

Review Article

Research progress on auricular combined therapy for elderly hypertension

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Abstract: Senile hypertension is a very common and high incidence disease among elderly patients, causing heavy economic pressure to society and patient families. This article reviews relevant medical literature on the treatment of elderly hypertension with ear point therapy. It is found that active prevention of elderly hypertension is more important before onset, including adhering to blood pressure monitoring, strengthening aerobic exercise, emphasizing weight management, and establishing a good lifestyle; the combination of ear acupoints and other therapies is more effective in treating elderly hypertension than single ear acupoint therapy. It can effectively improve the blood pressure level and traditional Chinese medicine syndrome score of elderly hypertension patients, improve their quality of life, and adjust their psychological state. The combination therapy of ear acupoints can effectively compensate for the shortcomings of Western medicine in treating elderly hypertension, playing a good therapeutic role in coordinating blood pressure reduction and improving symptoms. Ear acupoint therapy is easily accepted by patients due to its non-invasive, convenient, and effective characteristics, and is worthy of in-depth research.

Keywords: Auricular therapy, elderly hypertension, review

Introduction

The overall population of China is entering the “aging” process at a fairly fast pace. According to a report, by 2027, China will be transformed into an “aging” society. In addition to the prevalence of metabolic and other risk factors related to the elderly, the incidence rate and mortality of CVD are increasing, becoming a serious threat to the life and quality of life of the elderly population in China. Hypertension, as the main risk factor for CVD, is constantly increasing in prevalence. According to the China Cardiovascular Health and Disease Report 2021, most hypertensive patients require a combination of two or more medications to effectively control their blood pressure [1]. However, at present, primary medical and health institutions in China mainly use Western medicine to treat hypertension [2]. Many patients have poor compliance and are unable to take medication in a timely and regular manner. In addition, medication can easily damage organs and has

other shortcomings. In addition, continuous medication for several years will reduce the patient’s ability to stabilize and regulate themselves, increase the burden on the body, and cause imbalance in the supply and demand relationship of blood flow, leading to important organ damage [3]. In 1956, French scholar P. Nogier first applied the theory of “inverted fetus” to explain the distribution pattern of ear acupoints, aiming to regulate the body and treat diseases by stimulating ear acupoints. The book “Lingshu. The Formation of Evil Qi and Organ Diseases” records: “The twelve meridians, 365 collaterals, have their qi and blood flowing up to the surface and through the empty orifices. The essence and yang qi flows up to the eyes and becomes the eyes, while the other qi flows through the ears for listening”. In Liu Wansu’s “Six Books: Tinnitus Chapter”, it is recorded that “covering the ears is the orifices of the kidneys, and the meridians of the Sun, Shaoyang, Foot Jueyin, Shaoyin, and Shaoyang intersect”. The communication between the

ears and the meridians and organs is of great significance. Stimulating ear acupoints can cause stimulation of the meridians and related organs.

Ear point therapy has the characteristics of good efficacy, non-invasive, high safety, high acceptance and low adverse reactions. Research has found that the dominant diseases of ear point therapy mainly include pain relief, gastrointestinal dysfunction, headache, hypertension, bronchial asthma, arthritis, chloasma removal, pigmentation, acne, rhinitis, neurasthenia, myopia, obesity, gallstones, irregular menstruation, anti-aging, cancer prevention, diabetes, fatigue syndrome, hiccup, menopause syndrome. Ear point therapy has certain advantages in treating the above diseases, especially in terms of specificity for painful diseases, immunodeficiency diseases, and functional diseases [4]. Ear acupoints have also been widely used and studied in elderly hypertension, mainly including simple ear acupoint therapy and combination therapy with other treatment methods. The clinical application of ear acupoint therapy in elderly hypertension is summarized as follows.

Auricular therapy as a standalone treatment

Auricular sticking and pressing

The application of ear acupoint pressure therapy in blood pressure control has been supported by relevant research evidence. Clinical commonly used methods include Wang Buliu Xingzi, magnetic beads, etc. It is advisable to apply light or heavy pressure to the ear acupoints according to the condition differentiation, resulting in a burning or radiating sensation in the ear. Some researchers believe that ear acupoints control blood pressure levels by relaxing meridians, regulating qi and blood, and balancing yin and yang [5]. Stimulation of auricular acupoints can suppress the excitatory focus of hypertension, regulate endocrine levels, restore blood pressure to normal, alleviate symptoms of vasospasm, reduce damage to blood vessels, and protect myocardial cells [6], as well as reduce the level of endothelial damage markers and promote the improvement of patient treatment effectiveness by improving blood pressure [7]. It can also reduce the ACE content in the blood, increase Ang (1-7) content, and lower blood pressure [8]. Scholars

such as Gu Jun et al. [9] believe that ear acupoints can also reduce traditional Chinese medicine syndrome scores, significantly lower patients' blood pressure, stabilize blood pressure levels, and reduce blood pressure variability. Therefore, for patients with high blood pressure variability and concomitant heart disease, ear acupoint pressure therapy can be used in conjunction with adjuvant therapy.

