



ORIGINAL RESEARCH PAPER

Physiology

EFFECT OF DEEP BREATHING EXERCISE ON CARDIAC PARAMETERS IN YOUNG ADULTS

KEY WORDS: Stress, Cardiovascular function, Deep Breathing Exercise.

Kavitha.S

Assistant Professor, Department of Physiology, Coimbatore Medical College, Coimbatore.

Sujatha. B*

Associate Professor, Department of Physiology, Coimbatore medical college, Coimbatore. *Corresponding Author

ABSTRACT

Background&Objectives:Our ancient Indian therapeutic traditions and modern researches have shown that natural healthy respiration not only increases longevity, but also helps in medical conditions like asthma, hypertension, anxiety, and insomnia. The current study was undertaken to assess the impact of deep breathing exercise in the cardiovascular function of selected volunteers.

Materials & Methods: The study group consisted of 146 medical students in the age group of 17-25 years. Pulse rate (/min),Blood pressure(mm Hg) were measured in the study group for assessing the cardiovascular function and Deep breathing exercise was done for 30 minutes/ day for a period of 3 months. At the end of every month, variation in cardiovascular function was assessed by repeating the measurement of PR and BP.

Results: All the values obtained before and after performing Deep Breathing Exercise, were expressed as mean ± S.D.The results were analysed and interpreted by repeated measures of ANOVA and the student’s paired t test was used to compare parameters within the study group. There was a gradual decrease in pulse rate/min and blood pressure (mm Hg)following the deep breathing exercise and it was found to be statistically significant (p<0.001)

Conclusion: The deep breathing exerciseis a simple,easy method that provides students to improve their physical & mental skillsand also to face their professional challenges in a better way.

Introduction

The Modern Age is the age of stress and stress related diseases, which are posing a great challenge to the present society[1,2]. In today’s world, most deaths are attributable to non-communicable diseases (35 million) and just over half of these (17 million) are as a result of cardiovascular diseases.In today’s world, most deaths are attributable to non-communicable diseases(35 millions) and just over half of theses(17 millions) are due to cardiovascular diseases[3].Psychological stress may manifest as disrupted breathing, as tachypnoea seen in anxiety disorders.The ancient Indian therapeutic traditions as well modern research have shown, how natural healthy respiration not only increases longevity and supports our overall wellbeing and self development ,but also helps in medical conditions like asthma, hypertension, anxiety, insomnia etc[1]

A paper from the Framingham Heart Study indicated that anxiety in the younger age group was a significant predictor of the subsequent incidence of hypertension among middle-aged individuals(Markovitz et al 1993)[4].Studies targeting younger age group would provide an estimate of the future magnitude of the problem and assist in developing strategies for applying deep breathing exercise as a non-pharmacological adjunct in the treatment of hypertension, stress related asthma, anxiety, diabetes mellitus etc.Deep slow breathing trials have been published in various journals around the world[5].Slow and deep breathing itself has a calming effect on the mind and helps an individual to de-stress[6].This calming effect may also exert profound physiological effects on cardiovascular system .

Anantharaman, Balachander, Nishith (1973) and Iyengar (1998) suggest that, the cardiovascular system can be toned through mere rhythmic breathing exercise.With this background,the present study was undertaken to assess the impact of deep breathing exercise on cardiovascular function in the selected volunteers of medical students aged 17 to 19 years by estimating the pulse rate and blood pressure before and after Deep Breathing Exercise..

Aims and objectives

- To assess the cardiovascular function in the first year MBBS students by estimating pulse rate and blood pressure
- To train the study group for performing deep breathing exercise, which has to be done daily for a period of 12 weeks

- To repeat the tests for cardiovascular functions,mentioned above at the end of 4,8 and 12 weeks.

Materials & Methods

The study was conducted in 146 medical students in the age group of 17-25 years,in the Department of Physiology,Tirunelveli Medical College,Tirunelveli. After getting institutional ethical committee clearance, written informed consent were obtained from the individuals. After filling up the proforma, the following parameters-Pulse rate(/min),Blood pressure(mm Hg) were measured in the study group for assessing the cardiovascular function, both prior to the study and at the end of 4 weeks, 8 weeks and 12 weeks respectively .

