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Health aspects of outdoor activities - Possibilities of use of exercise in nature a course of prevention and treatment of hypertension

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Abstract
The aim of the paper is to summarize the basic knowledges of problems with hypertension disease and focuse to its movement therapy. The component of its therapy is the example of outdoor activities lesson in natural enviroment

Keywords: Hypertension disease, secondary prevention, movement aktivity, natural enviroment

Introduction
Hypertensive disease is one of cardiovascular diseases, which significantly and independently increases cardiovascular morbidity and mortality (e.g. Souček & Nevrlka, 2008; Veronese *et al*., 2017) [15, 17]. In developed countries, high blood pressure is a relatively common disorder affecting 10-20% of the adult population. It is one of the strongest risk factors for many other diseases. Hypertensive disease belongs to a group of "civilization diseases." These are generally associated with a type of lifestyle produced by modernity, in which the main contributive causes are industrial mass production, as well as the intake of calorie-rich foods, a significant decrease in physical activity, excessive consumption of alcohol and cigarettes, and augmented stress levels (Widimský *et al*., 2008) [19]. Král (2007) [7] states that the total cost of treating cardiovascular diseases in the EU amounts up to 169 billion of Euros. Some of the causing factors can be avoided to an extent. This can be achieved particularly with lifestyle modifications, which might include changes in exercise and dietary habits. Aside from the description of fundamental facts about hypertensive disease, this paper will also focus its attention on physical activity in nature.

Characteristics of disease
Vondruška and Barták (1999) [18] describe hypertensive disease (high blood pressure) as one of the most common cardiovascular diseases. It is one of the key risk factors in developing many other diseases, such as stroke or ischemic heart disease. It is defined as the value of blood pressure /further BP/ measured at rest that exceeding 140/90 mmHg. This is a case of permanently elevated blood pressure in both systolic pressure in heart contraction and diastolic pressure during which the heart rests /Tab. 1/.

Table 1: Classification and ranges of blood pressure (Vondruška & Barták, 1999) [18]

Blood Presure	Value (mm Hg, torr)	Classification
Systolic pressure	up to 140	Normal
	140 – 159	Border range
	nad 160	Hypertension
Diastolic pressure	do 84	Normal
	85 – 89	Border range
	90 – 104	Mild Hypertension
	105 – 114	Moderate Hypertension
	nad 115	Severe Hypertension

According to Palatini (2010) [12], it is generally assumed that the normal sinus rhythm can vary between 60 to 100 beats per minute and is usually between 70 to 80 beats per minute. Further, Palatini points out the connection between high heart rate and increased development of hypertension, ischemic heart disease and sudden death, and suggests that it would be wise to redefine tachycardia threshold to about 85 beats per minute. As stated by Ostchega, Dillon, Hughes, Carroll & Yoon (2007) [11] based on new data from the National Health and Nutrition Examination Survey, blood pressure values in both adolescents and adults have been revised and subsequently, for example, BP of ≥ 120/80 was relabeled as "prehypertension."

According to Svačina (2006) [16], this disorder has usually no symptoms. In severe cases, it can manifest itself mainly as a headache, dizziness, fatigue or sleep disorder. If a specific cause is discovered /kidney disease, vascular disease, endocrine disease, etc./, then the hypertensive disease is classified as the so-called secondary hypertension. However, most cases fail to establish an "organic origin," thus the disease is classified as essential hypertension with a multifactoral cause. According to Nevrlky and Součka (2006) [10], the persistence of severe hypertension leads to the development of serious life-threatening complications in organ and system functions. In this regard, we can speak of a hypertensive crisis, in which a gradual or sudden development of a life-threatening condition is characterized by hypertension and damage to vital organs. Here, the blood pressure values exceed by 30 - 55% of 95th percentile of the norm. Sajadieh *et al*. (2004) [13] emphasizes that the clinical manifestations and severity of hypertension depends not only on the maximum values, but predominantly on the rate in which the blood pressure rices. A sudden rise of pressure accompanying various states of emergency leads to more severe symptoms and clinical images than the gradual rise of equal values.

Blood pressure is determined by two basic mechanisms. The first is characterized by the filling of a vascular bed. This depends on the minute cardiac output and peripheral vascular resistance, which is influenced by the functional and structural change in the vascular bed. In physiological conditions, blood pressure is maintained by an optimal dynamic balance between pressoric and depressoric mechanisms, and locally and systemically acting humoral factors. Arterial hypertension is the consequence of absolute or relative superiority of pressoric mechanisms or the lack depressoric mechanisms (Lakka & Laksonen, 2007) [8].