Ear point pricking and bleeding

The pricking and bleeding method is a sterile operation that uses millineedles and other acupuncture points in the ear to prick and bleed. It is used for the treatment of excess heat by balancing yin and yang, relaxing muscles and activating collaterals, and other effects [10]. The relationship between the ear and the viscera is close. In Luo Tianyi's "Health Treasure", "the five organs and six organs, the twelve meridians have collaterals and ears". This explains the relationship between the ear and the viscera. Li Yang's [11] study showed that blood pressure can be significantly lowered by tapping the acupoints at the tip of the ear, and accompanying symptoms of hypertension such as headache and dizziness can also be significantly improved. At the same time, it also has the effect of maintaining a stable heart rate. Research has shown that pricking the acupoints at the tip of the ear to release blood can evaluate typical symptoms of hypertension, such as dizziness, headache, tinnitus, palpitations, and other traditional Chinese medicine syndrome scores. For liver yang hyperactivity type hypertension, it can also improve patient symptoms and assist in reducing blood pressure [12]. Other scholars believe that ear tip bleeding performs well in reducing blood pressure and improving the overall effective rate of symptoms [13]. It is worth noting that pricking and bleeding are invasive procedures that require strict disinfection to prevent infection. At the same time, for patients with damaged or infected bleeding sites and coagulation disorders, bleeding is contraindicated.

Combined ear acupoint therapy

Ear point therapy has a definite therapeutic effect in clinical research, and it can also be effective when combined with other therapies. Some scholars have analyzed that compared to single ear point pressure therapy, ear point

pressure therapy combined with other therapies has more advantages in predicting blood pressure reduction efficacy and TCM syndrome efficacy ranking [14]. The first literature report on the use of ear acupoints combined with other therapies in elderly hypertension began in 1992 [15]. The strategies for treating elderly hypertension with ear acupoints combined with other therapies mainly include combined acupoint application, ear scraping, medication, health preservation techniques, psychological intervention, music therapy, and acupoint massage.

Auricular pressure stimulation combined with acupoint application

Acupoint application is usually used in the field of external treatment, which involves applying traditional Chinese medicine to the corresponding acupoints in the human body to stimulate the circulation of qi and blood in the meridians, achieving the effects of dredging the meridians, promoting blood circulation and resolving stasis, dispersing cold and dampness, regulating the organs, and preventing and treating diseases. The advantage of acupoint application is that it can avoid various adverse reactions that may occur after oral medication, and not affect the overall treatment compliance of patients [16]. Drugs can also stimulate specific acupoints in the body, regulate the balance of yin and yang, and directly regulate the immune system of the human body [17]. Research has shown that the combination of acupoint application and auricular pressure therapy has a significant effect on treating primary hypertension, which can effectively improve patients' blood pressure levels and also improve their quality of life [18]. The combination of acupoint application and auricular pressure therapy can also significantly reduce the levels of systolic and diastolic blood pressure, as well as the incidence of adverse reactions [19]. The combination of acupoint application of nourishing yin and reducing blood pressure formula and ear acupoint application can steadily reduce blood pressure levels, significantly improve clinical symptoms, effectively control pulse pressure and central artery pulse pressure levels, significantly reduce the content of inflammatory factors hs, CRP, and risk factor Hcy in the treatment of primary hypertension (yin deficiency and yang hyperactivity syndrome), and have

high safety [20]. For patients who received both auricular pressure and acupoint application as auxiliary intervention plans, the control effectiveness rate reached 92.00%, which is 20% higher than the control group. Moreover, in terms of reducing blood pressure, the observation group also showed a significant advantage, and the quality of life item evaluation score was higher than the control group ($P < 0.05$) [21]. Acupoint application improves the body and regulates blood pressure by regulating the balance of yin and yang throughout the body.