EXCLUSION CRITERIA: Hypertension, congenital heart disease.

The radial pulse was examined by compressing the radial artery against the head of the radius and forearm of the subject wassemipronatedand the wrist slightly flexed. The pulse was counted for one minute and is expressed as pulse rate/minute.With a standard mercury sphygmomanometer and the stethoscope, both the systolic and the diastolic blood pressure were measured carefully, by noting the first and fifth korotkoff sounds in the left arm, using auscultatory method in sitting position of the individual after 5 minutes of rest.

DEEP BREATHING EXERCISE:Deep breathing exercise involves having the individual sit upright in a comfortable position, with eyes closed and the study group was instructed to focus on the movements of their diaphragm, while breathing in a slow deep relaxed manner and the procedure is continued for 15 minutes in the presence of the instructor in the morning session and they were asked to repeat the same procedure for 15 minutes in the evening. Thus, the procedure was done for 30 minutes/ day for a period of 3 months. At the end of every month, variation in cardiovascular function was assessed by repeating the measurement of PR and BP

RESULTS

All the values obtained before and after performing Deep Breathing Exercise, were expressed as mean ± S.D. The results were analyzed and interpreted by repeated measures of ANOVA and the student’s paired t test was used to compare parameters within study group. The above statistical procedures were performed with the help of statistical package namely PASW

Statistics-18 (Predictive and analysis software)

Table1: Gender Distribution in the study group

AGE (YEARS)	MALE	FEMALE	TOTAL
17	23	46	69
18	30	32	62
19	4	11	15
TOTAL	57	89	146

Among the 146 students in the study group,57 were men and 89 were women.

Table2.EFFECT OF DEEP BREATHING EXERCISE ON PULSE RATE

	PULSE RATE (1 min)	F VALUE (ANOVA)	P VALUE
	MEAN ± S.D		
Baseline value	94.8 ± 10.9	165.090	< 0.001
At 4 weeks	87.6 ± 11.3		
At 8 weeks	84.0 ± 9.6		
At 12 weeks	81.4 ± 8.9		

There was a gradual decrease in pulse rate/min following the deep breathing exercise and it is found to be statistically significant (p<0.001).

Fig.1 Effect of DBE on systolic blood pressure

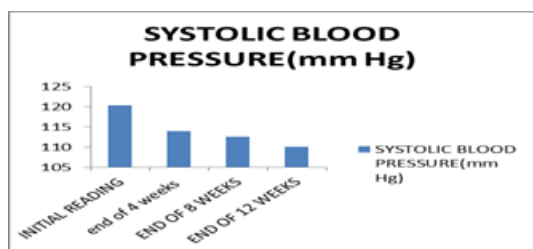


Table3. COMPARISON OF DIFFERENT CARDIAC VARIABLES BEFORE AND AFTER DEEP BREATHING EXERCISE

Variables	Before (Baseline Value)	After (End Of 12 Weeks)	Difference	T	d.f	P Value
	Mean ± S.D	Mean ± S.D	Mean ± S.D			
PR (/Min)	94.8 ± 10.9	81.4 ± 8.9	13.4 ± 8.9	17.302	145	<0.001
SBP (mm Hg)	120.3 ± 13.6	110.1 ± 14.2	10.2 ± 11.8	13.486	145	<0.001
DBP (mm Hg)	81.2 ± 10.4	72.5 ± 7.8	8.7 ± 7.8	17.344	145	<0.001

DISCUSSION:

In our study, there was a significant reduction in the pulse rate, from the mean value of 94.8 to 81.4/min at the end of 12 weeks after the practice of deep breathing exercise. This indicates that, the practice of deep breathing exercise improves vagal activity [7]. Our present study correlates well with the study of Grossman A& Grossman E in 2003[8].Deep and slow breathing found to improve small vessels blood flow and thereby decreases the peripheral resistance, leading to reduction in pulse rate [9].