Treatment, secondary prevention

Based on the current knowledge of medical science, the fundamental prerequisite to the management of hypertensive disease is the patient's will and willingness to consistently follow a complex method of treatment. The therapeutic procedures can be divided into non-pharmacological and pharmacological treatment. The non-pharmacological treatment is implemented in treatments of all patients suffering from hypertension. The pharmacologic treatment is used for all patients with sBP higher than 180 mmHg and/or with dBP higher than 105 mmHg. Patients with mild hypertension /BP 140-179/90-104 mmHg/ use non-pharmacological treatment, but these patients are subject to regular medical check-ups (Souček, 2008) [14, 15]. Basic components of treatment are the maintenance of a reasonable body weight, reduction of factors of stress and tension, moderate supply of salt and increased potassium intake, and last but not least, appropriate and adequate physical activity (Műllerová, 2003) [19]. Other fundamental aspects of the treatment are changes in lifestyle, which include a correct diet, an increase of active motion and a reduction of harmful habits. There is a proven close relationship between blood pressure and weight, such as that weight loss helps to lower blood pressure without the need to make changes in salt intake. A reduction in body weight leads to the lowering of pressure measurable by a sphygmomanometer and to the lowering of intra-arterial pressure (Nevrlka & Souček, 2006) [10].

People suffering from hypertension can benefit from a suitable regular movement, mainly via peripheral mechanisms. After physical activity, the supply of oxygen to the exercised muscles increases. Blood pressure is not affected during physical activity. Working out is suitable especially for patients with mild hypertension, for young patients and for middle-aged hypertension patients (Vondruška & Barták 1999) [18]. Widimský *et al*. (2008) [19] recommends only isotonic exercises. Fitting physical activity has a favorable affect on blood pressure and evidently reduces the values of resting BP by 10 to 15 mmHg in both systolic and diastolic values. This affect is even greater in cases where an obese patient also undergoes a weight loss, lowers total body fat percentage and adjusts the BMI value.

Principles and recommendations for therapy

Due to their health and environmental benefits, various forms of physical activity in nature are important in addressing the quality of life of every individual (Kirchner, 2007; Kirchner & Rehor, 2010) [5, 6]. Generally, it is necessary to follow certain principles during the implementation of physical activity and fitness workouts. For every person diagnosed with hypertension, it is highly desirable that they complete a complex clinical examination including a stress test to reliably determine a safe level of stress tolerance and the limit for exercise exertion, which is expressed by the value of heart rate (Lakka & Laksonen, 2007) [8]. In patients with hypertension at rest, with a relatively good response of BP to physical stress, it is possible to recommend an endurance exercise /which has a positive impact on health/ of similar intensity and duration as those performed by healthy individuals - i.e. a frequency of 3 - 5 times a week for 20 to 60 min. with an intensity of physical stress from 50 to 80% of maximum heart rate response /in old age with a lower intensity of about 30 to 50% of maximum heart rate reserve/. For people who have normal resting blood pressure, but who respond to a dynamic physical exertion /like bicycle ergometry/ with increased pressure, it is recommended to make changes in lifestyle /such as the elimination of stress, the avoidance of excessive consumption of salt and drinks with caffeine or alcohol, combating of obesity, etc./ in order to minimize risk factors for developing hypertension (e..g. Jatoi *et al*., 2017; Král, 2007; Souček, 2008) [4, 7, 14, 15]. Vondruška and Barták (1999) [18] recommend zero strength training for individuals who respond hypersonically /with an increased blood pressure/ to static physical stress /such as dynamometry/. Sajadieh *et al*. (2004) [13] maintain a view that overseeing the activities of a hypertonic who doesn't have an explicitly hypertensive response to static physical stress, shouldn't be as strict. It st possible to combine a continuous dynamic stress with a physical activity, which includes elements of light and medium static stress, under the condition that the dynamic activity dominates significantly. However, even then, in the case of dynamic stress, the BP of a

hypertensive individual should not exceed the values of 220 mmHg of systolic and 100 mmHg of diastolic pressure. Dynamic endurance workouts should be accompanied by stretching exercises that target muscles with the tendency to shorten and by mild forms of muscle strengthening targeting especially muscles with the tendency to weaken and relax at the same time. In such a case, strengthening workout is to be performed with a minimum weight and conditional regular breathing (Hošková & Matoušová, 2003; Vondruška & Barták, 1999) [3, 18].

A workout unit consists of initial, main and final phases, where during the initial phase occurs a warm up and the preparation of the organism for a subsequent aerobic exertion in the main phase, while the final phase of exercise proceeds with calming relaxation (Hošková & Matoušová, 2003) [3]. According to Král (2007) [7], it is beneficial to measure BP before beginning of workout and in the last minute of the aerobic phase. If the BP value at the beginning of the workout is not within the normal range, it must be checked during the course of a workout. Consequently, the intensity of the exercise might need an adjustment. In addition, subjective feelings of the exercising patient need to be monitored as well. Heart rate /further HR/ should be monitored during the entire exercise using sport testers. Its values are recorded before exercise, after the first and second aerobic phase and after the final phase. According to Havlíčková (2003) [1], establishing the right intensity of physical stress is an important aspect of the recommendation of physical activity for each individual. The determination of appropriate intensity can be based on the so called respectable objective measurable parameters, or on the rather subjective feelings of an individual. The objective parameters include heart rate, power /measuring unit is W, m/s/, or used energy /measuring unit is KJ, kcal/. The use of heart rate in finding the correct intensity is viewed as the most important determination method. This can be based either on calculations from estimated values /derived from age and value of HR at rest/ or more precisely, on a completed stress test.

