Deep Breathing Exercise Application: It's Effect on Physiological Parameters among Patients with Acute Coronary Syndrome

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Abstract

Patients diagnosed with acute coronary syndrome have found that deep breathing exercises effectively reduce physiological parameters. The study aimed to explore the effect of deep breathing exercise application on physiological parameters among patients with acute coronary syndrome. **Design**: To achieve the aim of the current study quasi-experimental pre-test- post-test with a control group design was adopted in this study. **Setting**: Thestudy was conducted at the coronary care unit, cardiology ward, and cardiology clinics at Sohag University Hospital. **Sampling:**A total of 100 with acute coronary syndrome were selected from previous settings based on purposive sampling Then divided randomly into two groups: the experimental group and the control group in each one (n=50)**. Tools for data collection: Tool I**: Structured questionnaire; composed of two parts. **Part 1**: Patients' demographic data. **Part 2**: Patients' Medical History Assessment Sheet, **Tool II:** Physiological Data Assessment Sheet**.Results:** There was a statistically significant improvement in physiological parameters such as heart rate, respiratory rate, blood pressure, and oxygen saturation among patients in the experimental group compared to the control group.**Conclusion**: According to the results of the study, the deep breathing exercise application has a significant positive effect on improving physiological parameters among patients with acute coronary syndrome. **Recommendation:** Breathing exercises are suggested to be applied to routine care given for patients with acute coronary syndrome**.**

Keywords: Deep breathing exercise, Patients with acute coronary syndrome, Physiological parameters.

Introduction

Acute coronary syndrome and coronary heart disease are two ailments that fall under the umbrella of cardiovascular disease, which is a collection of illnesses that affect the heart and blood arteries. Regardless of the existence of coronary artery disease, acute coronary syndrome almost always manifests as a symptom, such as unstable angina, and is commonly linked to myocardial infarction (**Saju et al., 2021**). An acute coronary syndrome patient exhibits variability in vital signs, including blood pressure, oxygen saturation, heart rate, and breathing rate. Patients with acute coronary syndrome, which combines unstable angina and a heart attack, have been shown to have a decreased chance of experiencing another heart attack when they exercise (**Gitima et al., 2021).**

According to current guidelines, individuals with acute coronary syndrome should engage in moderate aerobic activity, including brisk walking, for at least 30 minutes every day for the first two weeks following hospital discharge. It has been discovered that deep breathing exercises are beneficial in lowering blood pressure, heart rate, and respiratory rate **(Atlanta, 2017).**

25 million people worldwide are estimated to die from cardiovascular disease each year by the World Health Organisation. In India, there are now 45 million people suffering from coronary artery disease. It has been discovered that breathing and aerobic workouts are useful in lowering blood pressure, heart rate, and respiratory rate. An

acute coronary syndrome patient exhibits variability in vital signs, including blood pressure, oxygen saturation, heart rate, and breathing rate. One non-pharmacological method is deep breathing exercises. Frequent breathing exercises reduce sympathetic activity and raise the parasympathetic tone. It enhances respiratory and cardiovascular health and lessens the negative effects of stress and pressure on the body **(Monin et al., 2022).**

In **Atlanta (2017**), a study on heart ailments and disorders was carried out. Exercise has been shown to reduce the chance of suffering another heart attack in individuals with acute coronary syndrome, which includes heart attacks and unstable angina (chest pain). The acute coronary syndrome has a small number of heart attack survivors who get the required amount of physical activity. In the first two weeks following hospital discharge, the current guidelines strongly advise acute coronary syndrome patients to engage in at least 30 minutes of moderate aerobic activity, such as brisk walking, at least five days a week.

In a meta-analysis, **Zou et al., (2019**) investigated the benefits of voluntary slow, deep breathing exercise for blood pressure and heart rate regulation in individuals with cardiovascular disease. Breathing exercises led to statistically significant increases in blood pressure and systolic and diastolic heart rates. As a consequence of this study, patients with cardiovascular disorders can experience a reduction in heart rate, and systolic and diastolic blood pressure by engaging in voluntary slow, deep breathing exercises.

