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YOGA AS AN ALTERNATIVE PRACTICE FOR THE REHABILITATION OF PEOPLE WITH HYPERTENSION

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Annotation. This article discusses the ways and methods used in yoga to protect the health of people prone to hypertension. We have examined the indications and contraindications to the use of physical exercises for hypertension, as well as recommendations for the inclusion of special breathing exercises and the exclusion of a number of such exercises from the exercise set. Brief characteristics of breathing exercises in terms of their effect on the autonomic nervous system are presented. Basic relaxation techniques for the rehabilitation of people with hypertension are also demonstrated.

Keywords: yoga, hypertension, blood pressure, heart rate, cardiovascular system, breathing exercises, meditation, relaxation techniques, rehabilitation.

Introduction. Hypertension (essential or primary hypertension) is one of the most common diseases in people over 40 years. According to the World Health Organization (WHO, 25 August 2021, joint press release, Geneva, Switzerland), “over the past 30 years, the number of hypertensive adults aged 30-79 has increased from 650 million to 1.28 million. Older people over 60 are particularly at risk”. Hypertension is a significant risk factor for the development of various cardiovascular diseases, which has been confirmed by a number of epidemiological studies [1-3]. Hypertension is both associated with other risk factors for major diseases and triggers them as well. Arterial hypertension has been found to account for about 50% of cardiovascular mortality [4-5]. There are many factors that can cause it: dysfunction of the central nervous system or the neuroendocrine system, membrane receptor pathology that leads to vascular, cardiac and renal structural remodeling, as well as heredity. [6]. Some authors point out the following main factors of hypertension [1, 4, 5, 7]:

- 1) stress-inducing factors;
- 2) occupational factors also associated with stress;
- 3) genetic predisposition;
- 4) age;
- 5) bad habits (smoking, alcohol, unhealthy diet);

- 6) lack of physical activity;
- 7) excess weight.

In view of the above we can conclude that to prevent and treat hypertension one needs to break bad habits, exclude unhealthy food from their diet. In case of risk, one should get rid of the factors that cause stress and burnout, and start working out. In addition, as a non-drug treatment, there are many different lifestyle-changing strategies that need to be studied.

The aim of the work is to explore the means and methods of yoga for further effective use in the rehabilitation of people with hypertension.

Methods and organization. The literature data analysis included following scientific databases: PubMed, PsycInfo, the Cochrane Databases, elibrary.ru.

Results and discussion. *Effect of physical yoga exercises on the cardiovascular system*

E. Dietrich, A. Safronov, A. Frolov and other researchers in their scientific works have noted the positive effect of yoga exercises on the work of the cardiovascular system [8-14]. It is necessary to pay attention to the structure of yoga classes and take into account the different effects of asanas on the human body. First of all, one needs to understand which exercises should be excluded from the yoga course for hypertension treatment. The following exercises, which increase the tone of the sympathetic division of the autonomic nervous system (ANS) and may provoke a rise in blood

pressure, should be in the exclusion list: asanas for strength with prolonged fixation, dynamic practices, active and deep bending, standing pelvic tilts with the head below the heart with prolonged fixation, balances on hands, inverted asanas. In other cases, these exercises should be performed with caution and only in an adapted version with an experienced yoga therapist.

As Artem Frolov noted in his practical guide to yoga therapy, "Controlled physical effort reduces activity of the sympathetic nervous system and the catecholamine level in the blood. In the whole, the classes are constructed in a mild, relaxing mode, calm dynamics in the rhythm of natural breathing (marjariasana cycle), articular warm-ups without breath-ups and sharp exhalations, ujjayi breathing in the 1:2 ratio are also possible. Arch exercises are used in mild variants and in moderate quantities as asanas that precede longer bends in available variants" [14]. Taking the aforementioned into account, we recommend including the asanas that stimulate the parasympathetic division of the ANS: *tadasana* (mountain pose), *utthita trikonasana*, pelvic tilts with a support (make sure your back is parallel to the floor), *ardha uttanasana*, *ardha parshvatanasana* (adapted versions), tilts while sitting with support, *janu shirshasana*, *pashchimottanasana*, *virasana*, *balasana* (baby pose), *marjariasana* (cat pose) and *shavasana*. We also recommend keeping an eye on heart rate and blood pressure during the whole class.

