ejpmr, 2019,6(12), 598-601

SJIF Impact Factor 6.222

EUROPEAN JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

www.ejpmr.com

Research Article

ISSN 2394-3211

EJPMR

EFFECTS OF BHRAMARI PRANAYAMA ON RESTING CARDIOVASCULAR PARAMETERS AND HIGHER MENTAL FUNCTIONS IN HEALTHY INDIVIDUALS

***[1]Dr. Rashma S., BAMS MD and [2]Dr. Sonia J.**

*[1]Assistant Professor and [2]Associate Professor
Department of Swasthavritta & Yoga SDM Institute of Ayurveda and Hospital, Bengaluru.

***Corresponding Author: Dr. Rashma S.**

Assistant Professor, Department of Swasthavritta & Yoga SDM Institute of Ayurveda and Hospital, Bengaluru.

Article Received on 21/10/2019 **Article Revised on 11/11/2019** **Article Accepted on 01/12/2019**

INTRODUCTION

Pranayama is defined as a manipulation of one's own breathing movement. In yoga "*Prana*" means life force/energy and "*Ayama*" means to control. So, Pranayama Practice will help us control the life force or energy and make our system more healthy and energetic. Pranyamas such as *Kapalabhati, Bhastrika, Nadisuddhi, Bhramari* cause pronounced physiological responses among normal healthy people.[1] Further, it is known that yoga and pranayama are helpful in managing the cardiopulmonary diseases, autonomic nervous system imbalances and psycho-somatic disorders.[2,3,4] Most of the studies previously done have reported the effect of different pranayama individually as well as collectively with different duration of these practices (e.g., immediately, 1 month, 3 months, etc.).[5,6,7,8]

In this growing era of scientific advances on yoga where scientific evidences about pranayama are increasing, *Bhramari pranayama* is one among the pranayama that could be practiced by everyone which lack in evidence on various physiological effects.

Bhramari is derived from the Sanskrit word '*Bhramar*' meaning Wasp. It is because of the humming sound that is produced during the expiration mimicking the flying wasp, it is named as *Bhramari pranayama*. Immediately after 5 min of practice of Bhramari Pranayama, the heart rate and blood pressure is influenced in healthy subjects because of the parasympathetic dominance.[9] High frequency paroxysmal gamma wave pattern is observed in the participants immediately after practicing the Bhramari Pranayama.[10,11] These gamma brain waves are related with the performance of higher mental function and perceptual task.

Adolescent population is one vulnerable group who are in the transformation period between the childhood and adulthood.[12] They face lot of stress in this period in multi dimension perspective; physical stress due to their changing physiology, mental and emotional stress and the social stress in accommodating the changes that approach them in their social environment. They face high level of anxiety during this period.[13] They need support to cope up in a better way that could be beneficial both in their adolescent period as well as in their later lives.[14] The association of stress to the cardiovascular complications is very well known. Further, there is evidence that yoga and pranayama practice help in reducing and managing the stress of day to day life event.[15]

AIMS

The present pilot study aimed to record the immediate effect of single session of Bhramari pranayama practice on resting cardiovascular parameters and multiple session Bhramari pranayama practice effect on higher mental functions.

MATERIALS AND METHODS

This study was carried out during at the Shri Dharmasthala Manjunatheshwara Institute of Ayurveda & Hospital. Ethical approval was obtained from the institutional human ethical committee. Before recruiting the students, permission from the head of the institution was exercised through proper channel. Written informed consent was obtained from the students after explaining the detailed procedure in the intervention.

Thirty healthy adolescents of both sex (18 males and 12 females) with mean age of 20.56±1.01 years participated. Students with no history of metabolic or systemic diseases, under any medication, recent surgery within three months, active athletes, or previous yoga training were excluded and only apparently healthy students after general as well as systemic examination were included in the study. They were randomly grouped into two; Bhramari pranayama (n=15) and control (n=15) group.

All their assessments were done in the evening between 3 pm and 4 pm. Height (cm) and weight (kg) was measured and their BMI was calculated. Heart rate was

recorded in radial artery after ten minutes of the supine rest and blood pressure was obtained in standard manner by sphygmomanometer. All the reading noted three times with five minutes interval and lowest of all the three values was included for the study.

