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A Systematic Review Of Bhramari Pranayama On Holistic Health

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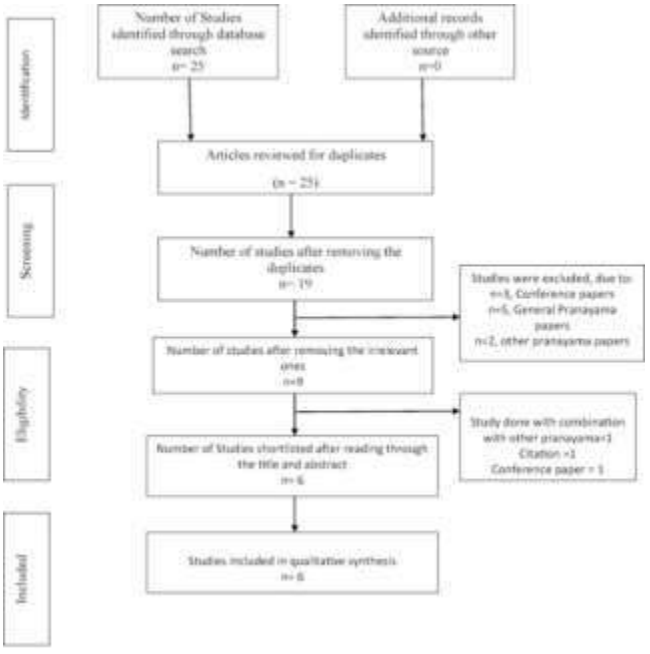
Abstract

Pranayama is extremely beneficial to everyone in maintaining holistic health and this article aims to attain an awareness on the research conducted on the effect of Bhramari Pranayama (Bhr.P) on mental health. The researches done until May 2020 were set up using Medline, Embase, Google scholar and manual hunt. Studies conducted to see effect of Bhr.P on mental health were included on the base of prism guidelines. The data were defined by their objectives, methodology, study setting, holdings, interventions done and counteraccusations suggested in the study. To report and review the researches included in study, Methodological Quality rating Scale (MQRS) and Newcastle-ottawa Scale (NOS) has been used.2 studies satisfied the addition criteria; one on the inhibitory response and one on the tinnitus condition. In the included researches, we can see para-sympathetic dominance of the Bhr.P practices. There are some encouraging effects of Bhr.P on varied physiological systems. Methodological quality of the included studies was estimated to be veritably low and none of them were RCTs. Yet the available studies are miscellaneous, dealing in different grounds and this diversity serves as a resource for the limited range of studies on Bhr.P. thus, further large- scale, duly designed, randomized trials of Bhr.P on varied systems have to be done to justify these effects efficiently.

Keywords: Bhramari Pranayama, Systemic Review, Physical and Mental Health benefits

Graphical abstract



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1. Introduction

Yoga prescribes various breathing approaches that help different parts of the body and mind to work in coordination. Pranayama refers to the practice of regulating your breathing. Each time you inhale air, you're trusted to consume "prana" which is a vital life force.

Prana is the power that provides strength to the mind and body, and keeps us live. So our 'life' refers to our life force and regularization with 'dimension'. Thus, Pranayama means homogenizing one's own life force. therefore, Pranayama secures a special place in the eight limbs of Yoga. Pranayam is acquired from two words Prana (means vital force) and Yama (means control)1. further, Pranayama exclusively implies the elongation of Prana. It's the breadth or expansion of the breath done as a major part of Ashtanga Yoga Practices.

