

EFFECT OF BHRAMARI PRANAYAMA ON HEALTHY VOLUNTEERS: A SYSTEMIC REVIEW

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ABSTRACT

Yoga is a branch of science which deals with facilitating homeostasis. Yoga has further sub divided into many branches in which pranayama is one of the branches. Pranayama played an important role as well as is a remotest favorable to human beings to balance physical and mental health. Pranayama is sub classified and within which commonest practiced is the Bhramari pranayama. It is evidenced that practicing yogic exercise improves cardiac, respiratory as well as mental state of human being and improvise healthy human being as by reducing stress over various systems which is done by increasing the vagal tone. There is an evidence-based study proves that practicing deep breathing yogic exercise along with meditation results in better memory, capacity of concentration, span of attention and level of consciousness. During present scenario where everyone is running with a tight schedule, full of stress to get rid of these situations, incorporating of yoga for lifestyle management has been played an important role. Aim of existing research is to achieve effect of Bhramari pranayama on healthy volunteers and also enlighten the effect on cognitive function, cardiovascular, respiratory stress. Material and Method: This study included 28 articles from 1992 to 2023. The respective studies suggested about the methodology, objectives study setting, their findings, intervention last but not the least is the implication these all define their data. Conclusion: It reduces stress, anxiety, improve concentration as well as attention span, improves the working memory, relaxation of mind that is on cognitive function. Even reduced the blood pressure and heart rate. Results: The papers which were included depict the practice of bhramari pranayama as well as their advantages on physiological function of various system.

KEYWORDS: Bhramari, Pranayama, Cognitive Function, Stress, Vagal Tone, Short Term Memory.

INTRODUCTION

A spiritual discipline of 5000 year older.¹ Which schemed to escort harmony to somatic, psychological, spiritual health of a solitary.² Yoga is a prehistoric national science which framed life with its several exercises.³ Their practice is well known to attain cardiorespiratory and psychological status of individuals.⁴ It also releases stress which is proved by many studies.⁵

One of the most commonly practiced yogic exercise is the pranayama.⁶ It also involves in controlling the breathing pattern in which breath is a zestful aqueduct in between mind and body.⁵ For keeping sound health ashtanga yoga is much more important than yogasana.⁷ This exercise is found to be effective to mankind with regarding its function.³ Pranayama has

two segment prana meaning lively strength while Yama meaning to retain.⁸ The method is to elongate and control breath along with awareness about the breath in order to modify respiration pattern and habits.⁹

Pranayama has three phases, these phases are inhalation which is also known as purak, retention also known as kumbhak, exhalation also known as rechak.⁷ In living being specially humans there's a connection of breath in between body and soul or mind. While in case of pranayama, it consists of modification of self-breath. It also consists of slow and fast breathing exercise.¹⁰ If we practice pranayama continuously it even reducing dead space of lungs as well as reduces the breath work done.³ Practicing pranayama continuously decreases stress and strain of different

system of body by improving the vagal tone.³ It consists of slow breathing exercise and fast breathing exercises.⁵ Practicing of both are adventitious, but their physiological response is different on different healthy volunteers which depend upon the span and the kind of exercise.¹¹

Type of pranayama are slow and fast which are again of different varieties includes slow pranayama's are Bhramari, nadishuddhi, savitri, and pranav while fast pranayama's are kapalbhathi and bhastrika.¹²

Practicing of slow pranayama reduces the rate of heartbeat, blood pressure and its components while increases pulse pressure.¹³

Practicing of fast pranayama alone leads to increase in sympathetic activity of the body via increasing heart rate, blood pressure and its component that is systolic and diastolic blood pressure.¹⁴

Each and every pranayama individually have its significance which is based upon the pattern of breathing, and use of anatomical structure for utilizing the pattern.¹⁵

Kapalbhati

It's a type of pranayama which includes the forceful expiration followed by uncomplicated inspiration which leads to stimulation of organs of abdomens and improves in balancing autonomic activities.¹⁶ This type of pranayama causes expulsion of CO₂ out of the body and increase in consumption of O₂ which further causes relaxation of respiratory center. These leads to improvement in cognitive domains, activity of cells of brain, renewal of neurons.¹¹

