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(RESEARCH ARTICLE)

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Comparing the effectiveness of slow breathing exercise and humming techniques on hypertensive individuals

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Abstract

Introduction: Hypertension is a serious medical condition characterized by continuously elevated blood pressure in the blood arteries. It is a major cause of premature death worldwide. To reduce stress and improve wellbeing, practice conscious control over your breathing pattern by extending the time between inhalation and exhalation. Slow breathing exercises can reduce stress, improve emotional well-being. The humming technique, which involves exhaling while closing your mouth and humming continuously.

Methodology: The interventional study involving 30 hypertension subjects, undergoes intervention in outpatient department for 6 weeks.

Technique: The study involved two groups: Group A, who were given a slow breathing technique, and Group B, who were given a humming technique. Both groups were given specific instructions, blood pressure checks, and a therapist's guidance.

Result: The study found significant differences in pre- and post-values between two groups, with the humming approach being more effective than the slow breathing strategy.

Conclusion: The study shows that humming breathing technique significantly improves both diastolic and systolic blood pressure levels in patients compared to slow breathing.

Keywords: Hypertension; Slow breathing exercise; Humming technique; Sphygmomanometer

1. Introduction

A continuously elevated pressure in the blood arteries is called hypertension, sometimes referred to as high or rising blood pressure. Through the vessels, blood is transported from the heart to every area of the body. Every time that Blood is pumped into the vessels by the beating heart.

Hypertension is a serious medical condition and can increase the risk of heart, brain, kidney and other diseases. It is a major cause of premature death worldwide, with upwards of 1 in 4 men and 1 in 5 women – over a billion people having the condition.

To slow down your breathing, practice careful and conscious control over your breathing pattern. Usually, the goal of these workouts is to decrease breathing by lengthening the time between each inhalation and exhalation.

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The rate of breathing and promote calmness. These breathing techniques can trigger the body's relaxation response, which calms the nervous system, lowers stress levels, and enhances wellbeing by purposefully slowing the breath.

Regularly engaging in slow breathing exercises can provide several advantages, such as decreased stress, higher emotional well-being overall, better attention and concentration, lowered blood pressure, and decreased anxiety. It can also improve sleep quality. These exercises are frequently used in yoga, meditation, mindfulness practices, and other stress reduction methods.

The humming technique entails exhaling while closing your mouth and humming continuously. This method is frequently applied in some breathing exercises, meditation techniques, As well as speech exercises.

One should be able to tolerate a soft, steady humming sound at a frequency that suits you. As you exhale, concentrate on the experience of the sound and the vibrations.

Benefits of humming technique are relaxation and Stress Reduction, improved respiration, sinus and nasal health, enhanced focus and concentration, boosted mood and energy, voice resonance and relaxation, stimulation of vagus nerve, mindfulness and medication, improved dental health and lowered blood pressure.

Physiology of humming technique in reducing Blood pressure are Increased Levels of Nitric Oxide, Increased Lymphatic Circulation, Increased Levels of Melatonin, Release of Endorphins, Release of Oxytocin and Decreased level of cortisol.

An Intentional and regulated breathing pattern distinguished by a slowed breathing rate is referred to as slow breathing. Taking leisurely breaths entails taking deeper breaths than the quick, shallow ones that are frequently connected to tension or anxiety.

Breathing more deeply and deliberately with each breath, and taking fewer breaths each minute. The body might experience a range of physiological and psychological impacts by breathing more slowly. It is frequently employed as a relaxation method to increase general well-being, foster serenity, and lessen stress. A crucial element of many mindfulness and meditation practices is slow breathing.

Benefits of slow breathing technique are stress reduction, lowering blood pressure, improved respiratory function, enhanced focus and concentration, better sleep quality, pain management, improved heart health, anxiety and mood management, strengthened immune system and mindfulness and meditation.

