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RESPIRATORY GYMNASTICS, MEANS OF IMPROVING THE HEALTH CONDITION TO HIPERTENSIVE PERSONS

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Abstract
Aim. Through the resulting complications such as myocardial infarction, stroke or heart failure, essential hypertension is placed first among causes of cardiovascular mortality. Thus, it becomes necessary to apply all the means by which to combat the cardiovascular risk factors and cardiac activity is facilitated.
Purpose. For proper functioning of the cardiovascular system need a healthy respiratory system to provide vital oxygen to all cells and tissues of the body. In these circumstances, the identification of a therapy based on movement, but accesul and effective with minimal side effects and the possibility of applying to as many hypertensive patients, regardless of age, underlying disease, lifestyle adopted is a necessity.
Methods. It is assumed that respiratory gymnastics can improve the health and quality of life of people with essential hypertension. The study was conducted on a number of patients of the Medical Center Class, aged 45-56 years, diagnosed with essential hypertension and beneficiaries of a program-model of respiratory gymnastics for 3 weeks. Basic methods used were study case and the experiment.
Results. After monitoring patients, we found that a respiratory gimnastics program increased patient quality of life.
Conclusions. Development and implementation of a respiratory gymnastics program aimed to increase exercise capacity is a compulsory requirement for improving the health condition to hypertensive.
Key words: hypertension, respiratory gymnastics, quality of life.

Introduction

Essential hypertension is an important public health matter.

According to the World Health Organization reports (Romanian Journal of Cardiology, 2007), this is ranked first in terms of cardiovascular mortality.

In 95% of the cases, the aetiology of the disease is unknown (essential) although it is stated that alcohol intake and obesity may play an important role (Hope, Longmore, Hodgets et al., 1995).

The process of demographic ageing which is ongoing both globally and nationally contributes to a high percentage of patients with essential hypertension.

Due to the incidence of hypertension and cardiovascular and cerebrovascular diseases caused by it, the costs for patients' diagnosis and treatment administration are constantly increasing.

Under these circumstances, it is necessary to apply all means to fight against cardiovascular risk factors. The personal attitude to eliminate all cardiovascular risk factors has the potential to prevent atherosclerosis and to delay the onset of its manifestations and consequences, in the event of its installation.

The risk of cardiovascular disease increases exponentially with the number of risk factors present on an individual.

Karassi (1988) claims that "*when risk factors are associated, their effects do not add up, but they multiply*".

Controlling risk factors is one way to improve the cardiovascular activity.

The heart is able to provide for each organ of the human body continually, throughout lifetime, the food and energy necessary for a normal functioning due to the heart muscle properties (excitability, automatism, conductivity and contractibility).

To fulfil its function, the heart needs a proper environment, a healthy lung that will permanently provide essential oxygen for the body. If blood is not freed from harmful impurities that saturate it, from carbonic acid gas through the regenerator process from the lungs, it will return in the body through the arteries, and its obvious result will be illness.

According to Hough, (2001) the neighbourhood relations between heart and lung are reflected in their integrated response at disturbances in each other, especially when intravascular pressure is involved.

Arădăvoaice (2010) mentions stress as a major factor in generating 75% of cardiovascular diseases.

Selye (quoted in Luban-Plozza, Pozzi and Carlevaro, 2000) defines stress as the body's general adaptation syndrome against any type of aggression. For the body to adjust to this, it releases hormones as well as cortisol, adrenaline, increasing the amount of glucose and energy substances in the blood and enhances the activity of the heart, increasing blood

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pressure.

A certain amount of stress is good for a person, it is useful due to dynamism and extra energy they emit, but the body's resistance potential overuse can cause cardiovascular disease.

Stress phenomenon, continuously increasing in the modern life of the contemporary man, leads to increased blood pressure and heart rate, as well as a fast and shallow breathing.

Often, daily life causes modern man to adopt a rhythm too accelerated, often experience anxiety, irritation, and other negative moods, influencing thus the speed and quality of breathing.

On the other hand, modern man lifestyle becomes increasingly sedentary, reason for which Nussio (2009) believes that it makes us use only one tenth of our breathing capacity.