Every practitioner follow the three phases of pranayama: Purak (inhalation), Kumbhak (retention) and Rechak (exhalation).[1] There are many types of pranayama which involves in inhalations and exhalations differently and uniquely. Wherein the practitioner is anticipated to hold his/ her breath in a distinct manner. Different kinds of pranayama produce particular physiological effect and it significantly depend on kind and length of the practice.[2,3,4]. Different types of pranayama are briefly described here:

Bhramari Pranayama (to create a humming sound with breathing)

Kapalbhati Pranayama (rapid breathing techniques practitioner must take a deep breath in and once they exhale, they must pull their navel back towards the spine)

Bhastrika Pranayama (inhale and exhale rapidly)

Nadi Shodhan Pranayama (block the nostrils in alternate sequences)

Shitali Pranayama (roll the tongue in an O shape and inhale oxygen through their mouth)

Ujjayi Pranayama (breath through your mouth while you sit in a cross-legged position and mimic the sound of the ocean)

Anulom Vilom Pranayama (pause the inhalation and exhalation in two stages) Sheetkari Pranayama (breath in air while placing their tongue behind their teeth)

Pranayama, by constant practice reduces the dead space ventilation and reduce the work of breathing. Complete lung is publicized in contrast to the low breathing which only refreshes the base of the lung.[5] Practicing pranayama regularly has a positive impact on cardiovascular,[6,7] and respiratory functions,[8,9] improves the autonomic system towards parasympathetic (vagal tone) dominance.[10, 11] This in turn reduces the effects of stress and strain on various systems. Hence the overall physical and mental health improves.[12]

Each type of pranayama has its own salutary outcome depends on the breathing pattern, tidal volume and other factors like the use of mouth, nostrils, squeeze of laryngeal muscles and place of the glottis.[13] The Bhramari is one kind of pranayama. Its sophistication of shallow breathing and that it could be fluently rehearsed by everyone irrespective of their age or gender makes it notifiable. In Bhr.P, the practitioner will sit in any easy posture and inhale and exhale through nostrils slow and deeply. While exhaling, will have to produce sound (humming sound) like bumble freak rigorously through nasal airways, keeping oral cavity closed by the lips, ears closed by fingers.[14]

beginners in yoga are always bucked up to first learn Bhramari pranayama before learning different types of breathing patterns. This is because it's kind of easy to perform and helps enhance psychological and physical abidance. They shouldn't try to hold their breath when they first start exercising pranayama. Once they become comfortable with the basics of these breathing pattern, then only they should try to hold their breath. This should be under the guidance of a yoga teacher.

When we come across into the advantages of this pranayama, the self induced humming sound in this practice resembles mantra replay method.Bhr.P changes the common breathing rhythm, with prolonged exhalation and short inhalation, which produces eloquent impact in physiological system.[15] Practice of Bhr.P for 5 – 10 min continuously bring about individual experience of mind refreshment and happiness and occasionally the practitioners are believed to go to even thoughtful

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state.[16] So Bhr.P technique isn't just a breathing pattern but also a form of contemplation. As compared with different pranayama, it doesn't have any type of breath holding or alternate nostril involvement with counting. Added to over, the humming sound which is produced during the breathing gives additional attraction and interest to the practitioner for practicing the pranayama. In this, it's truly accessible to inhibit and accord the correctness by the sound of humming which is produced by the pranayama practitioners.

It has been reported thatBhr.P practice is efficient for rectifying the hormonal imbalance conditions and other diseases like hypertension, nervousness, and depression. The soothing effect of theBhr.P helps in devastating medicine dependency.[17] still very few scientific researches on the effects of this technique have been done so far. So, this article seeks to demonstrate what pranayama (regulated breathing) entails.

1.1. Need for the review

There are numerous benefits for pranayama and there have been numerous researches administrated experimenting these benefits, still there's very few researches on specific pranayama independently. TheBhr.P is one such method that has numerous health benefits but very low scientific documentation showing its effects. Most of the literatures available are the combined effects of pranayama practices as a whole and there's no backup forBhr.P independently. In this review, we wanted to explore the existing scientific researches on theBhr.P. Hence we've systematically viewed the available studies on the benefits ofBhr.P to assess how the researches have been done and what are the advantages ofBhr.P addressed in them. This review could direct in further identifying the voids in the existing researches as well as exploring the new floor for scientific advances in this field.

2. Methodology

This methodical review has been conducted according to the Preferred Reporting particulars for Systematic Reviews and Meta- Analyses (Prism) guidelines.

