◆</sup>
Intervention group (n=30)	1	26.21±5.13	2.10±0.97
	2	10.40±3.57 <sup>△*</sup>	2.09±0.88 <sup>◆</sup>

**Table 7:** Comparison of results of hamilton anxiety and depression scale between 2 groups (scores,  $\bar{x}\pm s$ ). Before intervention=1; after intervention=2; Compared with before intervention <sup>△</sup> $P<0.05$ ; Compared with before intervention <sup>◆</sup> $P>0.05$ ; Compared with the control group \* $P<0.05$ .

**Conclusion**

*In this study, the TCM tone-breathing exercise therapy combined with western medicine conventional treatment was applied to the patients with hypertension (hyperactivity of liver-yang syndrome), and the following results were obtained:*

- The symptoms of the intervention group were significantly improved, the TCM syndrome score was significantly reduced, and the total effective rate of TCM evaluation was 90.0%.
- The 24h systolic blood pressure, 24h systolic

blood pressure standard deviation and 24h diastolic blood pressure in the intervention group were significantly decreased after treatment, and the 24h diastolic blood pressure standard deviation was not statistically significant between the two groups, but the trend of decline was obvious. The total effective rate was 86.67%.

- TCM tone-breathing exercise therapy has significant advantages in improving patients' anxiety state. From the results, we can see the contribution of the therapy in reducing blood pressure, relieving symptoms, and improving anxiety. It provides a new reference for developing clinical ideas, establishing TCM fitness method based on syndrome differentiation and relieving the burden of patients. However, there are some limitations in the sample of this study. The depression scores were all low before treatment. Although no significant difference was observed before and after treatment, it does not indicate that the TCM tone-breathing exercise therapy has no effect on improving the depression state. In addition, the mechanism of TCM tone-breathing exercise therapy in stabilizing blood pressure and protecting target organs still needs to be further explored.

**Discussion**

Hypertension is a major risk factor for cardiovascular disease, occurs in middle-aged and old people because of their high age, decline in the immune system, the lack of correct cognition of disease. They are usually impatient and anxious during treatment. The bad mood will react on the body, make the blood pressure higher<sup>(8-9)</sup>, and cause the illness hard to control. And it has become a major problem affecting public health<sup>(10)</sup>.

Blood pressure variability refers to the fluctuation of blood pressure, which can be expressed by the standard deviation of 24h blood pressure, the ratio of standard deviation to the mean, and variation independent of mean, etc.<sup>(11)</sup>. Blood pressure variability (BPV) can lead to the occurrence of metabolic diseases, cardiovascular diseases and cerebrovascular diseases such as coronary atherosclerotic heart disease, stroke, hyperhomocysteinemia and so on. BPV plays a clear indicator role in the prognosis of these diseases. It can even be used as an independent influencing factor for the perivascular space in the basal ganglia region, and is an important indicator for the evaluation of experimental results<sup>(12-13)</sup>. The diagnosis and

treatment guidelines for hypertension in western medicine have been basically improved, but there are still patients with poor disease control, emotional irritability and serious impact on the quality of life in clinical hypertension. Traditional Chinese medicine characteristic therapy plays an irreplaceable role in this respect, and there are many related researches. Among them, massage, acupuncture therapy and acupoint application, to a large extent, need the operation and guidance of professional medical personnel, which are not conducive to patients' home care and have certain limitations. Compared with the former, Qigong therapy and music therapy have higher patient acceptance, better compliance, easier operation, and they are also free from site restrictions. They have great value for long-term disease management and rehabilitation of patients.

This research used the TCM tone-breathing exercise therapy in the clinical treatment of the hyperactivity of liver-yang type of hypertension. The new therapy showed its superiority in three aspects in the western medicine curative effect, the TCM curative effect and the improvement of anxiety mood. First of all, Baduanjin' characteristics is soft, slow, continuous, and relaxing. It belongs to the category of aerobic exercise. Previous studies have shown that the exercise of Baduanjin helps to regulate humoral factors, improve blood rheology, improve mental state, and achieve a certain antihypertensive effect<sup>(14)</sup>. Secondly, Chinese five-element music therapy is based on five different tones of Jue, Zhi, Gong, Shang and Yu. These songs consist of five tones can improve the human body's psychology and physiology and regulate diseases. The Jue tone (3-mi) is connected with the function of liver and belongs to wood. It has the effect of relieving liver depression, protecting liver, nourish heart and invigorating spleen.

It is often used for liver qi stagnation and emotional irritability relaxing. Most tunes of this kind of music style are kind and fresh, high and clear, which makes people feel happy and optimistic. It is conducive to soothing the liver, regulating qi, calming the liver and inducing Yang, thus reducing blood pressure. The research results of Zhang Sitong<sup>(15)</sup> showed that the application of Jue tone in hypertension with hyperactivity of liver-yang syndrome can pacify anxiety and control blood pressure. The research of Zheng Liwei<sup>(16)</sup> confirmed that the mechanism by which listening to Jue tone can effectively reduce blood pressure is closely related to the improvement of vascular endothelial function

caused by the increase of serum NO concentration and the decrease of plasma ET-1 concentration. They both shows us that Jue tone has good effect on hyperactivity of liver-yang type of hypertension. In this study, the results of 24h mean blood pressure, 24h standard deviation of systolic blood pressure and anxiety score were consistent with those results. That is, the intervention of TCM tone-breathing exercise therapy significantly reduced the blood pressure of patients compared with those without TCM tone-breathing exercise therapy.