Mini Mental Status Examination was done on day one and day 30 to assess the improvement in higher mental function of the individuals.

Bhramari Pranayama

Bhramari pranayama training was given as per standard procedure. Accordingly, the subjects were made to sit in any comfortable posture with erect spine with their eyes closed. At this position, they were asked to take slow and deep inhalation through both the nostrils (5 secs approx), followed by deep and slow exhalation in the same way (15 secs approx.) with their thumbs on two external auditory canal. While exhaling, they are instructed to chant the "A U Mmm" mantra along with a humming nasal sound similar to that of a wasp. It causes mild vibration on the laryngeal walls and the inner walls of the nostrils. This complete procedure at the respiratory rate 3-4/min followed with one min rest form one cycle of Bhramari pranayama. They were allowed to practice up to 5 cycles (45 min) in the same manner. Control group subjects were made to do normal breathing (12-16 breath/min) with eyes open in a comfortable sitting posture. After this, the blood pressure and heart rate were again recorded using the same instrument mentioned earlier for both the groups. MMSE was recorded day one and day 30.

RESULTS

DEMOGRAPHIC DATA OF BHRAMARI PRANAYAMA & CONTROL GROUP

DEMOGRAPHIC VARIABLE	BHRAMARI GROUP	CONTROL GROUP
AGE (Years)	20.24 ± 1.23	21.01 ± 1.12
HEIGHT (cm)	153.12 ± 10.12	152.00 ±7.92
WEIGHT (kg)	54.28 ± 9.53	47.11 ±7.95
BMI (kg/m^2)	20.44±4.07	20.89±3.18

RESTING CARDIOVASCULAR PARAMETERS BEFORE AND IMMEDIATELY AFTER BHRAMARI PRANAYAMA PRACTICE

BP VARIABLE	BHRAMARI GROUP		CONTROL GROUP	
	Before	After	Before	After
SBP (mmhg)	117.8±4.9	112.3±4.4	116.9±5.9	115.1±4.3
DBP (mmhg)	73.1±4.12	71.85±3.4	74.9±3.4	74.9±2.19
HR (beats/min)	78.35±5.6	71.7±2.84	75.30±4.92	76.3±3.53
MAP (mmhg)	87.3±3.4	85.31±2.4	88.23±2.2	89.3±1.6
PP (mmhg)	43.7±5.92	41.45±5.49	40.0±7.04	40.20±5.34

MINI MENTAL STATUS EXAMINATION

AVERAGE POINTS SCORED

Question number	Before Bhramari Practice (day 1)	After Bhramari Practice (day 30)
1	3.5	5
2	4	5
3	3.7	3
4	2.3	5
5	2.4	3
6	2	2
7	1	1
8	2.6	3
9	1	1
10	0.7	1
11	0.6	1

DISCUSSION

In this study, it was found that following a single session of 5 cycles of (45 min) Bhramari Pranayama practice, has significant effects on resting cardio vascular parameters in the healthy adolescents. We observed that DBP, SBP, HR, MAP, PP, decreased significantly in Bhramari Pranayama group. A similar result was observed in a study done by Pramanik et al., in that study, immediately after 5 minutes of Bhramari Pranayama practice, they found a decrease in SBP, DBP, MAP and HR. From this, they derived a conclusion that Bhramari Pranayama induced parasympathetic dominance however their study design was different from our study because they have given the intervention of Bhramari Pranayama practice for only 5 min.[9] In another study, it was found that BP and HR decreased significantly when measured immediately after the practice of Savitri Pranayama which is similar to

Bhramari Pranayama supports our results as well.[17] Sympathetic Nervous System (SNS) and Parasympathetic Nervous System (PNS) determines the HR and DBP. Parasympathetic is associated with the HR and the SNS with the DBP by altering the peripheral vascular resistance. The Mean Arterial Pressure (MAP) of the cardiac cycle is determined by both the SNS and PNS. Hence, parasympathetic activity increases and sympathetic decreases in the Bhramari Pranayama group causing a decrease in HR, DBP and MAP, PP is the index of the Oxygen consumption and workload of the heart and they denote the status of sympathetic activity.[18,19,20] Decrease in PP represent decreased workload on the heart in the Bhramari Pranayama group which is a favourable outcome. In deep breathing pulmonary stretch receptors are stimulated which lead to withdrawal of sympathetic tone on the skeletal muscle causing pervasive vasodilatation with decrease of peripheral resistance.[21]