2.1. Search criteria

The hunt was done online in Medline, Embase, google scholar and manual hunt also carried out till May 2016 to make the hunt thorough and associated all the studies done on the effects of Bhr.P. The crucial words used were pranayama, Bhramari pranayama, calming pranayama, humming pranayama, benefits, effects, practice of Bhramari. The words with alike meaning of the key words were also used for the hunt. Zotero, open origin source management software, was used to cite and handle the data by online library program. [18]

2.2. Selection of studies

The selection of studies was done on the ground of inclusion and exclusion criteria.

Inclusion criteria the studies done especially on Bhr.P and its advantages. General effects, peculiar health benefits, systemic effects of Bhr.P were involved.

Exclusion criteria The studies that have been done on Bhr.P in alloy with any different trial were excluded.

2.3. Data extraction

After the complete search and electing the researches on the basis of inclusion criteria, the data extraction was done by two reviewers single-handedly and disputations were settled by discussion. also, the final set of manuscripts was levied as a team by the authors and data was thematically extracted. The data extracted contain the aim of the study, the methodology employed, the study setting, salient findings, any interventions carried out and implications or recommendations performing from the study findings.

also the studies were levied for their grade and rated by Methodological Quality Rating Scale

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(MQRS) [19] and Newcastle- Ottawa Scale (NOS).[20] Four dimensions of methodological quality were levied by MQRS scale and based on that all the included studies were scored which has the range from minimum of 1 (extremely poor quality) to max of 16 (extremely rational quality). Three angles were accounted in the NOS criteria (1) subject selection 0 – 4;(2) subject community 0 – 2; and (3) clinical conclusion 0 – 3. NOS scores range from 0 to 9; a score ≥ 7 pointed that the study was of rational grade.

2.4. Data synthesis

Following the data extraction, the data alloy was served by classifying the study findings under pulmonary effects, cardiovascular effects and autonomic system. The number of investigations was restricted and was briefed applying a chronicle approach and hence meta- analysis couldn't a befitted.

3. Results

A Prisma flow diagram (Fig. 1) thoroughly depicts the search procedure and study election. Following the search through varied search engines, 25 papers were concluded. excluding the duplicates, 19 studies turned up. By reading through the title and abstracts of these 19 papers, the papers traded with effects of pranayama in common, conference papers, other pranayama papers, and effects of Bhr.P in alloy with other trials were eliminated and eventually 6 studies quenched the inclusion criteria and were included for the review. The closing involved papers depict about the persuasion of Bhr.P in various physiologic functions. They've been extensively allocated all over Indian sub-continent. The involved papers are depicted in detail. (Table 1) Out of the involved studies, 2 studies done on the cold pressor,[21, 22] bone on heart rate and BP,[23] one study on EEG changes,[24] each on the inhibitory response[25] and mental condition.[26] Hence they were largely classified under pulmonary, cardiovascular, autonomous and others on the ground of their physiologic effects.

Table 1 Details of the included studies on Bhr.P.

S. no	Author	Objective	Methodology	Tools used	Particip ants	Findings	Implication
1	Maheshkumar Kuppusamy et al., 2017	to find the effects of Bhrāmarī prāṇāyāma practice on pulmonary function in healthy adolescents	Randomized control trial	Pulmonary function test using RMS Helios spirometry	32 females and 58 males	A significant ($P < 0.05$) improvement in all pulmonary function parameters; FVC, FEV1, FEV1/FVC ratio, FEF 25%-75% and PEFR was seen in the Bhr.P group than the control group adolescents.	to find the effects of Bhrāmarī prāṇāyāma practice on pulmonary function in healthy adolescents.