Nadishodhana

In this type of pranayama there is forceful breathing by nostril through one side for example left side causes dominance of opposite side hemisphere that is right side.⁴ It improves cognition, attention span, higher function of brain. It also specified that left side nostril nadishodhana practise cause improvement in spatial skill while in case of right side causes verbal skill improvement.¹⁷

“om” Chanting

Chanting “om” “aum” causes decreases in physiological alertness, increases in sensitivity and simultaneity for transmission of sensory impulses.¹⁸ Practicing “om” chanting also suppresses the activity of the cortex function.¹⁹

Chanting aum sound depict the meditation specifically the repetitive mantra techniques.³

Bhramari

Bhramari signify “a black bee” the word bhramari

derived from bhramara. While practicing, the sound is produced like a buzzing of black bee.²⁰

In this type of pranayama, the sequence to be followed are the slow breathing pattern that is short inspiration and long expiration no matter the age and gender as it can be easily practiced by everyone.³

Healthy volunteers, to be seated in a relaxed position by closing eye. Then breath in and out slowly and deeply though nostril, while breathing out the individual have to chant or to produce humming sounds and that should be from the nostril itself with the mouth closed by lips and ear closed by thumbs.⁸

Practicing of bhramari pranayama constantly produces individuals' apprehension of mind revitalization as well as enchanted.³

Benefits of bhramari pranayama: -

- It also modifies the breathing pattern by shortening the inspiration breath and elongating the expiration breath, this help in improving the physiology of the various system of the body.⁵
- It relives the stress and reduces anxiety, anger as well as hyperactivity.²¹ (It is effective to rectify the hormone variation state and the other condition such as high blood pressure, or depression etc.)
- The tranquil effect of bhramari pranayama assist to even overcome drug dependence.¹⁰
- This pranayama prepares the body for concentration and meditation.
- It also increases the vagal tone which helps in balancing the autonomic activity if the body.²¹
- Regular practice of pranayama enhances cardiorespiratory functions. It has a positive impact on visceral system by increasing craniosacral division effect i.e overpowering tone of vagus nerve which further decreases tension and pressure of numerous systems. Therefore, gross improvement of somatic and psychotic health.³
- Bhramari Pranayama is an effective tool in calming increased nervous system activities, for the endorsement of good physical condition by relaxing the entire psychosomatic complex. As well as found, predominance of craniosacral division effect instantly after humming bee technique.²¹
- In healthy individual, Bhramari Pranayama practice reduces the response latency by improving involuntary spontaneous response and information rectifying. It is also effective in improving stress response.²²

Indication of bhramari pranayama: -

For peaceful mind, insomnia, stress, anxiety, depression, rhino sinusitis, thyroid dysfunction and hypertension.²³

Contraindication of bhramari pranayama: -

Sever ear infection, heart disease, psychological and psychiatric problem, hypertension, migraine, pregnancy, during menstrual cycle in women.²³

MEDITATION

It is a change in state of alertness being well known for ataraxia, steady respiration and ease the musculature which undergo to reduce metabolic rate while the encephalon is pursued with awakens and the individual produce elevated state of consciousness.²⁴

TYPE OF MEDITATION

- i) **Transcendental meditation:** The technique involves repetition of mantras without any effort utilization. If the attention gets distracted regain it towards the mantra itself.
- ii) **Zen Buddhist meditation:** Derived from Japanese Buddhist tradition. It is simplest but very difficult, as this technique required to think of a riddle and focus on it with opened eye.
- iii) **Brahmakumaris Raja Yoga meditation:** This technique originated in Mount Abu Rajasthan, India. It is also known as tratak meditation which involves gazing on light with eye open.
- iv) **Vipassana meditation:** the word itself means when you see yourself as you are in relation to them. It is also derived from Buddhist tradition but from Burmese Buddhist. This technique involves eye close and focus on the inner awareness.²⁵

NEED FOR THE REVIEW

Pranayama has several advantages for which numerous research have been escort to experiment these advantages, until now scarcely any documentary for particular pranayama separately. The bhramari pranayama is solitary yoga practicing technique which has several advantages related health but for which evidence are less. It's because the yoga techniques are practice as a whole rather than specific bhramari pranayama itself for practice. Therefore, present review is all about exploring the documentary available by reviewing the scientific studies available in sequence manner about the advantages as well as evaluating study procedure. So, this study is providing with new floor for upcoming researches related present study and also for scientific field which can even benefit our society too.