Physiology of slow breathing in reducing blood pressure are Autonomic Nervous System (ANS) modulation, Baroreflex sensitivity, Nitric oxide production, Reduction in stress hormones, Improved oxygenation, Heart Rate Variability (HRV) and Respiratory Sinus Arrhythmia (RSA).

2. Methodology

- **Study design**: An interventional study
- **Study population**: Subject with hypertension
- **Sampling methods**: Random sampling method.
- **Sampling size**: 30 subjects
- **Study setting**: Outpatient department
- **Study duration**: 6 weeks
- **Materials used**
  - Mercury sphygmanometer
  - Stethoscope
  - Stop watch
  - Pen
  - Paper
  - Assessment form
  - Consent Form
  - Data collection sheet
  - Couch
  - Pillow

2.1. Criteria for selection

2.1.1. Inclusion criteria

- Age: 35-65 years
- Gender: male and female both will be included
- Patients with hypertension (SBP>/=140 mmHg and DBP >/=90mmHg) diagnosed by a physician at least six months prior to the study and no change in medications during participation in the trial.

2.1.2. Exclusion criteria

- Autoimmune diseases
- Cigarette smoking
- Alcohol consumption
- Use of oral contraceptives
- Use of neuroleptics /anti-arrhythmic
- Impaired cognitive function

2.2. Procedure for slow breathing technique

2.2.1. Group – A is given slow breathing technique.

- Subjects meeting specific criteria were chosen
- Only willing subjects provided consent.
- Before starting, their blood pressure was checked
- Before starting, their blood pressure was checked.
- The therapist clearly taught the slow breathing technique.
- Subjects sat comfortably in a quiet place.
- They were guided to sit steadily on a soft seat.
- Subjects closed their eyes or gazed at the floor. Breathing in through the nose and out through the mouth, they focused on relaxing while exhaling.
- Inhaling for 4 seconds and exhaling for 6 seconds formed one slow Breathing cycle.
- They practiced this cycle for about five minutes and then resumed normal breathing.
- If feeling agitated, they stopped and returned to normal breathing.
- Finally, their blood pressure was checked again post-practice.

2.3. Procedure for humming technique

2.3.1. Group – B is given humming technique.

- Subjects were chosen based on specific criteria.
- Consent was obtained from willing subjects.
- Blood pressure was checked before starting the humming technique.
- The therapist taught the humming technique clearly.
- Subjects were asked to sit comfortably in a quiet place.
- They sat in a relaxed posture on a soft seat, closing their eyes or gently gazing at the floor.
- Breathing slowly through the nose, they focused on relaxation while exhaling.
- Subjects kept facial muscles relaxed and lightly made a gentle humming sound while exhaling through the nose.
- They continued this humming comfortably, noticing the vibrations, for about five minutes before returning to normal breathing.
- If feeling agitated, subjects were advised to stop humming and resume normal breathing.
- Subjects were prompted to notice any changes in their feelings, breathing, and mood.
- Blood pressure was checked after completing the practice.

2.4. Data analysis

The outcome was assessed by measuring blood pressure prior to and following conducting the slow breathing and humming techniques to the two groups.

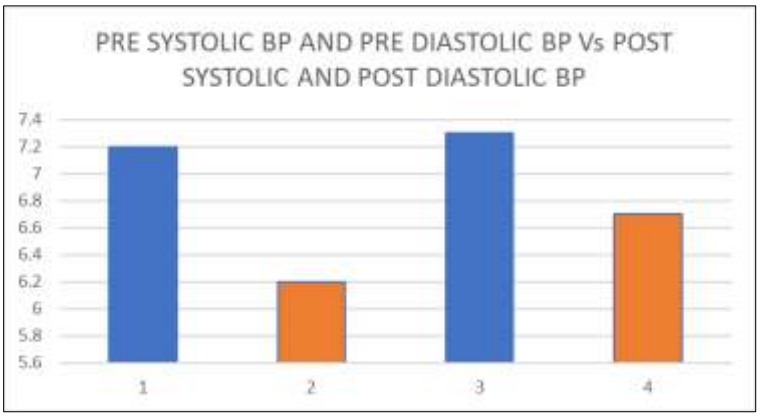

Figure 1 Pre systolic bp and pre diastolic bp vs post systolic bp and post diastolic bp of group A