The systolic and diastolic blood pressure also showed significant change, before and after Deep Breathing Exercise. The mean systolic blood pressure had decreased from 120.3 to 110.1mm of Hg and the mean Diastolic blood pressure had decreased from 81.2 to 72.5 mmHg.Our present study correlates well with the study of Mori et al 2005[10] in which 21,565 subjects practiced deep breathing exercise for 30 seconds and there was a significant blood pressure decrease in normotensives,untreated and treated hypertensives. The slow deep breathing enhances the baroreflex sensitivity,leading to improvement of vagal tone and reduced

sympathetic discharge,thereby decreasing systolic blood pressure[11].Diastolic blood pressure depends on peripheral resistance and lung inflation has been shown to decrease systemic vascular resistance.This response is initiated by pulmonary stretch receptors,which bring about withdrawal of sympathetic tone in skeletal muscle blood vessels,leading to widespread vasodilatation ,thus decreasing the peripheral resistance, which leads to decreased diastolic blood pressure[12]

Thus, the reduction in pulse rate and blood pressure found in our study indicates the shift in the balancing components of Autonomic System towards the parasympathetic activity, which was reported byAnand BK et al in 1991..This modulation of Autonomic Nervous System Activity might have been brought about through the conditioning effect of Deep Breathing Exercise on autonomic functions and mediated through the limbic system and higher centres of Central Nervous System as reported by Selvamurthy et al[13].

The better response seen in the present study can be attributed by more elastic blood vessels and also better reflex activity,which is seen in younger age group.

CONCLUSION

In summary, these findings suggest that, Deep breathing technique lowered BP pulse rate in a group of healthy individuals, which is easily learned and practiced at no cost and it involves no bodily movements and results in both physical and mental relaxation to achieve the improvement of psychological and psychomotor components. The deep breathing technique can be implemented in each academic year and it provides students to improve their academic performance and to face their professional situations better.

REFERENCES

- G.Sharma,L.K>Sharma &S.Sood:Synergistic Approach of Applied Physiology & Yoga to Combat Lifestyle Diseases.The Internet Journal of Alternative Medicine.2009 Volume 7 Number 1
- AnandBK.Yoga and Medical Sciences.Ind J Physiol Pharmacol,1991 Apr;35(2):84-87
- Park's Textbook of Preventive and Social Medicine 20th ed. Pg.314
- MarkovitzJH,MatthewsKA,Kannel WB, et al.Psychological predictors of hypertension in the Framingham study:Is there tension in hypertension? JAMA1993; 270:2439-2443
- Breathing control lowers Blood Pressure-Journal of human hypertension.April 15,2001,Vol.15 No.4,Pg 263-269.
- N.K.Subbulakshmi,S.K.Saxena,Urmimala and Urban J.A.D.'Souza.Immediate effect of 'Nadi-Shodhana Pranayama' on some selected parameters of cardiovascular,pulmonary and higher functions of brain.Thai Journal of Physiological Sciences Volume 18 No.2 August,2005 Pg 10-16.
- PalGK,VeikumaryS,Madanmohan.Efect of short-term practice of breathing exercises on Autonomic Functions in normal human volunteers.Indian J Med Res.2004 Aug;120(2):115-21
- Grossman A, Grossman E,Treatment of Hypertension with device-guided breathingexercise.2003 Oct;142(10):677-9,718
- CollenM.Johnson,Heidi A. Larson,Steven R. Conn, Lincoln A. Estes, and Amanda B. Ghibellini.Theimpact of Relaxation Techniques on Third Grade Students' Self-Perceived Levels of Test Anxiety,2009 March 19-23
- RavinderJerath& Vernon A. Barnes,Augmentation of mind-body therapy and role of Deep Slow Breathing.Journal of Complementary andIntegrativemedicine, 2009;Vol,6,Iss.1,Article 31.
- BhargavaR,GogateMG,MascarenhasJF.Autonomic responses to breath holding and its variations following Pranayama.Indian J PhysiolPharmacol 1988;42:257-64
- K UpadhyayDhungel,VMalhotra,DSarkar and R Prajapati.Effect of alternate nostril Breathing exercise on cardiorespiratory functions.Nepal Med Coll J 2008;10(1):25-27
- IndaDevasena,PandurangNarhare. Effect Of Yoga on Heart Rate and Blood pressure and its clinical significance Int J Biol Med Res 2011;2(3)