METHODOLOGY

The present review is held under the guidance of meta-analysis and systemic review for preferred reporting items.

Research criteria: the search of 35 articles was performed from Medline, PubMed, google scholar etc. particularly from international journal of yoga, journal of traditional and complementary medicine, journal of biomedicine, journal of pharmacogn etc. Here the keywords used are Bhramari, pranayama, cognitive function, stress, vagal tone, which has been extracted from the article itself. These keywords were helpful in research purpose.

Selection of studies: Preference of the studies conducted based on inclusion and exclusion criteria.

Inclusion criteria: The present study is particularly on Bhramari pranayama and its advantages, its effect on systems as well as specific advantages on health were included.³

Exclusion criteria: all the article which does not include the Bhramari pranayama.

As per all the article, procedure prior to performance of any type of pranayama or evaluation of its function, written consent has been taken along with the techniques and procedure were explained to them individually in their native language.

PARAMETER USED ARE FOR ESTIMATION ARE

- Respiratory rate was counted manually and average of 3 reading taken.
- Heart rate taken by pulse rate manually.
- Blood pressure by sphygmomanometer both palpatory and auscultatory method used to estimate.

HOW TO PERFORM BHRAMARI PRANAYAMA

- Volunteers were permitted to sit erect position. Close eyes with fingers and ear with thumb. Bhramari pranayama was practice with slow and deep breath in from nostril with mouth close, followed by breath out by producing humming sound. It signifies one complete round.
- Repeat the procedure for 5 to 10 times.²³

DATA EXTRACTION

After going through all research papers articles, finally included the points as follows: introduction, need for review, objective of the study, methodology, tool used, number of participants, findings, interventions if any performed and results from the study findings.