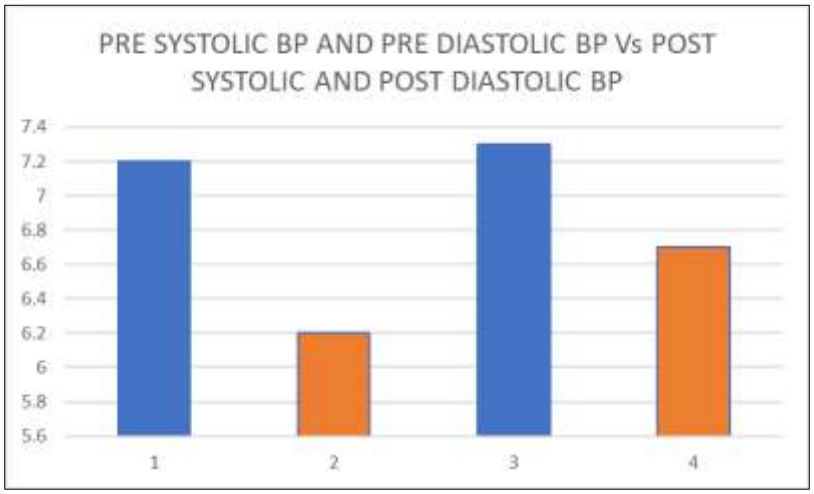

Figure 2 Pre systolic BP and pre diastolic bp vs post systolic and post diastolic bp of group B

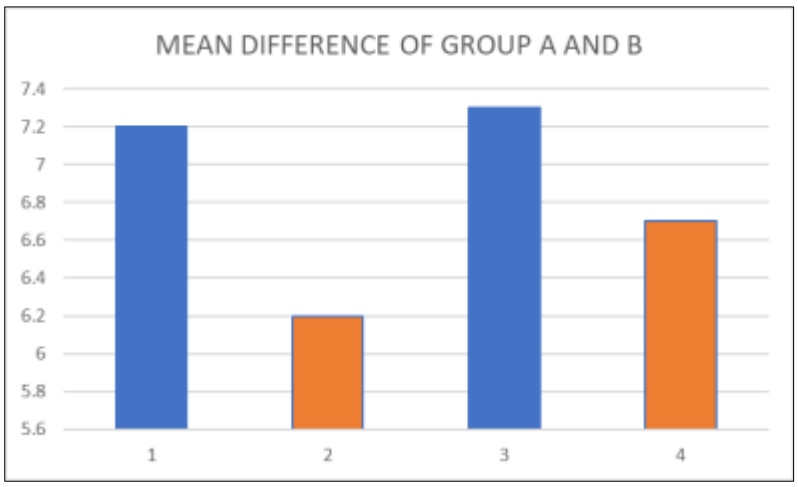

Figure 3 Mean difference of graph a and b

3. Result

The study demonstrates a substantial difference between the two groups' pre- and post-values from the outcome measures with the p value = 0.005. However, when contrasted, the humming approach proves to be more effective than the slow breathing strategy.

4. Discussion

Tidal volume rises in hypertensive people undergoing slow, deep breathing exercises at a rate of 6 cycles per minute in order to sustain minute ventilation.

Tidal volume times respiration rate equals minute ventilation.

According to Narkiewicz et al., the reflex mechanism involves the pulmonary stretch receptors, which are stimulated and afferents via vagi reach the nucleus tractus solitarious. This reduces the chemoreflex sensitivity and may strengthen the baroreflex, which may have the effect of lowering blood pressure and sympathetic activity. The baroreflex mechanism acts as a rapid, automatic feedback loop that helps maintain blood pressure within a relatively narrow range, ensuring that essential organs receive adequate blood flow without experiencing undue Stress from excessively high pressures.