Significance of the study:

The acute coronary syndrome was seen in 130.2 (183.3 for men, 85.6 for women) and 107.5 (148.4 for men, 73.2) cases respectively. It has been demonstrated that deep breathing can help people transition from depression to calm and enhance the autonomic nervous system's or human organs' ability to regulate themselves, increasing the body's capacity for adaptation. When a trainer modifies their breathing habits to fit specific breathing patterns (frequency, depth, ratio of expiratory/inspiratory time, chest/belly style), it's referred to as voluntary breathing exercises (VBE) and doesn't require the use of any additional equipment **(Pal et al., 2020).**

Operational definition:

Deep Breathing Exercise: It refers ability to take a breath in slowly through the nose, hold breath for a count of 1-5 and slowly breathe out through the mouth.

Aim of the study:

To explore the effect of deep breathing exercise application on physiological parameters among patients with acute coronary syndrome through:

Assess the physiological parameters among patients with acute coronary syndrome.

Evaluate the effect of deep breathing exercises on physiological parameters among patients with acute coronary syndrome.

Research hypotheses:

H1-The levels of blood pressure, heart rate, respiratory rate, and oxygen saturation (SPo2) in the experimental group and control group are significantly different before and after deep breathing exercise.

H2-The levels of blood pressure, heart rate, respiratory rate, and oxygen saturation (SPo2) following deep breathing exercise varied significantly between the experimental and control groups.

Subjects and Methods:

Research Design:

This study used a quasi-experimental pre-test-post-test design with a control group to accomplish its goal. In this two-group design, one group is assigned to the intervention program while the other, designated as the

control group, receives standard hospital care for the same amount of time but is subjected to identical testing.

The independent variables

It was a deep breathing exercise

The dependent variables

It was physiological parameters such as heart rate, respiratory rate, blood pressure, and oxygen saturation.

Setting:

Thestudy was conducted at the coronary care unit, cardiology ward, and cardiology clinics at Sohag University Hospital

Sample:

Sample type:

Purposive sampling was used.

Study subjects

A total of 100 with acute coronary syndrome were selected from previous settings based on purposive sampling Then divided randomly into two groups: the experimental group and the control group in each one (n=50). Fifty patients received usual care in the hospital (control group) and Fifty in deep breathing exercise along with routine care (experimental group).

Sample size:

Based on G*power analysis, it was determined that a minimum sample size of 50 participants was necessary for this study to prevent risks to internal validity, including type I and type II errors. A medium effect size of f ¼ 0.25 offered a power of 0.95 to identify a difference at the 0.05 significance level for the repeated-measures approach. Fifty participants are required for the sample size, and an attrition rate of approximately 10% is anticipated. Each group comprised a total of fifty participants, who were thereafter divided into two independent groups at random.

The inclusion criteria:

- Both sexes male and female
- Participants have ages between 18- 65 years,
- Willing to participate.

Exclusion criteria

Excluded from consideration were patients with congenital cardiac defects (such as coarctation of the aorta and transposition of the great arteries), unstable hemodynamic conditions (such as unconscious patients, uncontrolled hypertension [systolic blood pressure > 180 mmHg and/or diastolic blood pressure > 100 mmHg, resting heart rate > 40 beats per minute, significant arrhythmias, and significant renal and hepatic failure], or ACS caused by coronary artery dissection, stress-induced cardiomyopathies, endocarditis, and a non-cardiovascular cause (such as anemia, coronary embolus, and individuals who had previously undergone cardiopulmonary surgery).

Tools of data collection:

Two tools were used for data collection:

Tool I: Structured questionnaire; **this sheet was formulated by the researcher to assess subjects.** It is composed of two parts.

Part 1: Patients' demographic data: it included data related to Gender, age, education, occupation status, and residence

Part 2: Patients' Medical History Assessment Sheet, included data related to **the duration of hospital stay**

Tool II: Physiological Data Assessment Sheet**: This includes an assessment of the patient's heart rate, temperature, blood pressure, respiration rate, and oxygen saturation.**

Pilot Study:

It was completed before the initiation of the data collection process. Before the instruments were added to the study population, 10% of the entire sample (10 patients) had them evaluated for practicality, clarity, application, and simplicity. Any necessary revisions were then made.

Validity and reliability:

The study instrument was validated by three experts from the critical medicine and physiology departments. Content and construct validity were validated with extra expert support. All expert alterations and

helpful criticism were taken into consideration while creating the final edition of the instrument. Reliability was used by the researchers to evaluate the instruments' internal consistency, while dependability was evaluated to ascertain the measurement consistency. Through calculating the correlation coefficient for each scale, it was found. The range of the Cronbach's alpha coefficient was 0.78 for practice and 0.79 for knowledge.