Whether at home, or at work, people take extended static positions, often wrong, unconsciously modifying their natural way of breathing and developing the habit of shallow breathing, not deeply, limiting oxygen inputs to a vital minimum.

In this context, we believe that including breathing gymnastics in the treatment regimen of individuals with essential hypertension can offer a new insight into the evolution of this disease with the possibility of fast recovery, with the lowest biological and material cost.

Breathing gymnastics programs are needed for both healthy individuals who have lost this practice, and hypertensive individuals, blood oxygenation being essential for the entire body. Oxygen intervenes in all chemical processes in the body and it is a vital element which, on one hand, can synthesize beneficial elements, and on the other hand, eliminates toxic substances from the body.

Hypertensive individuals must learn correct breathing which relaxes the chest muscle and which makes the diaphragm and lungs function at full capacity.

A physical training without proper breathing will lead to rapid fatigue and lower results in terms of benefits gained after practising the physical training program, benefits represented by the relaxation of the entire body, stress relieve, improvement of internal organs efficiency and the entire body respectively optimization of quality of life.

Moreover, "*breathing is the fundamental motivation of the body*" (Maddock, 1998) if this function were absent, we would suffocate and there would be no life.

Methods

The aim of this article is to improve the health of individuals with essential hypertension through breathing gymnastics programs and to see, first, to what extent the subjects accept, understand and respect the latter, and secondly, to determine their influence on the hypertensive individuals' quality of life.

Research methods used to demonstrate the positive influence of breathing gymnastics on the above mentioned individuals were: theoretical documentation method, observation method, survey method, experimental method, specific measurement and evaluation methods, graphical method, case study method.

The study was conducted on a number of 5 subjects, aged 45 to 56 years, diagnosed with essential hypertension.

They were evaluated in September 2012 through anthropometric and functional measurements, the breathing gymnastics program being applied on subjects for 3 weeks, between September 2012 and October 2012.

Devices for data measuring, recording and processing such as: pulse oximeter, blood pressure monitor, meter band, questionnaire to inquire on the level of quality of life (well-being) were purchased to evaluate and monitor subjects.

We mention that this study is ongoing, which is why there was not an intermediary evaluation of the subjects, but the role of breathing gymnastics on them was identified using certain parameters monitored on every training session.

Also we point out that this article is part of the first author's PhD thesis.

The comparative study was conducted at the Medical Class Centre of Bucharest, where the minimal existing material equipment of the centre's physiotherapy room was used and the subjects were given special attention during the training itself to avoid any unpleasant incidents and accidents due to physical effort.

We emphasize that no subject was pushed to the limits in terms of effort tolerance, knowing that, at the beginning, exercise may cause slight dizziness due to increased arterial blood oxygen saturation.

The subjects who benefited from the breathing therapy were chosen based on the following inclusion criteria:

- Resting heart rate over 60 beats/minute,
- Age up to 65 years,
- Systolic blood pressure between 100 -170 mmHg,
- Absence of lung disease,
- Absence of angina pectoris or other significant symptoms during effort test and actual effort: dizziness, shortness of breath, dyspnoea, headaches
- Subjects' consent to cooperate within the study,
- Subjects' full involvement in this study.

Subjects who met the inclusion criteria were evaluated in terms of somatometric and functional

parameters and were included in a breathing gymnastics program.

According to Albu, Rascarachi, Albu, Rascarachi, (2001), "*a breathing gymnastics session is a methodical lever with large medical and psycho-pedagogical valences*" whereby the specialist, applying the developed program, influences the hypertensive' breathing function inferring on blood circulation, cardiac effort and, ultimately, quality of life.

The objectives of the program, taken and adapted from Avramescu, (2007), Armean, (2004) and Cinteză, Marcu, (2011) are represented by the following:

- ✓ Balancing the nervous system and neuro-psychological relaxation;
- ✓ Decreasing cardiac effort for a given effort level;
- ✓ Increasing lung elasticity to improve lung volumes and increasing vital capacity;
- ✓ Promoting vasodilation in skeletal muscles and decreasing peripheral resistance;
- ✓ Improving coordination as a means of relaxing muscles;
- ✓ Reaching and maintaining optimal body weight;
- ✓ Preventing atherosclerosis phenomena;
- ✓ Educating the subject and the family to adopt a reasonable lifestyle.