During extended voluntary expiration, there is raise of intra-thoracic pressure causing more blood flow to the heart from lung and thus increasing the stroke volume. This in turn increases the blood pressure stimulating the baroreceptors in carotid sinus.[22] Further, this increased baroreceptor discharge inhibits the vasoconstrictor nerves and excites the vagus innervations of the heart. These are the possible reasons for a drop in blood pressure and heart rate in our study. Jerath et al., have reported that slow deep breathing in pranayama results in decreased oxygen consumption, heart rate and BP[23], thus adding more strength to our study. Neural activity in heart, lung, limbic system and cortex is synchronized by the signals of two main sources; one is the slow adapting stretch receptors which produces inhibitory signal by deep inspiration above tidal volume and the other is the hyperpolarized current produced when the connective tissues like fibroblast around lungs are stretched.[24,25,26] This in turn causes the cells of cardiopulmonary and central nervous system to act rhythmically within them and regulating the excitability of nervous tissues. All these create a state of relaxation. In today's modern industrial societies most of the children and adolescents are not having proper physical activity and this lead to an increased risk of cardiovascular and other lifestyle-related diseases later in their adulthood.[27]

Yoga is currently being accepted as a part of academic curriculum in some school programs and is gaining more awareness not only in teachers but also among the parents. Obesity among the adolescents is increasing because of their sedentary nature, yoga remains as the only ideal option and alternative form of physical therapy that is beneficial both for their body and mind. It has strong effects on physiological system in improving the physical fitness along with their performance by enhancing the cognitive function. As for our study is concerned, Bhramari Pranayama as a pranayama was well accepted by the students because of its simplicity, the humming sound produced during the practice and the mimicking group chanting that induced deep state of relaxation like meditation. Pranayama is an integral component of holistic yoga therapy schedule and involves slowing down of the normal breathing rate along with an awareness based, conscious inner focus on the respiration.

CONCLUSION

The findings of this study concludes that Bhramari pranayama practice improves the cardiovascular parameters through parasympathetic dominance in adolescents and it can be practiced routinely for the reduction of stress induced cardiovascular risk in their future.

REFERENCES

1. Bhavanani AB, Ramanathan M, Trakroo M, Thirusangu S. Effects of a single session of yogic relaxation on cardiovascular parameters in a transgender population. International Journal of Physiology, 2016; 4(1): 27–31.
2. Brown RP, Gerbarg PL. Sudarshan Kriya yogic breathing in the treatment of stress, anxiety, and depression: part I-neurophysiologic model. Journal of Alternative & Complementary Medicine, 2005; 11(1): 189–201.
3. Bhattacharya S, Pandey US, Verma NS. Improvement in oxidative status with yogic breathing in young healthy males. Indian Journal of Physiology and Pharmacology, 2002; 46(3): 349–54.
4. Harinath K, Malhotra AS, Pal K, Prasad R, Kumar R, Kain TC, et al. Effects of Hatha yoga and Omkar meditation on cardiorespiratory performance, psychologic profile, and melatonin secretion. The Journal of Alternative & Complementary Medicine, 2004; 10(2): 261–68.
5. Jain S. Effect of pranava yoga on cardiac output and systemic peripheral resistance. International Physiology, 2015; 3(2): 99.
6. Jain S. Effect of 6 weeks Kapalabhati pranayama training on pulmonary and cardiovascular parameters of young, prehypertensive obese medical students. International Journal of Medical Science and Public Health, 2016; 5(8).
7. Jain S. Effect of Six Week Training of Alternate Nostril Breathing on Cardiac Output and Systemic Peripheral Resistance in Prehypertensive Obese Young Adults. Indian Journal of Public Health Research & Development, 2016; 7(1): 1–4.
8. Ankad RB, Herur A, Patil S, Shashikala G, Chinagudi S. Effect of short-term pranayama and meditation on cardiovascular functions in healthy individuals. Heart Views, 2011; 12(2): 58.
9. Pramanik T, Sharma HO, Mishra S, Mishra A, Prajapati R, Singh S. Immediate effect of slow pace bhastrika pranayama on blood pressure and heart rate. The Journal of Alternative and Complementary Medicine, 2009; 15(3): 293–95.