Ethical consideration:

The conduct of the current study has been formally approved by the dean of the faculty of nursing at Sohag University. Each patient was informed of the purpose and benefits of the study, as well as their right to refuse involvement. Before any data was collected, patients were informed about the nature and goal of the study and gave their consent. Women were told of their voluntary right to consent to or decline study participation, that they could opt out of the study at any time, and that confidentiality would be maintained.

Administrative design:

The dean of the nursing faculty at Sohag University obtained administrative authority to conduct this study by notifying the directors of the previously selected setting.

Fieldwork:

Assessment phase:

Patients were interviewed utilizing the pre-intervention assessment in the planned setting to collect baseline data for the evaluation.

- by applying a variety of teaching techniques, such as lectures, group discussions, and brainstorming. Using more audiovisual resources, such as sharing movies, posters, and pictures.

Implementation phase:

The fieldwork for the study began in October 2023 and ended in March 2024, a period of six months. The institutional ethical committee provided ethical consent. We acquired informed consent from every study participant. Before engaging in deep breathing exercises, the heart rate, respiratory rate, blood pressure, and oxygen saturation were measured. The patients were told to put one hand on their abdomen and the other on their chest. gave the patient instructions to take a deep breath through their nose, hold it for four seconds, and then release it for four seconds. Twice a day, for ten minutes, the mouth-deep breathing exercise was administered. Following the exercise of deep breathing, the physiological parameters were evaluated.

.. The acute coronary syndrome patients provided the demographic profile. A pre-test was conducted. From the time of admission to the time of discharge, the heart rate, breathing, blood pressure, and oxygen saturation were measured. Patients in the experimental group who had been admitted with acute coronary syndrome were instructed to practice deep breathing twice a day for ten minutes until they were discharged. The control group was given standard care. Each time following a deep breathing exercise, a post-test was given to the experimental and control groups.

Evaluation phase:

Using the same study questionnaires, it was used both before and after To explore the effect of deep breathing exercise application among patients with acute coronary syndrome on their physiological parameters to evaluate the differences, similarities, and places for improvement using the same instruments used in the pretest.

Statistical design:

Statistical Package for the Social Sciences (SPSS), version 20, was used to enter, code, and analyze the data. The study sample was described using descriptive statistics such as mean, SD, percentage, and frequency. The comparison was conducted using the Chi-square test, and the appropriate use of linear

regression was made to ascertain the correlation between the variables. Statistical significance was defined as $P < 0.05$.

Results:

Table (1): demonstrates that 78% of the control group of the sample compared to 70% in the experimental group belonged to the 46–65 years, and 74% in the control group of the sample compared to the experimental group (66%) were men. Furthermore, it demonstrates that 22% of them had a university education in the control group compared to the 40.0% experimental group.

Table 2: Reveals that following the intervention, the mean score of heart rate in both the experimental and control groups were, respectively, 88.06 and 96.78, 2.77 and 3.17. There was a 10.72 mean difference. At the 0.05 level of significance, the computed "t" value of 9.17 was higher than the table value of 2.59. Following the deep breathing exercise, there was a significant difference in the heart rates of the experimental and control groups, as indicated by the computed "t" value of 9.17.

Table 3: Illustrated that following the intervention, the mean scores of the respiratory rate in both the experimental and control groups were, respectively, 21.44 and 26.51, 1.42 and 1.41. There was a 5.14 mean difference. At the 0.05 level of significance, the computed "t" value of 10.93 was higher than the table value of 2.59. Following the deep breathing exercise, there was a significant difference in the respiratory rates of the experimental and control groups, as indicated by the computed "t" value of 10.93.

From Table 4: It was observed that, in patients with acute coronary syndrome who received deep breathing exercise was an effective intervention for lowering systolic and diastolic blood pressure At the 0.05 level of significance.

Table 5: showed that, in patients with acute coronary syndrome who received deep breathing exercises are an effective intervention, and after intervention, the oxygen saturation level of patients with acute coronary syndrome in the experimental and control groups were improved.