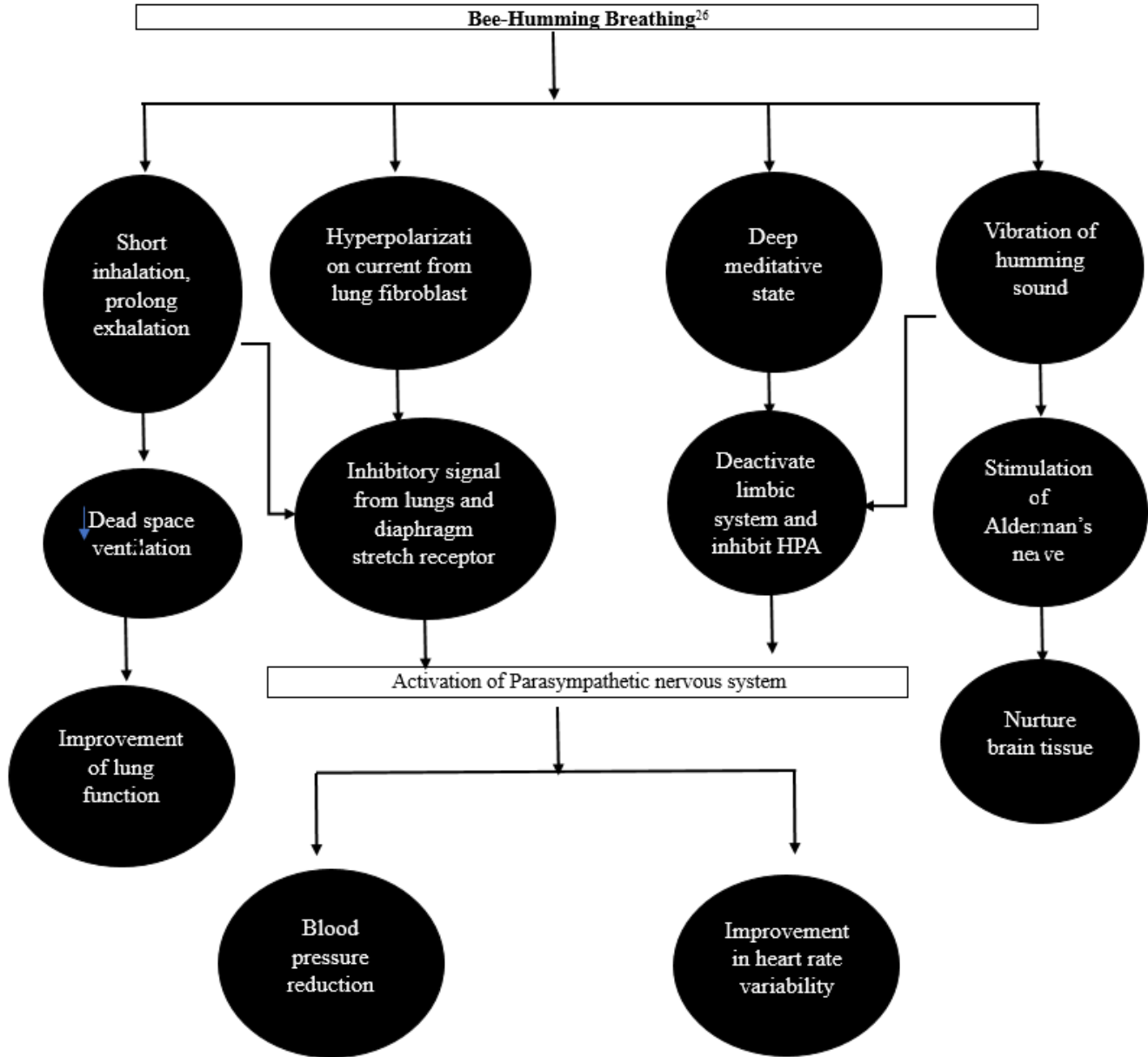


Fig 1: Effect of Bee-Humming Breathing on Various Organ System

S. No	Name of Author & Objective of the studies	Methodology	Tools applied within the study	Participan ts	Results of the study	Inculpation
1.	Vivek Kumar Sharma ⁵ to compare the effects of slow and fast pranayama on perceived stress and cardiovascular functions in young health-care students.	Randomized control trial	Perceived stress scale, Heart rate, Breathing rate, Blood pressure and its components, rate pressure product, and double product	90 participants (18-25 years).	Significant PSS scores reduction in both group but percentage reduction was comparable. While in group 2 nd Significant decrease in HR, DBP, RPP, and Do P	Both types of pranayama are beneficial in reducing PSS in the healthy subjects but beneficial effect on cardiovascular parameters occurred only after practicing slow pranayama.

Cont. Table 1:

2.	Kunal⁴ To investigate the impact of yogic practices (Nadishodhana, Kapalabhati Pranayama, 'AUM' chanting and meditation), among mentally retarded children attending a 'special school' on: Resting respiratory rate; Resting heart rate; Blood pressure and Short-Term Memory	Randomized control trial	Breathing rate, Heart rate, Blood pressure and active Memory	40 children.	STM were higher, breathing-rate and heart-rate were lower. Blood pressures showed no changes in both groups.	The pranayama and meditation have beneficial influences on heart rate, breathing rate and STM of mentally-challenged people.
3.	Vivek Kumar Sharma¹¹ To compare the cumulative effect of commonly practiced slow and fast pranayama on cognitive functions in healthy volunteers	Observational study	Perceived stress scale, BMI, waist: hip, cognitive parameters-letter cancellation test, trail making tests, forward and reverse digit spans, acoustic and optic response latency for red and green light.	84 participants (18-25 years).	Executive functions, PSS and response latency improved significantly in both groups. Reverse digit span and Percentage reduction in response latency were significantly more in the fast pranayama group.	Both types of pranayama are beneficial for cognitive functions, but fast pranayama has additional effects on executive function of manipulation in auditory working memory, central neural processing and sensory-motor performance.
4.	Surekharani Chinagudi⁶ To study the effects of slow deep breathing for short duration (5 min) on the cognitive levels.			71 participants.	Significant improvement seen after slow deep breathing in solving matrices with respect to time and score but score was not statistically significant.	Slow deep breathing even for five minutes is beneficial. Can be advised for students before starting any class for their better academic performance.
5.	Junu Upadhyay²² To assess and compare the immediate effect of Nadi Shodhana and Bhramari Pranayama on HRV and ART in hypertensive individuals. Thus, to understand the effectiveness of specific pranayama on hypertension	Randomized clinical trial	Heart Rate Variability & Acoustic Response Latency	100 participants.	Nadi Shodhana and Bhramari Pranayama showed highly significant decrease in ART but was not statistically significant.	Nadi Shodhana and Bhramari Pranayama can be effective in stabilizing tone of sympathetic and vagus nerve. Hence, both can be practiced for essential hypertension management
6.	Pratibha Hemant Rajbhoj²¹ To know the effect of simple Bhramari pranayama on both hypertensive and normotensive individuals. To help standardize this Pranayama and advise it as a preventive measure in the management of hypertension.	Single-Arm Clinical Trial	Blood Pressure and Pulse Rate	97 participants, (30 to 60 years).	Simple Bhramari Pranayama significantly lowered SBP, DBP and PR in both groups. Normotensives were well within the normal range of BP and PR.	It is concluded that simple Bhramari Pranayama has significantly reduction in the BP and PR in both groups immediately.

Cont. Table 1:

RESULTS

Prism diagram resembles the process search and selection of study. Almost 40 research articles were involving out of which 38 were selected on the basis of the abstracts and the title of the study only 35 articles after the criteria of inclusion and exclusion were applied to determine which elements were incorporated into the present research. The papers which were included depict the practice of bhramari pranayama as well as their advantages on physiological function of various system. For evaluating sympathetic nervous and parasympathetic nervous system.

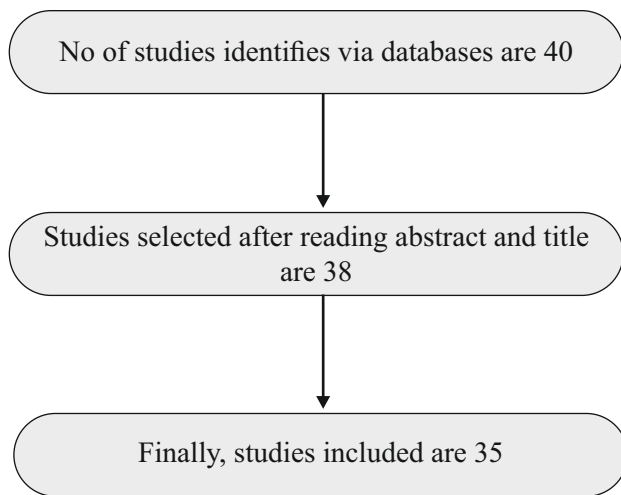


Fig 2: Flowchart diagram showing the process of data search

DISCUSSION

Yoga is a discipline that promotes balance within the body. Bhramari Pranayama involves voluntary ventilation, found to be effective for various system of body and evidences by Mooventhan A et al.27 The studies which were included alternatively shows significantly effective mainly to parasympathetic as it causes reduced Blood Pressure, heart rate, stress levels, irritability in tinnitus, reduction to cold pressor test response, cognitive improvement and favorable EEG changes supported by Kuppusamy M et al.3 but that is contradicted according to the article published by Nivethitha L et al.28 As evidenced by the study the quantitative markers decrease after practicing pranayama which further leads to decrease in sympathetic activity. It also inhibits the dorsal or sympathetic area of hypothalamus responsible for balancing the human physique to cop up the stress. Other study by Novaes et al29 state about amygdala and anterior insula.