The breathing gymnastics model program applied on hypertensives consisted of exercises that trained breathing muscles on all three levels of the lungs. These were determined according to health, age, gender, level of training, effort or ability of each of the subjects.

The breathing gymnastics program included moderate intensity aerobic exercises during which the heart contracts faster and harder to meet the oxygen demands at the level of the muscles involved in the effort and the breathing capacity increases. The program carried out for 30 minutes, 3 times a week, included extensive movements of arms and legs in order to increase the force of contraction of the heart muscle, but also exercises that were based on coordination, balance, twisting torso to rebalance the nervous system.

By working the muscle mass, the body's maximal oxygen consumption increases the benefits reflecting on cardiovascular activity and implicitly on the hypertensive evolution. This aspect is also supported by Aronow, Fleg, Rich, (2008).

All exercises were combined with the breathing activity, except for those used at the beginning of the session that were meant to activate the structures involved in ventilatory dynamics.

The breathing gymnastics stages are similar to those of any physical training: a warming up period, known as one of "*warm-up*" (Cinteză, 2005), an actual effort period and a relaxation period, "*cooling*" or „*cool-down* "(Tache, 2001).

In terms of physical training methodology used to improve the cardiovascular functional capacity as well as the resistance of subjects with essential hypertension, the parameters of the effort carried out by the latter can be highlighted as follows:

- ✓ Type of exercise → aerobic exercise
- ✓ Frequency → 3 times a week
- ✓ Exercise intensity→ moderate 60-75% of theoretical maximum heart rate
- ✓ Time→ 30 minutes

The 5 subjects, who benefited from the above mentioned program, are not a homogeneous group, even if they have the same diagnosis and are adults with ages ranging between 45 to 56 years.

Some of them are ongoing an anti-hypertensive treatment, others must follow a diet, but each of them needs a reasonable lifestyle where complying with rules such as fighting against extended stress and cardiovascular risk factors (smoking, obesity, hypercholesterolemia, hypertension, physical inactivity, unhealthy diet) is imperative in order to reduce the risk of cardiovascular disease.

Following the subjects' evaluation, we obtained data that we introduced in tables and charts representing basic information on them used to assess their progress in terms of kinetic.

Results

The following somatometric parameters were monitored and studied: height, weight, chest perimeter (during inhale and exhale), chest elasticity, hips and abdomen perimeter.

By analysing the values of these parameters we can observe:

- All subjects have a low and very low chest elasticity, with values ranging between 1-4;
- Abdominal perimeter has values over 110 and indicates cardiovascular risk all subjects of the present study are exposed to;
- Body Mass Index (BMI) values are very high, ranging from 31, 64 to 38,6, indicating the presence of first degree of obesity (BMI: (BMI: 30 to 34,99) and degree II of obesity (BMI: 35 to 39,99).

The table below presents personal data and subjects' somatometric assessment on initial evaluation.

Summarizing the values of the functional parameters measured at rest, we can state that, unlike the values of heart rate and systolic and diastolic blood pressure, breathing rate and those of arterial O2 saturation are not appropriate.

The respiration rate with values ranging between 18-33 breaths/minute is a high one, considering that the normal limits are between 16-18 breaths/minute.

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Subject 2 has the highest values while subject no.3 has the lowest breathing rate among the values registered. The latter presents a better thoracic elasticity than the others.

The saturation in O_2 of the arterial blood (SpO_2) has values between 94-96 % on all subjects.

Cardiac rate is lower at Subjects no.1 and 5 comparing to the others, but within normal limits, due to both beta blocker and anti-depressing medication that they are taking.