Table (1): Demographic data of the control and experimental groups of patients

Groups Variables	Control group (n=50)		Experimental group (n=50)		hi-square test	P. value
	No	%	No	%		
Age						
21- <45	11	22.0	15	30.0	$\chi 2$= 1.450	0.486
45- ≤65	38	78.0	35	70.0		
Gender						
Male	37	74.0	33	66.0	$\chi 2$=1.973	0.383
Female	13	26.0	17	34.0		
Education						
Illiterate	16	32.0	9	18.0	$\chi 2$= 8.142	0.167
Primary	10	20.0	16	32.0		
Secondary	13	26.0	5	10.0		
University	11	22.0	20	40.0		
Residence					$\chi 2$=1.873	0.379
Urban	35	70.0	36	72.0		
Rural	15	30.0	14	28.0		

Table 2: Differences in Deep Breathing Exercise mean scores in Heart rate **of the studied patients with Acute Coronary Syndrome in both experimental and control groups (n=100)**

Heart rate	Study groups	Observation	Mean	SD	Mean difference	Calculated value	't' value
	Experimental		88.06	2.77			
	Group						
Heart rate		After			10.72	9.17	2.59
	Control						
		Intervention	96.78	3.17			
	Group						

Table 3: Differences in Deep Breathing Exercise mean scores of Respiratory rate **of the studied patients with Acute Coronary Syndrome in both experimental and control groups (n=100)**

Respiratory rate	Study groups	Observation	Mean	SD	Mean difference	Calculated value	't' value
	Experimental		21.44	1.42			
Respiratory	Group	After					
					5.14	10.93	2.59
Rate	Control	Intervention	26.51	1.41			
	Group						

*Significance at 0.05 level

Table 4: Differences in Deep Breathing Exercise mean scores of Blood Pressure **of the studied patients with Acute Coronary Syndrome in both experimental and control groups (n=100)**

Blood Pressure	**Study groups**	**Observation**	**Mean**	**SD**	**Mean difference**	**Calculated value**	**'t' value**
Systolic	Experimental		127.4	7.67			
	Group	After					
Blood					13.9	4.18	2.59
		Intervention					
	Control						
Pressure			141	10.64			
	Group						
Diastolic	Experimental		73.89	4.87			
	Group	After					
Blood					8.29	0.14	2.59
	Control	Intervention		7.25			
Pressure			82.17				
	Group						

*Significance at 0.05 level

Table 5: Differences in Deep Breathing Exercise mean scores of Oxygen Saturation in the studied patients with Acute Coronary Syndrome in both experimental and control groups (n=100)

Oxygen Saturation	**Study groups**	**Observation**	**Mean**	**SD**	**Mean difference**	**Calculated value**	**'t' value**
	Experimental		95.78	3.54			
Oxygen Saturation	Group	After					
					5.10	9.22	2.59
	Control	Intervention	99.35	1.43			
	Group						

*Significance at 0.05 level

Discussion:

Acute coronary syndrome is a leading cause of cardiovascular-related morbidity and mortality worldwide. Breathing exercises, which form one of the mind-body-based approaches among many methods, decrease breathing speed, oxygen consumption, heart rate, and systolic and diastolic blood pressure. In our study, the group that had breathing exercises taught to them was found to have improvements in hypertension values, heart rate, oxygen saturation, and respiratory rate compared to the control group **(Bhargava et al., 2019).** Breathing exercises are one of the non-pharmacological modalities. It is known that the regular practice of breathing exercises increases parasympathetic tone, decreases sympathetic activity, and improves cardiovascular and respiratory functions **(Mohan et al., 2019).**

The current study results found that following the intervention, the mean score of heart rate in the experimental group was improved than in the control group following the deep breathing exercise with a significant difference in the heart rates of the experimental and control groups. These results were in line with those of A study on the effects of deep breathing exercises on patients with coronary artery disease's heart rate variability, blood pressure, anxiety, and depression carried out by **Silva, et al., (2021)** found the same results and also reported breathing exercises to be an effective method of decreasing heart rate and diastolic blood pressure in a study they performed with patients with coronary artery disease. From the point of view of the researchers, it confirmed the beneficial outcomes of the deep breathing exercise application given to the patients under study.