For physical activity in cases of hypertension, Souček and Nevrlka (2008) [14, 15] recommend a value of 60-75% of HRmax /HRmax = maximum heart rate, it can be estimated by calculating HRmax= 220-age/. If it is possible, we are more likely to work with values that take into account the HR at rest. Here, we talk about the percentage of the cardiac reserve. Then the recommendation looks as follows, Hrrecomended = Hrrest + 0.6 x (HRmax - HRrest). The coefficient /here given as 0.6/, is of course different according to the state of an individual, his or her physical fitness and the length of the physical exertion. The intensity of physical stress can be also monitored by the so called subjective parameters, such as the Borg‘s scale or the so-called "talk test". In talk testing, if an individual can talk during an exercise, then the intensity is adequate. When it comes to the duration and frequency of the exercise, according to Souček (2008) [14, 15], a suitable workout should be 45-60 minutes of exercise 2-3x a week, or 30 min. of exercise daily, or at least every other day. When exercising, it is important to monitor perceptions and subjective feelings such as pain /chest in particular/, dyspnea, nausea, "dizziness" or extreme tiredness. When devices for measuring blood pressure or heart rate are available, an increased attention should be paid to irregular HR and to too large increases or drops in BP during an exercise. The selection of an endurance activity should take into an account the age, gender, and the state of the musculoskeletal system of an individual, as well as his or her hobbies and skills. For example, running is suitable exercise in cases where the patient used to run and the return to the activity has a significant motivational character. For others, walking is the best suitable activity, though patients with severe disorders of the lower limbs must be excluded (Herber & Ulrych, 2003) [2].

Example of a workout unit

The proposed exercise /workout/ unit consists of three parts, an opening /5-8 min./, an aerobic phase /approx 30 min./ and a final phase /10 to 15 min./ into a normalization of blood pressure and heart rate.

When creating a workout unit, we use the principles and recommendations of its assemblage given by Herbert and Ulrich (2003) [2], Hošková and Matoušová (2003) [3], Lakky and Laksonen (2007) [8] and Vondruška and Barták (1999) [18].

Workout unit for middle-aged hypertensive patients

The aim of this unit is to improve the performance of the cardiovascular system, to loosen carrying joints and to improve the breathing stereotype.

The opening phase /5 to 8 min./

A walk with an alteration of its rhythm and stride length, /i.e. the so called shifting and fluxional step, walking alternately in calf raises and on heals/

A protraction and retraction of the shoulder joint

A fist clutching and a subsequent release with arms abducted sideways while walking.

The main phase - compensational /10 to 15 min./

Sitting on the ground - protraction and retraction of the shoulder joint, shoulders are pulled down while exhaling /the aim is to relax muscles of the shoulder joint/

Sitting on the ground - head bows to the right and left, crossing from the left to the right in a forward arc movement during an exhale /the aim is to relax neck flexors, cervical spine and the upper part of the trapeze muscles/.

Sitting on the floor – legs wide open, turning the soles of the feet inward while inhaling, turning the soles of feet outward and simultaneously contracting the gluteus muscles while exhaling /the aim of this exercise is to relax the muscles of the hip/

Standing using a tree for support – alternating back leg lifts during an exhale /the aim of this exercise is to activate gluteus muscles/

Standing using a tree for support – alternating leg abductions during an exhale /the aim of this exercise is to activate abductors of the hip joint/

Stand with legs slightly apart - arms lifted upward sideways, palms facing inward, torso rotations alternately to the left and right with an exhale /the aim of this exercise is to relax and stretch muscles of the torso and to stretch muscles of the chest/.

The main phase - emerging /about 20 min./

Endurance training based on individual fitness levels, 15 to 20 min., best performed in nature, alternating between running and walking, with a prescribed intensity of exertion.

The final phase /5 - 8 min./

Sitting on the ground, releasing muscle tension in the lower limbs by "shaking" the muscles. Deep diaphragmatic breathing with simultaneous observance of chest movements.

Standing with the right leg bent at the knee and tucked back,

the right hand is pressing the top of the foot toward the right buttock, knees are together, and the pelvic sits in.

Conclusion

The goal of this paper was to summarize the fundamental knowledge about hypertensive disease and to center attention on its treatment by exercising in nature. It also includes a proposal of a workout unit for middle aged patients with hypertensive disease.

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