Auricular pressure stimulation combined with ear scraping

Zhu Danxi's "Danxi Heart Method" elaborates on the relationship between the ear and meridians: "Those who cover the twelve meridians, the upper meridians lie in the ear". The ear is rich in nerves and blood vessels. When the ear is scraped, the blood and nerves in the ear are stimulated, which plays a role in regulating the body, activating collaterals, nerves, and organs, further regulating the immune system and strengthening the body's metabolism [22]. The copper and chromium contained in the copper needle have a frictional effect on the surface skin during scraping, which can have the effects of unblocking meridians, activating collaterals, eliminating blood stasis and dispersing nodules, and regulating the body's barrier function [23]. Therefore, this therapy is particularly suitable for hypertension with qi stagnation and blood stasis.

Hu Yuliu et al. [24] used a randomized single blind number table method to group 60 elderly hypertensive patients with yin deficiency and yang hyperactivity into a control trial. One group received routine oral antihypertensive medication treatment, while the other group received oral antihypertensive medication combined with ear scraping and ear acupoint pressing. The study showed that the combination of ear scraping and ear acupoint pressing was safe, and the total effective rate of reducing blood pressure was 93.33% higher than the control group. Scholars have compared the immediate blood pressure lowering effect, maintenance of long-term blood pressure lowering effect, traditional Chinese medicine syndrome score, and satisfaction between the experimental group

and the control group through random grouping. Research has shown that patients' sleep quality can be improved, the blood pressure lowering effect is good, and adverse reactions are less likely to occur [25]. Therefore, medical personnel can apply this therapy based on the syndrome differentiation of elderly hypertension accompanied by insomnia symptoms, which has the effect of calming the heart, calming the mind, and stabilizing blood pressure.

Auricular pressure stimulation combined with medication

Drugs are absorbed orally into the bloodstream and directly act on the body to produce a hypotensive effect. Ear acupoints can be used as adjunctive therapy for drugs, and due to their convenient, non-invasive, and painless characteristics, they are easily accepted by patients, making them widely used in traditional Chinese medicine hospitals. Clinical practice has shown that the combination of Jiangya Tang and ear acupoint pressing can effectively improve the accompanying symptoms of hypertension patients, reduce systolic and diastolic blood pressure levels, and also protect endothelial cells from damage. On the basis of oral antihypertensive drugs, combined with traditional Chinese medicine treatment and ear acupoint pressing, it can clearly have advantages of traditional Chinese medicine and Western medicine in treating symptoms [26]. Li Yang et al. [27] found that combining traditional Chinese medicine decoction with ear acupoint therapy can reduce blood pressure and traditional Chinese medicine syndrome points. The application of auricular acupoint pressing assisted with amlodipine in the treatment of hypertension with sleep disorders has a significant effect, which can effectively reduce blood pressure while improving the overall sleep quality of patients [28]. Therefore, on the one hand, this therapy can assist in reducing blood pressure, and on the other hand, it can improve symptoms, combine regulation and treatment, and treat both symptoms and symptoms.

Auricular pressure stimulation combined with health cultivation practices

The health preservation method is a combination of ancient philosophical and holistic views, integrating the theoretical systems of traditional Chinese medicine such as "Yin

Yang", "Zanxiang", "Meridians", and "Five Elements". Following the ancient way of nourishing life, it "follows Yin Yang and combines with techniques", thus developing a traditional Chinese medicine rehabilitation system with health as its core, mainly including Tai Chi, Baduan Brocade, Yi Jin Jing, and Wu Qin Xi. The health preservation technique belongs to the modern category of aerobic exercise. Some scholars believe that aerobic exercise on the basis of oral antihypertensive drugs can effectively maintain the antihypertensive effect, and is one of the non pharmacological therapies for hypertension treatment [29]. On the basis of oral antihypertensive drugs, combined with Ba Duan Jin health exercise and ear acupoint pressure application can assist in reducing blood pressure and improving patients' quality of life [30]. Studies have shown that both Tai Chi exercise and the "Eight Sections of Blood Pressure Reducing Brocade" can optimize endothelial function and significantly reduce patients' diastolic and systolic blood pressure levels. Among them, the effect of lowering blood pressure in female patients is far better than that in male patients, which may be related to hormones [31, 32]. Researchers such as Lin Hong randomly divided elderly hypertensive patients into an oral antihypertensive drug group and an oral antihypertensive drug plus exercise Qigong Wuqinxi group. The study found that for patients with mild to moderate hypertension and high blood pressure, practicing traditional Qigong can assist antihypertensive drugs in maintaining blood pressure stability and lowering blood pressure. This technique simulates the typical movements of five types of birds to activate the muscles, bones, and spine, thereby regulating the body's Qi and blood, it belongs to a type of aerobic exercise [33]. Therefore, medical personnel should actively guide elderly hypertensive patients to practice health preservation techniques.