The results of the current study demonstrated that following the intervention, the mean score of respiratory rate in the experimental group was improved than in the control group following the deep breathing exercise with a significant difference in the respiratory rates of the experimental and control groups. From the point of view of the researchers, it reflected the positive effects of the deep breathing exercise application for patients with acute coronary syndrome. This study's findings can be compatible with **Ramos et al., (2019)** was directed an examination to evaluate the impacts of pursed lip breathing exercise on the conduct of pulse and its inconstancy, and on varieties in blood pressure, respiratory rate, and heartbeat oxygen immersion in subjects with chronic obstructive pulmonary disease.

The study findings can be matched with **Karthika, (2017**) conducted a quasi-experimental study to evaluate the effectiveness of deep breathing exercises among patients with chronic obstructive pulmonary disease who are aged between 50-60 years of age. The study included 60 sample patients who were selected by purposive sampling technique. The study was done by using a pre-experimental (one group pre and post-test) design. The study revealed that the subjects in the experimental group had decreased levels of breathing patterns after giving deep breathing exercises compared to the control group.

Similarly, **Darnley et al. (2019**) examined the effect of resistive breathing on exercise capacity and diaphragm function in patients with ischemic heart disease and found an increase in the exercise capacity of the patients as well as a reduction in shortness of breath.

The results of the current study revealed that patients with acute coronary syndrome who received deep breathing exercise was an effective intervention for lowering systolic and diastolic blood pressure At the 0.05 level of significance. This study's findings are consistent with those of **Silva et al. (2021)** also reported breathing exercises to be an effective method of decreasing diastolic blood pressure in a study they performed with patients with coronary artery disease.

This study's findings agree with those of **Matthews et al. (2019**) evaluated the risk of blood pressure changes and subsequent coronary calcification during psychological stress in young healthy adults and they determined the same results. Similarly, **Mori et al. (2019) and Jagomagi et al. (2019)** examined the effect of deep breathing exercises on blood pressure and found that deep breathing reduced blood pressure.

Efe & Olgun (2021) also reported that breathing exercises caused reductions in heart and respiration rates and systolic and diastolic blood pressure in patients with essential hypertension. As can be seen, our findings are consistent with the literature. Breathing is considered to be a regulator of the

autonomic nervous system and consequently of mental processes. Controlling the breath and thus calming the nerves is a prerequisite to controlling the mind and the body. Breathing techniques provide a gateway to the autonomic communication network through which the individual can, by changing the breathing patterns, specific messages send to the brain using body language, and the body responds to it. Messages from the respiratory system have rapid, powerful effects on major brain centers involved in thought, emotion, and behavior (**Adhana et al., 2018**). Deep breathing increases blood and oxygen flow to the brain to function in its optimal state. It creates a connection between mind and body that can lead to greater self-awareness, mindfulness, and clear thinking, improves circulation, which improves heart health, and energy levels, and helps the body eliminate toxins, as well as reduces stress (**Mourya et al., 2018).**

The results of the current study demonstrated that patients with acute coronary syndrome who received deep breathing exercises are an effective intervention and after intervention, the oxygen saturation level of patients with acute coronary syndrome in the experimental and control groups were improved. From the point of view of the researchers, it was explained by the success of deep breathing exercise application for the patients with acute coronary syndrome which reflected positively on their oxygen saturation level. The results of this study **supported the results conducted by Bernardi et al. (2022**) examined the effect of slow breathing on arterial baroreflex sensitivity in patients with chronic heart failure and showed that slow respiration increased oxygen saturation and exercise tolerance.

Conclusion:

According to the results of the study, the deep breathing exercise application has a significant positive effect on improving physiological parameters among patients with acute coronary syndrome.

Recommendation:

Breathing exercises are suggested to be applied to routine care given for patients with acute coronary syndrome**.**

Deep breathing exercises will help to achieve optimal results regarding heart rate and reduction of respiratory rate, and lower blood pressure by stimulating cardiovascular reflexes so, deep breathing exercises can be one of the methods to reduce the physiological parameters among patients with acute coronary syndrome.