10. Rajkishor P, Fumitoshi M, Bakardjia H, Vialatte F, Cichocki A, editors. EEG Changes after Bhramari Pranayama. SCIS & ISIS, 2006.
11. Vialatte FB, Bakardjian H, Prasad R, Cichocki A. EEG paroxysmal gamma waves during Bhramari Pranayama: a yoga breathing technique. Consciousness and Cognition, 2009; 18(4): 977–88.
12. Osgood DW, Foster EM, Courtney ME. Vulnerable populations and the transition to adulthood. The Future of Children, 2010; 20(1): 209–29.
13. Reinherz HZ, Paradis AD, Giaconia RM, Stashwick CK, Fitzmaurice G. Childhood and adolescent predictors of major depression in the transition to adulthood. American Journal of Psychiatry, 2003; 160(12): 2141–47.
14. Guh DP, Zhang W, Bansback N, Amarsi Z, Birmingham CL, Anis AH. The incidence of co-morbidities related to obesity and overweight: a systematic review and meta-analysis. BMC public health, 2009; 9(1): 1.
15. Bhimani N, Kulkarni N, Kowale A, Salvi S. Effect of Pranayama on stress and cardiovascular autonomic function. Indian J Physiol Pharmacol, 2011; 55(4): 370–77.
16. Saraswati SS. Asana pranayama mudra bandha, 2009.
17. Vijayalakshmi P, Surendiran A. Effect of slow and fast pranayams on reaction time and cardiorespiratory variables. Indian J Physiol Pharmacol, 2005; 49(3): 313–18.
18. Kitamura K, Jorgensen CR, Gobel FL, Taylor HL, Wang Y. Hemodynamic correlates of myocardial oxygen consumption during upright exercise. Journal of Applied Physiology, 1972; 32(4): 516–22.
19. Hermida RC, Fernández JR, Ayala DE, Mojón A, Alonso I, Smolensky M. Circadian rhythm of double (rate-pressure) product in healthy normotensive young subjects. Chronobiology international, 2001; 18(3): 475–89.
20. Holmberg S, Serzysko W, Varnauskas E. Coronary circulation during heavy exercise in control subjects and patients with coronary heart disease. Acta Medica Scandinavica, 1971; 190(1-6): 465–80.
21. Daly M, Robinson B. An analysis of the reflex systemic vasodilator response elicited by lung inflation in the dog. The Journal of Physiology, 1968; 195(2): 387–406.
22. Hainsworth R. Circulatory responses from lung inflation in anesthetized dogs. American Journal of Physiology—Legacy Content, 1974; 226(2): 247–55.
23. Jerath R, Edry JW, Barnes VA, Jerath V. Physiology of long pranayamic breathing: neural respiratory elements may provide a mechanism that explains how slow deep breathing shifts the autonomic nervous system. Medical hypotheses, 2006; 67(3): 566–71.
24. Matsumoto S, Ikeda M, Nishikawa T, Tanimoto T, Yoshida S, Saiki C. Inhibitory mechanism of slowly adapting pulmonary stretch receptors after release from hyperinflation in anesthetized rabbits. Life Sciences, 2000; 67(12): 1423–33.
25. Schelegle ES, Green JF. An overview of the anatomy and physiology of slowly adapting pulmonary stretch receptors. Respiration physiology, 2001; 125(1): 17–31.
26. Robinson RB, Siegelbaum SA. Hyperpolarization-activated cation currents: from molecules to physiological function. Annual Review of Physiology, 2003; 65(1): 453–80.
27. Fulton JE, Garg M, Galuska DA, Rattay KT, Caspersen CJ. Public health and clinical recommendations for physical activity and physical fitness. Sports Medicine, 2004; 34(9): 581–99.