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2	Rampalliwar et al., 2015	To see whether the Bhr.P practice reduced the reaction of hyper reactive pregnant women to cold pressor	Experimental study (2 months practice)	Cold Pressor test	28 participants	Hyper reactivity reduced to hypo reactivity and basal blood pressure, rise in blood pressure and pulse rate reduced significantly	Bhr.P is effective for pregnant women for preventing pre eclampsia
3	Bajpai et al., 2021	to investigate whether regular practice of Bhramari	Pre-Post Experimental study (3 months practice)	Cold Pressor test	total of 94 young medical students	79% reduction in hyper- reactivity to cold pressor test as number of hyper-	Bhramari Pranayama and Yoga Nidra together can significantly
S.no	**Author**	**Objective**	**Method ology**	**Tools used**	**Participants**	**Findings**	**Implication**
		Pranayama and Yoga Nidra for3 months can reduce cardiovascular hyper-reactivity				reactors reduced from 32 before the study to 7 after 3 months ($p \leq 0.01$)	alleviate stress inducedchanges in cardiovascular parameters
4	Maheshkumar Kuppusamy et al., 2016	To assess the immediate effect of Bhramari pranayama (Bhr.P) practice on the resting cardiovascular parameters in healthy adolescents	Experimental study	Heart rate (HR) was assessed by radial artery palpation blood pressure was recorded in supine position after 5 minutes of rest by sphygmomanometer	60 apparently healthy adolescents	The HR reduced significantly (p-0.001) in Bhr.P group. in Bhr.P group. BP indices, Pulse Pressure (PP), Mean Arterial Pressure (MAP), Rate Pressure Product (RPP) and Double Product (DoP) significantly decreased after Bhr.p practice compared with control	Bhramari pranayama improves the resting cardiovascular parameters in healthy adolescents.
5	Anand et al., 2018	to find out the effect of Pranayama on physical fitness and mental health	Experimental study	Physical fitness variables, i.e., flexibility, and muscular endurance were measured using	108 adult Participants	The experimental group showed significant improvement in most of the physical fitness	Bhr.P The experimental group showed significant improvement not only on physical fitness such as

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		in University-level healthy students.		Cureton's Sit and Reach scale. lung capacity was measured using spirometer.		parameters after 12 weeks of Pranayama practice	muscular endurance and flexibility but also in factors of mental such as autonomy, environmental mastery, perception of reality, and
S. no	**Author**	**Objective**	**Method ology**	**Tools used**	**Participants**	**Findings**	**Implication**
				Mental Health Inventory Questionnair e constructed by Jagdish and Srivastava			group-oriented attitudes as a result of 12 weeks of Pranayama practice on regular basis.
6	Vialatte et al., 2018	Post effect of bhramri pranayama on ECG, EEG and EMG	Experim ental and control	EEG	8 participa nts	All subjects exhibited PGW during the practice and EEG activity is non-epileptic	Highly speculative effect on brain, and so induce a subjective feeling such as "bliss"

3.1. Effect on cardiovascular system

The Bhr.P practice reduces the cardio energetic reaction to cold pressor test among the practitioners. Of the 6 contained studies, three have been served on one or another effects of Bhr.P on the cardio vascular system.[21, 22, 23] Two researches were done by applying the cold pressor test of which one was served on the common adults21 while another on pregnant females.[22] The third study was administered to dig out its aftereffect on baseline blood pressure and heart rate.[23] Pregnant females who were hyper reactive were begin to show deduction of blood pressure as a response to the cold pressor test. 79 of 28 hyper reactive interviewees noted this deduction by two months practice. likewise, 81 of 21 medical student volunteers who were hyper reactive at the beginning observed deduction of blood pressure response after 3 months applying the same cold pressor test. Another study assessed the instant aftereffect of Bhr.P on the heart rate and blood pressure among 50 fit adults after rehearsing for 5 min and observed little decrease of (2 – 3 beats) heart rate and revealing decrease of mean blood pressure 5 – 6 mm Hg.

3.2. Effect on cognitive functions

Improved inhibitory reaction and cognitive regulator was observed among the fit individuals followed by 10 min of Bhr.P practice.[25] To assess the response inhibition in cognitive psychology, cognitive neuroscience, and psychopathology, the stop signal task (one of the historic tools) has been done. They introduce enhancement in SST compared with self-control groups.