Auricular pressure stimulation combined with psychological intervention and music therapy

Suffering from hypertension can easily lead to psychological problems in patients. After evaluation and summary, anxiety and depression generally account for a high proportion [34]. Various psychological and social stimuli can cause the neuroendocrine system to be in a state of high arousal, thereby enhancing sym-

pathetic nervous activity. The level of catecholamines in the blood increases significantly. Through various channels, catecholamines can damage the vascular endothelium, increase vascular tension, and lead to the formation and deterioration of hypertension [35]. Some researchers speculate that the principle of music intervention in the treatment of elderly hypertension is that music intervention can reduce the levels of systolic and diastolic blood pressure in elderly hypertensive patients. By regulating the body's sympathetic nervous system, it can reduce its excitability, relax the tense blood vessel wall, and thus lower blood pressure [36]. Medical personnel can refer to the traditional Chinese medicine five tone therapy to regulate the five organs and increase music choices for hypertension patients.

Zheng Guozhen and other researchers [37] used ear acupoint pressure therapy combined with psychological intervention to reduce anxiety and depression scores in hypertensive patients, lower blood pressure values, and improve patient quality of life. For elderly hypertensive patients with insomnia symptoms, ear acupuncture combined with psychological care can also improve insomnia, promote sleep, and have a blood pressure lowering effect [38]. Gong Liqin et al. [39] randomly divided elderly patients with hypertension into two groups: one group received routine care, and the other group received routine care combined with ear acupoint pressure therapy and the use of traditional Chinese medicine emotional care for intervention. The research results showed that adding traditional Chinese medicine therapy and care can effectively reduce anxiety, lower blood pressure, and improve quality of life for patients. Other results have shown that psychological counseling and music therapy can stabilize blood pressure control, reduce patient SAS scores, improve symptoms such as anxiety, headache, dizziness, palpitations, and tinnitus, effectively alleviate psychological stress in patients, and improve their quality of life [40]. Medical staff can guide patients in psychological adjustment based on the relationship between traditional Chinese medicine and emotions, thereby improving negative emotions such as anxiety and depression.

Auricular pressure stimulation combined with acupoint massage

According to the "Thousand Golden Wings Formula", every hole, if its name is not merely

established, has a profound meaning. Acupoints are the reaction points and stimulation points where the qi of the viscera and meridians of the human body is transmitted to the body surface. Generally, they are the intersections of muscles or bones on the body surface. Nerves or nerve endings are densely distributed here, usually the specific locations of acupuncture and moxibustion and massage. By stimulating these areas, it is possible to regulate the body's endocrine system, stimulate the nervous system, and thereby regulate the vascular system, synergistically reducing blood pressure [41]. Acupoint massage is the stimulation of corresponding acupoints through massage and massage techniques, which can achieve the goal of relaxing muscles, relaxing blood vessels, promoting blood circulation, regulating vascular resistance, reducing and controlling blood pressure, and reducing the damage of hypertension to various organs. Research has shown that ear acupoint pressure and acupoint massage can effectively reduce blood pressure, and the effectiveness of blood pressure reduction is significantly better than that of simple acupoint massage and ear acupoint pressure alone [42]. Researchers have found that for patients with primary hypertension, ear acupoint pressure application combined with acupoint massage can affect lipid metabolism levels, lower blood lipid levels, improve blood pressure control rate, and improve quality of life and nursing satisfaction scores [43]. Lin Lu's research found that combining ear acupoint pressure and acupoint massage can promote patients' sleep, lower blood pressure, and enhance nursing effectiveness compared to using ear acupoint pressure alone [44]. Other studies have also shown that combination therapy can improve patients' quality of life scores, and it is recommended to promote the use of this combination therapy in clinical practice [45]. Another researcher used a randomized controlled trial to compare the use of antihypertensive drugs alone and the combination of antihypertensive drugs with ear acupoint pressing and acupoint massage. The study showed that the total effective rate of antihypertensive drugs in the latter can reach 96%, significantly improving symptoms such as headache, dizziness, irritability, and irritability. At the same time, it can also stabilize patients' emotions, improve patient comfort, and have high safety [46]. Massage can reduce patients' psychological defense, increase trust, and help to relax

tense emotions, activate muscles and bones, and stimulate the body to regulate qi and blood by touching the skin.