Table 1. Subjects of the study: personal data and anthropometric evaluation

	Subject 1	**Subject 2**	**Subject 3**	**Subject 4**	**Subject 5**
First and last name	S.E.	M.I.	C.J.	D.C.	C.A.
Gender	Female	Male	Male	Male	Female
Age (years)	56	57	46	54	42
Diagnosis	Hypertension, ischemic heart disease	Hypertension, ischemic heart disease, hypercholesterolemia	Hypertension,	Hypertension, ischemic heart disease	Postpartum hypertension
Heart medication	Beta blockers, antihypertensive	Refuse medical treatment	Without medication	Without medication	Beta blockers
Height (cm)	154	176	185	182	165
Weight (kilos)	75	108	111	104	105
Chest perimeter (during inhale)-cm	111.5	119	120	116	111
Chest perimeter (during exhale)-cm	110.5	117.5	124	119	108.5
Chest elasticity (cm)	1	1.5	4	3	2.5
Hips perimeter (cm)	110	118	111	109	124
Abdominal perimeter (cm)	111	121	112	110	110
Body mass index	31.64	34.95	32.45	31.41	38.6

We can encounter slightly increased values at Subject no.3 and 4. Increased cardiac rate is a risk factor for cardio-vascular mortality and morbidity both for healthy subjects and for those that have essential arterial hypertension or other cardiac pathology, and this statement is sustained by a lot of studies.

Levy , White, Stroud, Hillman, quoted by Bădilă, Daraban, Bartoş et. al. (2012) assert that "t*he first study to report an association between increased heart rate and cardiovascular disease dates about 60 years ago and proved that subjects with resting tachycardia were more likely to develop hypertension.. More than 40 epidemiological studies have brought evidence ever since that heart rate is independently associated with cardiovascular and all-cause mortality."*

Within subjects' evaluation, we used the scale to evaluate the quality of their lives. The subjects were requested to give a grade from 1 to 10 for their life quality, under the following conditions:

- 1-2 : means much worse
- 3-4 : worse
- 5-6 : the same
- 7-8 : better
- 9-10 much better

The starting point of the scale is the one proposed by Armean, (2004) where the subject is interviewed and asked to give a grade from 1-5 to its well-being, where 1 is very good and 5 is much worse.

The reason Armean 's (2004) scale is modified with values from 1 to 10 resides in the fact that most people consider superior grades (8, 9, 10) to be the best.

Table 2 reflects the place life quality occupies for each of the 5 subjects.

Table 2. Quality of life scale

	Subject 1	Subject 2	Subject 3	Subject 4	Subject 5
Evaluation of quality of life	7	6	8	8	7

Also, we further present the table with the current study subjects and initial measurements of functional parameters

Table 3. Functional evaluation of subjects

	Subject 1	Subject 2	Subject 3	Subject 4	Subject 5
First and last name	S.E.	M.I.	C.J.	D.C.	C.A.
Gender	Female	Male	Male	Male	Female
Breathing rate	25 breaths/min	33 breaths/min	18 breaths/min	20 beats/min	20 breaths/min
Resting heart rate	75 beats/min	75 beats/min	84 beats/min	88 beats/min	76 beats/min
Training heart rate	135 minus 20 beats/min	136 beats/min	147 beats/min	142 beats/min	147 minus 20 beats/min
Systolic blood pressure/diastolic blood pressure	105/76 mmHg	170/90 mmHg	135/85 mmHg	130/80 mmHg	135/90 mmHg
SpO2	94%	96%	95%	96%	94%

Discussions

During the 3 weeks of training, subjects were able to learn physical exercises specific to the program and the evolution of the intensity of the breathing gymnastics session was made gradually and individually for each subject. If at the beginning of the programme the exercises carried out were fewer than established in the model-programme, at the end of the programme the recurrence of the exercises reached and even exceeded the target level which is why the second breathing gymnastics programme started to be put into practice.

Each patient was assisted individually in order to avoid possible complications and cardiorespiratory parameters were periodically measured (blood pressure, heart and breathing rate, SpO2).

During the program there were some incidents that required interrupting the session for 5-10 minutes, while the subject was resting, breathing deeply, and hydrating.