References:

- Adhana R, Gupta R, Dvivedii J, Ahmad S (2018): He influence of the 2:1 yogic breathing technique on essential hypertension. Indian J Physiol Pharmacol 57: 38-44.
- Atlanta. (2017). The heart disorders and diseases - Acute coronary syndrome. A Journal of the American college of cardiology. 1975-2013.
- Bernardi L, Porta C, Spicuzza L, Bellwon J, Spadacini G. (2022): Slow breathing increases arterial baroreflex sensitivity in patients with chronic heart failure. Circulation 105: 143-145.
- Bhargava R, Gogate MG, Mascarenhas JF (2019): Autonomic responses to breath holding and its variations following pranayama. Indian J Physiol Pharmacol 32: 257-264.
- Darnley GM, Gray AC, McClure SJ, Neary P, Petrie M. (2019): effect of resistive breathing on exercise capacity and diaphragm function in patients with ischemic heart disease. Eur J Heart Fail 1:297-300.
- D'silva F, Vinay H, Muninarayanappa NV (2021): effectiveness of deep breathing exercise (dbe) on the heart rate variability, blood pressure, anxiety & depression of patients with coronary artery disease. Nitte

University Journal of Health Science 4: 35.

- Efe F, & Olgun N (2021): The effect of education on dyspnea, fatigue, and life quality concerning heart failure patients. Hacettepe University Faculty of Health Sciences Nursing Journal 1: 1-13.
- Gitima Kalita, Nabajani Dutta. (2021): Evaluate Breathing Exercises on Improvement in Respiratory Status among Patients with Respiratory Diseases. Asian Journal of Nursing Education and Research. 2021; 11(4):495-8. doi: 10.52711/2349-2996.00118
- Jagomägi K, Raamat R, Talts J, Länsimies E, Jurvelin J (2019): effect of deep breathing test on finger blood pressure. Blood Press Monit 8: 211-214.
- Karthika K. (2017): A quasi-experimental study to evaluate the effectiveness of deep breathing exercises among patients with chronic obstructive pulmonary disease who are aged between 50- 60 years in selected hospitals in the Dindigul district. degree of master's in the science of nursing, Sakthi College of Nursing, oddanchatram.Chennai.
- Matthews KA, Zhu S, Tucker DC, Whooley MA (2019): Blood pressure reactivity to psychological stress and coronary calcification in the coronary artery risk development in young adults study. Hypertension 47: 391-395.
- Mohan M, Saravanan C, Surange SG, Hombre DP, Chakrabarty AS (2019): effect of yoga-type breathing on heart rate and cardiac axis of normal subjects. Indian J Physiol Pharmacol 30: 334-340.
- Monin, A.; Didier, R.; Leclercq, T.; Chagué, F.; Rochette, L.; Danchin, N.; Zeller, M.; Fauchier, L.; Cochet, A.; Cottin, Y. (2022): Coronary Artery Embolism and Acute Coronary Syndrome: A critical appraisal of existing data. Trends Cardiovasc. Med, S1050- 1738(22)00107-4.
- Mori H, Yamamoto H, Kawashima M, Saito S, Ukai H. (2019): How does deep breathing exercise affect blood pressure and pulse rate? Hypertens Res 28: 499-504.
- Mourya M, Mahajan AS, Singh NP, Jain AK (2019): effects of slow and fast-breathing exercises on autonomic functions in patients with essential hypertension. J Altern Complement Med 15: 711-717.
- Pal GK, Agarwal A, Karthik S, Pal P, Nanda N. (2020): Slow yogic breathing through right and left nostril influences sympathovagal balance, heart rate variability, and cardiovascular risks in young adults. N Am J Med Sci; 6(3):145–51.
- Ramos EMC, Vanderlei LCM, Ramos D, Teixeira LM, Pitta C, Veloso M. (2019): Influence of pursed lip breathing on heart rate variability and cardiorespiratory parameters in subjects with chronic obstructive pulmonary disease (COPD); 13(4): 288- 93
- Saju, D.; Joy, C.; Moorthy, M.A.; Wilson, B.; Antony, J.; Singaravel, S.; Thangavel, S. (2020): Prescription Pattern and Drug Utilization Analysis in Patients with Acute Coronary Syndrome. Indian J. Pharm. Pract, 13, 369–373.
- Silva, F.D., Vinay, H., and Muninarayanappa, N.V. (2021): Effectiveness of Deep Breathing Exercise on the Heart Rate Variability, Blood pressure, Anxiety and Depression of Patients with Coronary

Artery Disease. 4(1): 35-47.

- Zou. A (2017): Meta-analysis of effects of voluntary slow deep breathing exercise for control of heart rate and blood pressure in patients with cardiovascular disease. *The American Journal of Cardiology*. 120 (1): 148-153.