Mechanistic research

At present, there is little research on the mechanism of ear acupoint therapy for treating elderly hypertension. The main mechanisms explained in the literature are feedback regulation theory and sympathetic nerve theory. In addition, more in-depth mechanisms need to be further explored and verified. Future development should be combined with multiple disciplines, and scientific support should be obtained through the use of modern technological means to promote ear acupoint therapy and benefit humanity.

Feedback regulation theory

The nerves at the ear tip acupoints are abundant. After stimulating the acupoints, the generated stimulation is transmitted through the nerve nucleus and fed back to the corresponding organs, causing reactions in the qi, blood, and meridians of the organs, achieving the effect of reducing diastolic and systolic blood pressure levels [47]. Some scholars speculate that the mechanism of ear acupoint pressure application in reducing blood pressure in patients with primary hypertension is the down-regulation of angiotensin converting enzyme ACE and the upregulation of angiotensin 1-7 (Ang1-7) [7]. Other researchers have pointed out that the regulation of blood pressure by ear acupoints is bidirectional, and the mechanism may be to stimulate the vagus nerve, transmit nerve impulses to the central nervous system, integrate with the central nervous system, and then regulate the body's vascular and endocrine systems through efferent nerves, thereby regulating blood pressure. Stimulating the ear acupoints can indirectly stimulate the spinal nerves. After nerve impulses are transmitted to the cerebral cortex, they are integrated into the central nervous system and then have a certain regulatory effect on the organs [48].

Sympathetic nervous system theory

Foreign scholars have found through experiments that increased sympathetic nervous activity is the pathogenesis of hypertension [49]. Research suggests that by stimulating the

“chest lung area” of the ear, the stimulation signal can enhance the activity of endogenous opioid peptide-like substances in the body, stimulate neurons to produce EOP, and bind to receptors, producing an inhibitory effect on sympathetic nerves, reducing heart rate, peripheral blood volume, and arterial blood pressure [50].

Conclusion and outlook

Primary hypertension is believed to have an unknown cause of blood pressure and height, and can also increase the risk of damage to important organs such as the heart, brain, and kidneys. In industrialized countries, the risk of incidence rate of hypertension in a person's life is more than 90%. Essential hypertension is often associated with other cardiovascular risk factors, such as aging, overweight, insulin resistance, diabetes and hyperlipidemia. Minor target organ damage, such as heart, brain, and kidney damage, occurs in the early stages of hypertension and cardiovascular disease, although catastrophic events such as stroke, heart disease, kidney failure, and dementia usually only occur after long-term uncontrolled hypertension. All antihypertensive drugs can lower blood pressure (by definition), and there are differences between drugs in reducing target organ diseases and preventing major cardiovascular events [51]. Nowadays, most hypertensive patients need to take multiple medications in combination with statins to control blood pressure and reduce risk factors. Despite the availability of effective and safe antihypertensive drugs, hypertension and its associated risk factors remain uncontrolled in most patients.

Ear acupoint therapy has a history of nearly 60 years in the treatment of elderly hypertension (Figures 1, 2). There is relevant research literature both domestically and internationally. In summary, ear acupoint therapy can reduce blood pressure levels and has significant therapeutic effects in improving the physical and psychological symptoms associated with hypertension. For example, it can improve sleep, quality of life, and reduce the incidence of adverse reactions to hypertension in hypertensive patients. The accompanying symptoms of hypertension, such as dizziness, palpitations, etc., have also been significantly improved. At

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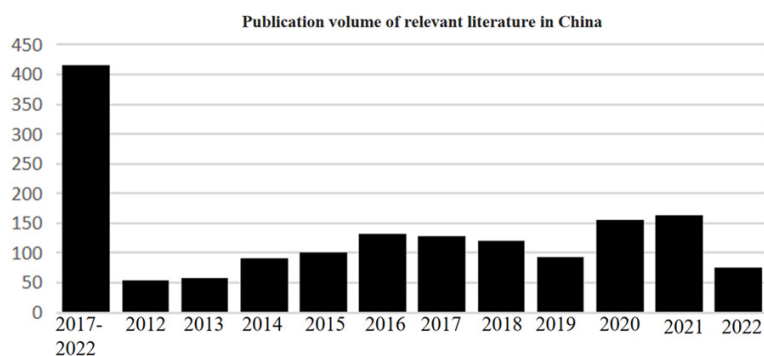


Figure 1. Publication volume of relevant literature in China.