Effect of breathing exercises of yoga on the cardiovascular system

The ancient yogic texts describe the physiological effects of certain types of breathing, which affect the general state of the body and human consciousness [10, 12, 15, 16].

A number of scientific papers indicate the positive impact of breathing exercises on the cardiovascular system and the possibility of reducing the risk of such diseases as arterial hypertension, coronary heart disease, etc. [2, 3, 8, 11, 17]. For effective yoga practice in the fight against hypertension, it is necessary to know about the effects of breathing exercises on the sympathetic and parasympathetic divisions of the ANS [5, 8, 12, 18]. In yoga there

are various breathing exercises that stimulate the sympathetic nervous system, and such exercises should be excluded from yoga practice for people who suffer from hypertension or have a predisposition to this disease. Such exercises include: intensive breathing exercises with sharp deep inhalations and exhalations, *bhastrika*, breathing techniques with sharp shortened exhalation – *kapalabhati*, usually used in the practice of articulate gymnastics (*Sukshma vyayama*), breath-holding (*kumbhaka*). It is advisable to include breathing exercises that stimulate the parasympathetic division and lower blood pressure (BP), such as full yogic breathing and extended exhalation *ujjayi*, *nadi shodhana*, *bhramari pranayama* and *chandra-bhedana*.

Even a five-minute breathing exercise with a special technique can lower blood pressure and improve cardiovascular performance at least no worse than aerobic exercise or antihypertensive drugs. Here are the results of the work of American researchers from the University of Colorado, published in the Journal of the American Heart Association [19]. The study included 36 volunteers with elevated blood pressure (BP) over 130 mmHg, aged 50-79 years. Half of them performed Inspiratory Muscle Strength Training – IMST (30 inhalations a day at high resistance for 6 days a week), the other part participated as a control group with a significantly lower inhalable air resistance protocol. 6 weeks later the IMST group had lowered systolic BP by 9 mmHg. Such decrease can be achieved with aerobic exercises (30-minute walks 5 times per week) or antihypertensive drugs. The effect persisted even after stopping training (6 weeks after). In the main group there was also a 45% improvement of endothelial function (the ability to expand in response to the corresponding stimulation), a significant increase in nitric oxide level, which is central for vascular dilatation, as well as a decrease in inflammation and oxidative stress. The mechanisms explaining this phenomenon have not yet been sufficiently investigated, but the authors of the study suggest that breathing forces the vascular endothelium to produce more nitric oxide.

The researchers from Colorado presented a simple and accessible non-drug method of blood pressure decrease [19].

Use of meditation for hypertension

One of the important factors that increased HR and BP is stress. To relieve stress and balance the nervous system meditation and relaxation techniques are actively used today. The role of various meditative techniques, such as cyclic meditation, yoga-nidra, visualization techniques, relaxation, etc., coming from the ancient tradition of yoga, are now actively studied by foreign scientists. It is scientifically confirmed that people practicing meditation cope better with stress, they are less anxious, and their nervous system is more stable [9-10]. The data are also presented on Internet resources in foreign databases: PubMed, PsycInfo, and the Cochrane Databases, etc. [9, 15].

The most safe and accessible are the relaxation exercises, the effectiveness of which in treating hypertension is scientifically approved in the studies of V.S. Volkov and A.E. Tsikulin

(1989). Special relaxation therapy, in which a daily relaxation session of 15-20 minutes 2 times a day was used, demonstrated its effectiveness in hypertensive patients. The researchers revealed that in the early stages of hypertension autogenic training itself can be sufficient to normalize BP [20].

Conclusion. Indeed, today yoga is successfully applied as a method of recovery and correction of all systems of the human body, including the abovementioned exercises. Yoga techniques are effective ways to combat hypertension and other diseases of the cardiovascular system. The controlled use of physical activity and properly selected breathing and physical exercises regulates and balances the excitation and inhibition of the central nervous system, strengthens its integrating role in the work of the organs and the body as a whole. However, independent training in yoga for hypertension is not recommended, instead one should contact an experienced teacher of yoga or yoga therapist.

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