The control of systolic blood pressure was stable, the fluctuation was small, and the anxiety was also significantly improved. However, the included cases did not show significant depression before and after the intervention, and no different results were obtained. It may be related to the selected TCM syndrome type, further exploration is needed in this aspect. In addition, after intervention, there was no statistical difference between the 2 groups in the standard deviation of diastolic blood pressure at 24 hours, although the absolute value showed a downward trend.

We believe that this may be due to the limitation of sample size, and Chinese phonetic therapy should also have certain effect on stabilizing diastolic blood pressure variation. In conclusion, TCM tone-breathing exercise therapy plays an important role in improving the physiological and psychological regulation of hypertension (hyperactivity of liver-yang type). It is easy to be accepted by patients, free from site restrictions, suitable for the promotion of primary medical services, and conducive to the long-term management of chronic diseases.

## References

- 1) Katherine T. Mills, Andrei Stefanescu. The global epidemiology of hypertension. *Nephrology*, 2020.16: 223-237.
- 2) Allison E. Norlander, Meena S. Madhur, David G. Harrison. The immunology of hypertension. *The Journal of experimental medicine*, 2018, 215(1): 21-33.
- 3) Bai Yu, Li Quanhong. Research progress of traditional Chinese medicine characteristic therapy on hypertension with hyperactivity of liver Yang. *Abstract of the world's latest medical information*, 2019, 76(19): 99-100.

- 4) Wu Jiaojuan, Zhang Xudong, Zhao Jiping, etc. Clinical study on acupuncture treatment of hypertension with hyperactivity of liver yang. *Medicine*, 2021, 100(17): 1-6.
- 5) Veerendra Melagireppa, Chadachan, Min Tun Ye, etc. Understanding short-term blood-pressure-variability phenotypes: from concept to clinical practice. *International Journal of General Medicine*, 2018, 11: 241-254.
- 6) Chinese Hypertension Prevention and Control Guidelines Revision Committee. Chinese Guidelines for the prevention and treatment of hypertension (2018). Prevention and treatment of cardiovascular and cerebrovascular diseases, 2019, 19(1): 1-44.
- 7) Zheng Xiaoyu. Guiding principles of clinical research on the treatment of hypertension with new Chinese medicine. Beijing: China Medical Science and Technology Press, 2002: 73-77.
- 8) Liu Wanying, Jin Ruihua, Ling Tao. Effect of emotional release therapy on anxiety, depression and quality of life in elderly hypertensive patients in community. *Nursing research*, 2019, 33(16): 2754-2758.
- 9) Zhang Qi, Shi Lei, Leng Hui, etc. Clinical study on the treatment of liver Qi stasis idiopathic tinnitus patients with five elements music therapy of Traditional Chinese medicine. *Journal of Liaoning University of Traditional Chinese Medicine*, 2018, 20(3): 170-172.
- 10) Zhou Fuzhen, Xiao Yingying, Luo Na. Effect of emotional intervention combined with Sizi SAN hot compress on mental state and blood pressure control of hypertensive patients. *Journal of Sichuan of Traditional Chinese Medicine*, 2020, 38(1): 199-201.
- 11) Huang Jiayi, Feng Yingqing. Research progress of blood pressure variability and the occurrence and prognosis of major cardiovascular and cerebrovascular diseases. *Lingnan Journal of Cardiovascular Disease*, 2020, 26 (2): 235-238, 247.
- 12) Chen Yanbin, Yan Yuting. Effect of blood pressure variability on cognitive function and prognosis in elderly hypertensive patients with elevated homocysteine associated with coronary heart disease. *Journal of Clinical Internal Medicine*, 2021, 38 (2): 120-122.
- 13) Qin Wei, Yang Shuna. Correlation between blood pressure variability and enlarged perivascular Spaces in different brain regions. *Chinese Journal of cardio-cerebrovascular Disease in the elderly*, 2021, 23 (3): 260-264.
- 14) Fu Pingping, Zhang Honhbin. Research progress of Baduanjin and Taijiquan in the treatment of essential hypertension and its antihypertensive mechanism. *Hebei Journal of Traditional Chinese Medicine*, 2013, 35(10): 1585-1587.
- 15) Zhang Sitong, Liu Jingwei, Li Junling, etc. Effect of Jue tone music on blood pressure and behavior of hypertensive rats with hyperactivity of irascibility. *World Journal of Traditional Chinese Medicine*, 2018, 13(9): 2117-2121, 2126.
- 16) Zheng Liwei, Wu Lifang, Chen Feng. Effect of Jue tone music on vascular endothelial function in hypertensive patients with hyperactivity of liver Yang. *Chinese Journal of Gerontology*, 2017, 37: 1926-1928.

#### *Acknowledgement*

*Fund Project: "Observation on the clinical effect of TCM Tone-Breathing Exercise therapy on hyperactivity of liver-yang type of hypertension" in 2020 Dongcheng District Health Science and Technology Project, Beijing*

---

#### *Corresponding Author:*

CHEN JING

The First people's hospital of Dongcheng District, No.130 YongWai St. DongCheng District Beijing China

Email: cjing6277@126.com

(China)