

Effect of *Bhramari Pranayama* on Menopausal Women

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ABSTRACT

Background: Modern-day lifestyles increase stress due to changes at physical, mental, and emotional level. Social, career, and family pressures, coupled with deviations from traditional healthy dietary habits have contributed remarkably in escalating the physical and psychological problems faced by the women passing through the transition phase of menopause. *Bhramari pranayama* is a yogic breathing practice that helps to improve the physical health and the cognitive functions by reducing anxiety among menopausal women.

Aim: To assess the effect of *Bhramari pranayama* on the physiological, psychological, and cognitive functions in menopausal women.

Materials and methods: An experimental study with pre and post-design was conducted on 30 women in the age range of 40–60 years for 10 days, with an intervention of *Bhramari pranayama* every day for 30 minutes. Physical and psychological parameters were recorded before and after the commencement of the *Bhramari* practice and values of State-Trait Anxiety Inventory (STAI), digit letter substitution test (DLST), blood pressure and pulse rate were collected. The subjects were given *Bhramari pranayama* practice instructions—verbal, in writing, and through demonstration.

Results: Anxiety as measured by STAI has reduced significantly after 10 days of *Bhramari pranayama* (7%, $p < 0.001$). Attention and concentration levels as well as eye-hand coordination have improved and are reflected in the Pre and Post-DLST scores. The effect after 10 days of *Bhramari* practice is 20%, $p < 0.001$. Systolic blood pressure and diastolic blood pressure have decreased significantly after 10 days of *Bhramari pranayama* practice (10%, $p < 0.001$) and (10%, $p < 0.001$) respectively. Whereas pulse rate showed significant improvement (9%, $p < 0.001$) after 10 days.

Conclusion: Ten days of *Bhramari pranayama* showed significant improvement in physical health and cognitive functions by reducing anxiety among menopausal women.

Keywords: Anxiety, *Bhramari pranayama*, Blood pressure, Cognitive function, Menopause.

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INTRODUCTION

Menopause refers to the permanent stoppage in menstrual cycles due to the decline in ovarian follicular function. Natural menopause is officially confirmed when a woman has experienced 12 consecutive months without menstruation, and there is no identifiable underlying pathological or physiological reason for this absence. Biological mechanisms associated with menopause originate from changes that occur in the structure and function of the ovaries.¹ The beginning of menopause is marked by a significant shift in hormonal equilibrium, characterized by a decline in estrogen levels and an increase in FSH and LH hormones. This hormonal shift ultimately leads to a reduction in progesterone levels.² Symptoms of acute menopause encompass vasomotor events, such as hot flashes and night sweats, as well as psychosomatic symptoms. These experiences can vary based on an individual's unique psychological, social, and cultural attributes.³ Hot flashes are episodic episodes of flushing and abrupt sweating, accompanied by sensations of coldness, heart palpitations, anxiety, pressure in the head and chest, nausea, a sense of choking, and difficulty focusing. Typically, these episodes endure for just a few seconds to a minute, with rare occurrences lasting up to an hour.^{4,5} In developed nations, the typical life expectancy for women hovers around 75 years, with about 90% of them living to the age of 65, and 30% reaching the age of 80.

Metabolic issues that arise during menopause, such as dyslipidemia and disturbances in carbohydrate metabolism, serve as contributing factors to cardiovascular disease among women, these factors play a role in the development of dyslipidemia, oxidative stress, inflammation, changes in coagulation, and the onset of atherosclerosis that are observed during the menopausal phase.⁶ The transition into menopause is linked to reduced health

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functioning among women who report experiencing menopausal symptoms.⁷ Researchers have discovered an association between a woman's history of menopause and disrupted sleep patterns.⁸ About 2,362 participants over a period of 4 years gave longitudinal information about measurable cognitive performance during menopause transition, consistent effect characterized by women not being able to concentrate.⁹

Effects of progressive muscle relaxation on postmenopausal stress by a study on 30 postmenopausal overweight or obese females belonging to the age group 50–55 years, who were given progressive muscle relaxation training for 3 months evaluated. The conclusions reached were that increased stress levels may increase the BMI and waist/hip ratio, dyslipidemia and lead to autonomic dysfunctions and increased incidence of cardiovascular disease.¹⁰ Brief bouts of exercise lead to enhancements in menopausal symptoms, psychological well-being, and the quality of life in postmenopausal women.¹¹ Individualized homeopathic treatment showed significant

difference leading to the conclusion that Homeopathy is effective and safe antidepressant for climacteric women.¹² Findings from a randomized controlled trial examining the use of cognitive behavioral therapy (CBT) for women experiencing hot flashes and night sweats during natural menopause indicate that CBT is both well-received and effective.¹³ A preliminary study involving 11 menopausal women experiencing climacteric symptoms was conducted over a period of 5 weeks. A follow-up assessment after 3 months revealed that acupuncture had a significant positive impact on alleviating vasomotor symptoms associated with menopause.¹⁴ Forty-five women, averaging around 56 years of age and experiencing insomnia, received daily acupressure treatment over a span of 4 weeks. The outcomes indicated a notable improvement in both total sleep duration and sleep efficiency, along with a significant reduction in sleep latency.¹⁵ In a research involving 102 postmenopausal women, these participants were randomly divided into two groups for a 12-week investigation. The findings demonstrated a noteworthy reduction in the frequency of hot flashes in both the acupuncture and applied relaxation groups.¹⁶ Applied relaxation can serve as an alternative therapy for managing vasomotor symptoms in postmenopausal women.¹⁷ In a 2010 systematic review conducted by Innes, it was discovered that yoga-based and select other mind-body therapies might offer advantages in alleviating particular menopausal symptoms.¹⁸