Together with other regulatory mechanisms and hormonal systems (such as the reninangiotensin-aldosterone system), the body uses the baroreflex as one of many methods to maintain blood pressure homeostasis.

Physiological mechanisms that maintain a healthy range of blood pressure. The results of the current study are supported by a 2013 study by Dr.Labiba Abd El-kader Mohamed et al. that examined the effects of slow deep breathing exercise on blood pressure and heart rate among newly diagnosed hypertensive patients. The study found that slow deep breathing exercise reduced the systolic and diastolic BP as well as heart rate of patients with essential hypertension.

Nitric Oxide is a molecule that causes vasodilation which causes smooth muscle cells to relax. This positively effects and enhances circulation as well as increasing the amount of oxygen in the cells. When an individual hums, Nitric Oxide is released, helping to reduce the blood pressure. Mechanisms through which nitric oxide helps maintain blood pressure are vasodilation, endothelial function, blood flow regulation, inhibition of platelet aggregation, neurotransmitter and regulation of renal function.

5. Conclusion

The current study's findings indicate a substantial difference in the two groups' pre- and post-treatment systolic and diastolic blood pressure levels. According to the study's findings, patients who use the humming breathing technique has a greater positive impact on both diastolic and systolic blood pressure than slow breathing.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed written consent was obtained from all individual participants included in the study.

References

[1] Balasubramanian Sundaram, Purvesh J Maniyar, Varghese John P, Vijay Pratap Singh. Slow breathing training on cardio-respiratory control and Exercise capacity in persons with essential hypertension- A randomized Controlled trial. Indian Journal of Physiotherapy and Occupational Therapy. 2012; 6(2): 22-7.

[2] Shirley Telles, Sachin Kumar Sharma, Acharya balkrishna the effect of alternate nostril breathing on blood pressure and heart rate variability in normal healthy male volunteers Med Sci Monit Basic Res, (2014); 20: 184-193

[3] Labiba Abd El-kader Mohamed, Naglaa Fawzy Hanafy, Amel Gomaa Abd El- Naby. Effect of slow deep breathing exercise on blood pressure and heart Rate among newly diagnosed patients with essential hypertension. Journal of Education and Practice; 2013;5(4):36-45

[4] Kayce Bell, June Twiggs, Bernie R. Hypertension: The Silent Killer: updated JNC-8 Guideline Recommendations 2015.

[5] Kow Fei Ping, MMed, Adlina Bakar, MMed, Sivasangari Subramaniam, PhD, Punithavathi Narayanan, MBBS, Ng Kum Keong, MBBS, Ang Ah Heong, SRN, Ong

[6] Loke Meng The impact of music guided deep breathing Exercise on blood pressure control – A participant blinded randomised Controlled study Clinical Research Centre, Hospital Pulau Pinang, Georgetown, Pulau Pinang, Malaysia. 2018.

[7] R.B. Ankad et al. Effect of short-term pranayama and meditation on Cardiovascular functions in healthy individuals

[8] Shirley Telles, Sadhana Verma, Sachin Kumar Sharma, Ram Kumar Gupta, Acharya Balkrishnathe effect of alternate nostril breathing exercise on Blood pressure and stress vigilance test Med Sci Monit Basic Res; 2017; 23: 392-398

[9] A.V. Turankar, S. Jain, S.B. Patel, S.R. Sinha, A.D. Joshi, B.N. Vallish, P.R. Mane & S.A. Turankar Effects of slow breathing exercise on cardiovascular Functions, pulmonary functions & galvanic skin resistance in healthy human Volunteers – a pilot study Indian J Med Res 2013; 137: 916-921.

[10] Tapas Pramanik, Hari Om Sharma, Suchita Mishra, Anurag Mishra, Rajesh Prajapati, and Smriti Singh the Immediate Effect of Slow Pace Bhastrika Pranayama on Blood Pressure and Heart Rate the journal of alternative and complementary medicine 2009; 15(3): 293–29