Thus, in the case of subject no.1 during the first six meetings, the resting values of blood pressure and heart rate decreased significantly during effort (e.g. from a heart rate of 80 beats/minute a 53 beats/minute one was reached). At first they decreased after 10 minutes effort, then after 15 minutes, and in time they decreased much less and after 20-25 minutes constant effort. After the effort ends, the parameters return to the resting values.

We mention that Subject no.1 is undergoing a treatment with beta blocker administered in the morning.

Following these regular manifestations we sent her to a specialist cardiology consult, suspecting a heart failure. The result was negative:

Subject no.1 continued with the breathing gymnastics program and even if at first she evaluated at 7 the quality of her life and she breathed with difficulty during the ADL s and I-ADLs (daily routine activities), at the end of the 3 weeks, through an anamnestic interview, she ranks the quality of her life ar 8 ,*"even 9"* if we are to quote her, and she considers that she can carry out more easily certain daily activities.

Subject no.2 couldn't carry out the entire breathing gymnastics program due to increased values of the blood pressure. Two of the sessions were not carried out because of the systolic blood pressure reached 180 mmHg and 188 mmHg. In those cases diaphragmatic breathing and lower chest exercises were performed.

Despite repeated explanations received on complications he might be exposed to in the absence of an anti-hypertensive treatment, Subject no.2 refuses oral treatment, but he continues with the kinetic one,

considering that he breathes better and feels better after it.

Last tension value measured before the breathing gymnastics program -150 mmHg reflects the well-being he mentioned.

Subject no.3 accused a lack of air during the first sessions and he was disturbed by yawning. The body's lack of resistance to stress was observed through the arterial O2 saturation value of 88% after 20 minutes effort. He didn't accuse the above-mentioned manifestations in the last 2 sessions.

Subject no.4 carried out the exercises within the breathing gymnastics model program for a longer period of time, choosing a slow rhythm of execution.

Fatigue is the symptom that he frequently accused. The anamnestic interview shows that his physical condition is unchanged, but notes a well-being both physical and mental after stopping physical training.

Subject no. 5 manifested dizziness and nausea throughout the program which are extremely unpleasant symptoms that require the interruption of the physical training. The manifestations ceased, as the body adapted to stress and Subject no. 5 feels much quieter, calmer and she no longer gets tired so easily.

Due to these less significant positive aspects observed on the 5 subjects after 3 weeks of specific physical training, we can say that breathing gymnastics influences in a positive way the life quality of individuals with essential hypertension.

Influence of breathing exercises in the short term on health of hypertensive patients was observed by Chacko et al. (2005). They were monitored hypertensive patients during breathing exercise performed in a normal rhythm spontaneously, slow and fast and concluded that six breaths per minute performed slowly reduce sympathetic nervous system activity and improve baroreflex sensitivity, with positive effects on the psyche and blood pressure.

The present results can be validated by studies such as that of Schein et al. (2001) which demonstrated that a respiratory pattern (slow and regular) obtained with a device that is able to listen to relaxing music and connect patients 10 minutes daily for 8 weeks, decreased blood pressure values in the long term. The efficiency of such devices that cause a slow and regular breathing is confirmed by Elliot et al. (2004). The study shows a greater decrease tension and thus increase exercise capacity in hypertensive patients who have spent more than 180 minutes for 8 weeks using the device by which slowed breathing, compared with those who spent less 180 minutes two months.

Conclusions

This study demonstrated that breathing gymnastics is a significant and valuable therapeutic means. The study was conducted on a small number of 5 subjects, a non-homogeneous group but who evaluated the quality of their lives as being slightly better than the initial one, after three weeks of breathing gymnastics. The breathing gymnastics program practised regularly influenced and increased the tolerance to effort of the current study subjects. Breathing gymnastics, through proper breathing exercises of muscle and neuro-psychological relaxation, improved the activity of the nervous system resulting in a better mental state. The interpretation of data from the subjects' evaluation shows that hypertensive people achieve a better quality of life by following the proposed training program. It is mandatory to elaborate and apply a breathing gymnastics program in order to improve the quality of life of individuals with essential hypertension.

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