Bhramari pranayama practice produces significantly

decrease in Blood Pressure because of increases in voluntary expiration, increased intra-pleural pressure leads to greater circulation from the pulmonary to cardiac region, thereby enhancing stroke volume. As a result, blood pressure rises, triggering the stimulation of pressoreceptors in the carotid bulb. The heightened baroreceptor activity inhibits sympathetic and activates the parasympathetic leading to fall in Blood Pressure stated by Kuppusamy M et al.3

The practice of humming bee technique has been associated with improved concentration, somnolence quality, vagal activity and lung function. It also level off tension, impatience, depression, sympathetic activity, and blood pressure throughout the research supported by Chetry D et al.30

The present review suggests the study findings evidence for variability of heart rate changes with practicing bhramari pranayama. In the Ancient Yoga Tradition, breathing and intellectual activity are interconnected therefore with continuous practicing pranayama, focusing intensifies alterations in cognition, which may be manifest by the body through the autonomic and neuroendocrine systems as per Jayawardena R et al.2

One of the articles which is reviewed by us in this research describe about reduce in beath because of bulbo-pontine complex which adjust the breathing pattern that is all due to practicing yoga as it strengthens the parasympathetic supported by Beutler E et al.31

It is also stated by the same article that working memory also get improved by practicing pranayama as it causes enhance in both presynaptic elevation and depression play roles in active memory which indirectly effect pre frontal area which is responsible for the working memory along with higher function. Therefore, pranayama can also be used for treatment of several autonomic nervous system imbalance (depression, anxiety etc.), also have effect on metabolic function apart from nervous, endocrine system supported by Kuppusamy M et al.3 Campanelli S et al.32

It also has effect on cognitive function therefore improvise the various cognitive domain such as reduction in stress. But there is lacking but it can be topic for further study so that upcoming research focus on the mechanism of action of pranayama on cognitive improvement stated by Ambareesha GK et al.33 apart from parasympathetic effect and reduction of stress, as these are: peripheral receptors stimulation carried by vagal efferent that is connected to nucleus of tractus solitarius ascend towards thalamus, now they descend down which further stretches the respiratory muscles

mainly the diaphragm thus inhibit the vagus nerve by dominating parasympathetic thus lead to calmness and alertness of mind stated by Sharma VK et al.5

Few articles which were included for review states about fast breathing exercise and slow breathing exercise, found that fast breathing has effect on sympathetic tone while slow breathing have parasympathetic tone effect. It is also found that deep breathing exercises improve the concentration as well as attention span withing the medical students therefore it could be involved as a regular time table where one lecture that is of morning can be use as yoga class Russo MA et al.(34) This small modification can have positive effect on memory and cognitive function.

Few studies evidence about the short-term pranayama (5 min) practice shows improvement, while rest states anticipated because exact mechanism behind improvement not been documented in Best and Taylor et al.(25) But it is documented that though it is slow or fast breath pranayama both has effect in reducing the stress, as a physiological parameter significant only for slow pranayama. Significant of slow pranayama is that it can be practice in all age group while fast pranayama is restricted to young generation and also to those who are with stable cardiovascular function. While practicing pranayama there is no significant clinical side effect it means it is safe to practice. Sharma VK et al.5 Anjali MJ et al.(35)

CONCLUSION

Present study review about bhramari pranayama breath effect and concluded the parasympathetic dominance over sympathetic. It reduces stress, anxiety, improve concentration as well as attention span, improves the working memory, relaxation of mind that is on cognitive function. Even reduced the blood pressure and heart rate.

It can be added to our curriculum activity even to the students lectures because it plays a significant role without causing any side effect.

It cannot be restricted to students but also be used by elderly, working subject to balance their mind with the lifestyle.

Furthermore, studies can be involved, as well as research can also be done on mechanism behind slow pranayama, as well as evidence for short duration practice of pranayama, pranayama effect of elderly population, even on the patients who are suffering from cardiovascular problems, cognitive function abnormally etc.

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