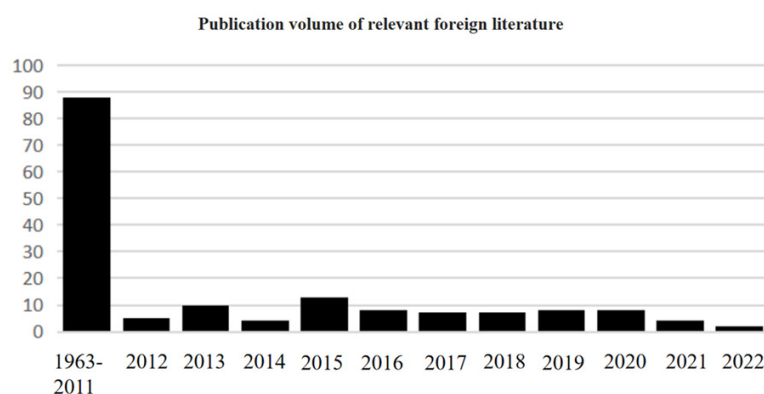


Figure 2. Publication volume of relevant foreign literature.

the same time, it can also reduce the rate of blood pressure variability, stabilize blood pressure, thereby reducing the pressure of the cardiovascular system, and thus reducing the incidence rate of cardiovascular disease (CVD). Although literature review has found that the combination of ear acupoints with other therapies has a significant control effect on hypertension compared to the use of ear acupoints alone, studies by Staley R [52] have found that the period of respiratory gated vagal afferent nerve stimulation (RAVANS) has no significant effect on blood pressure in hypertensive patients. This may indicate that the mechanism of action of ear acupoint therapy is not through individual stimulation of the vagus afferent nerve, but may be the result of a combination of multiple factors.

Medical staff should choose diagnosis and treatment methods for patients based on their specific situation, and there is no relevant literature on the comparison of the effects between ear acupoints combined with other types

of therapies. In response to the characteristics of hypertension with familial clustering, prevention of hypertension is particularly important. Healthy lifestyle habits, including dietary habits, weight management, emotional regulation, and physical examination, are important. For patients with hypertension, maintaining a low blood pressure variability rate can be achieved by using ear acupoint therapy in conjunction with disease management to improve quality of life and alleviate clinical symptoms.

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can be achieved by using ear acupuncture therapy in conjunction with disease management to improve quality of life and alleviate clinical symptoms. Kawabe H et al. [54] argue that young people under the age of 40 should receive education on the relationship between weight and high blood pressure, especially for men, who need to pay special attention to lifestyle habits including drinking and smoking, as high blood pressure in youth is closely related to obesity. Blood pressure monitoring and obesity management should be effective methods for detecting and treating hypertension. Lifelong prevention of hypertension requires understanding the health status of individuals from childhood and maintaining a healthy lifestyle, which is crucial. The appropriate means to achieve this goal is blood pressure measurement. Ruivo JA et al. [55] argue that the level of physical activity in modern urbanized society is clearly insufficient to maintain good health and prevent cardiovascular and other diseases. Aerobic exercise has almost no secondary

effects and is a useful adjuvant therapy for treating hypertension. Aerobic exercise is effective in assisting in the treatment of hypertension, which is similar to the control effect of traditional Chinese medicine on hypertension.

Ear acupoints have complex mechanisms of action, which may be related to the complex relationships between meridians, viscera, acupoints, and qi and blood. However, there is currently less in-depth research on ear acupoints, especially the mechanism of action. Basic research should be strengthened to provide deeper theoretical support for clinical practice. In addition, further verification is needed for various treatments of ear acupoint therapy, especially for the comparison of the therapeutic effects of ear acupoint combined with various therapies, in order to find the most suitable clinical diagnosis and treatment method and provide the best medical treatment for patients.

In summary, ear acupoint therapy has a significant effect on improving blood pressure and symptoms of elderly hypertension. However, the optimal therapeutic effect and mechanism of ear acupoint therapy for elderly hypertension still require more comprehensive and multidisciplinary clinical research in order to better serve patients.

Disclosure of conflict of interest

None.

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