3.3. Quality assessment of the included studies

The comprehended studies were imposed for their grade applying the scale gathered from some of the measures of NOS scale and MQRS scale. The scoring was befitted and the points are presented in the Table 2, The scores for each study are different, still they all appear to be poor in their methodological grade scoring. None of the studies were RCTs. In addition, they neither completely satisfied the case control category. maximum of the studies were pilot studies and appeared case

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control but didn't have crystal control group.[25] The non-reaction rate wasn't measurable in maximum of the studies. As the control group isn't clear, the case and control comparison couldn't be assayed and understood with transparency. The positive aspect is that all the studies described the cases still and they were represented well. In the MQRS scale, the follow up duration was really low in all the studies even so the studies have supervened certain standardized interventions. Still the overall scores carried by the contained studies are tropical.

Table 2 Newcastle-Ottawa Scale for the included studies.

Study	Selection	Comparability	Outcome	NOS score
Maheshkumar Kuppusamy et al., 2017	**	*	*	4
Rampalliwar et al., 2015	*	–	*	2
Bajpai et al., 2021	*	*	*	3
Maheshkumar Kuppusamy et al., 2016	*	*	*	3
Anand et al., 2018	*	*	*	3
Vialatte et al., 2018	**	**	*	5

Star (*) = item present in the study.
Selection criteria having 4 components and the outcome has 3 component. Maximum 1 star (*) for Selection and the Outcome component. Maximum 2 star (**) for Comparable component.

4. Discussion

In this research, it was found that following a single session of 5 rounds of (45 min) hyper-reactivity to the cold pressortest reduced by doing regular Bhramari Pranayamaand Yoga Nidra for 3 months. Furthermore, there was areduction in mean systolic and diastolic blood pressurewhich was statistically significant. The reason for this can be parasympathetic dominance on autonomic activity. We observed that DBP, SBP, HR, MAP, RPP, and Do P decreased significantly inBhr.P group. A similar result was adhered in a research done by Pramanik etal., in that study, promptly after 5 minutes of Bhr.P practice, they found a decrease in SBP, DBP, MAP and HR. From this, they deduced a conclusion that Bhr.P convinced parasympathetic dominance still their study design was distant from our study because they've given the intervention of Bhr.P practice for only 5 min. In another study, it was found that BP and HR dropped significantly when measured instantly after the practice of Bhramri Pranayama which is analogous to Bhr.P supports our results as well. Sympathetic Nervous System(SNS) and Parasympathetic Nervous System(PNS) determines the HR andDBP.

Parasympathetic is associated with the HR and the SNS with the DBP by altering the supplemental vascular resistance. The Mean Arterial Pressure (MAP) of the cardiac cycle is determined by both the SNS and PNS. Hence, parasympathetic exertion increases and sympathetic decreases in the Bhr.P group causing a decline in HR, DBP and MAP. RPP and Do P are the index of the Oxygen consumption and workload of the heart and they denote the status of sympathetic exertion (18 – 20). decline in RPP and Do P represent lowered workload on the heart in the Bhr.P group which is a favourable effect. In deep breathing pulmonary stretch receptors are stimulated which lead to withdrawal of sympathetic tone on the skeletal muscle.

Yoga is presently being accepted as a part of academic course in some school programs and is gaining another mindfulness not only in preceptors but also among the parents. rotundity among the adolescents is accelerating because of their sedentary nature, yoga remains as the only ideal option and indispensable form of physical remedy that's salutary both for their body and mind. It has strong goods on physiological system in perfecting the physical fitness along with their performance by enhancing the cognitive function. As for our study is concerned, Bhr.P as a pranayama was well accepted by the scholars because of its simplicity, the humming sound produced during the practice and the mimicking group chanting that convinced deep state of relaxation like contemplation. Pranayama is an integral element of holistic yoga remedy schedule and involves decelerating down

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of the normal breathing rate along with an mindfulness grounded, conscious inner focus on the respiration.

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