An integrated yoga therapy program lasting for 8 weeks proves more effective than the physical exercise in reducing climacteric symptoms, perceived stress, and neuroticism among pre-menopausal women.¹⁹ AUM chanting on female population with the average age of 60 years in the urban area of Thane showed positive effects on sleep quality in senior citizen women.²⁰ The effect of yoga on menopausal symptoms in the early menopausal period: A randomized controlled trial was carried out by Vora and Dangi.²¹ A study on postmenopausal women with the intervention of yoga – *pranayama*, *suryanamaskar*, and *savasana* for 4 weeks showed statistically significant reduction in all menopause-related scores. Yoga decreases insomnia in postmenopausal women: A randomized clinical trial by.²² The assessments were conducted on a group of 44 postmenopausal women, aged 50–65 years, diagnosed with insomnia, who engaged in 4 months of yoga practice. The findings indicated that the yoga group exhibited significantly reduced post-treatment scores for climacteric symptoms and insomnia, while also displaying higher scores for the quality of life and resilience in the face of stress. A study involving 60 menopausal women demonstrated that practicing *Trataka* for 15 days effectively reduced their overall menopausal symptoms.²³

Several studies have demonstrated the positive effects of *Bhramari pranayama*. Three studies have been done on one or more effects of *Bhramari pranayama* on the cardiovascular system. Two studies were done by using the cold pressor test of which one was done on the normal adults,²⁴ while the other on pregnant women.²⁵ The third study was conducted to find its effect on baseline blood pressure and heart rate.²⁶ *Bhramari pranayama* increases paroxysmal EEG waves immediately after practice in the healthy volunteers.²⁷ Enhanced inhibitory response and cognitive control was noted among the healthy individuals followed by 10 min of *Bhramari pranayama* practice.²⁸ It is evident that *Bhramari* practice influences multiple systems in the body and have effects on respiratory system, autonomic nervous system, stress, anxiety level, over all emotional status of the practitioner.²⁹ Several studies have been conducted on the effect of *Bhramari pranayama*, and none in connection with the menopausal problems faced by midlife women, a sizable portion of

the population. No studies were found exclusively on *Bhramari* in the area of its influence on menopausal problems. The objective of this study is to meet this need. The primary objective of this research was to evaluate the impact of *Bhramari pranayama* on the physiological, psychological, and cognitive functions of menopausal women following 10 days of consistent practice.

MATERIALS AND METHODS

This research adopts a single-group experimental pre-post design. It involves a total of 30 menopausal women, with ages ranging from 40 to 60 years (with a mean age of 49.73 ± 5.28). The study participants were recruited from the city of Bengaluru. Inclusion criteria were women aged above 40 years and below 60 years, with healthy conditions, not on hormone replacement therapy, not having current or prior history of any major illnesses, such as cancer, diabetes, asthma, IHD or thyroid problems, were not under treatment for any psychiatric problems and no prior exposure to *pranayama* practices. Exclusion criteria were women undergoing HRT treatment, major clinical illnesses, like cancer, diabetes, asthma, IHD or thyroid problems, severe psychiatric problems and prior exposure to *pranayama* practices currently or in the recent past. Informed consent was taken from each participant after requirements of the study were explained to them.

Design of the Study

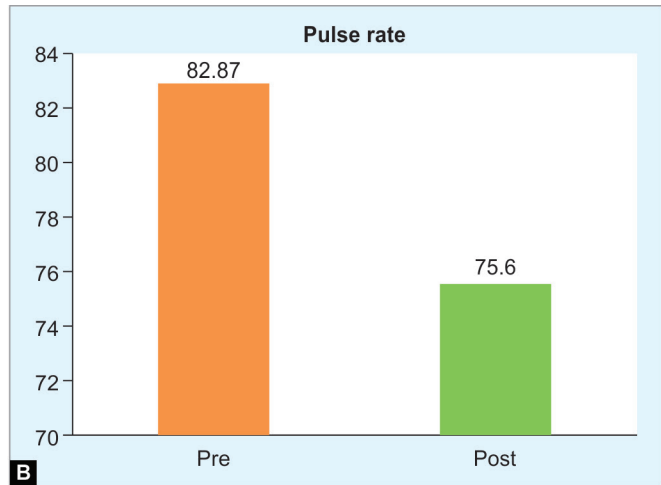
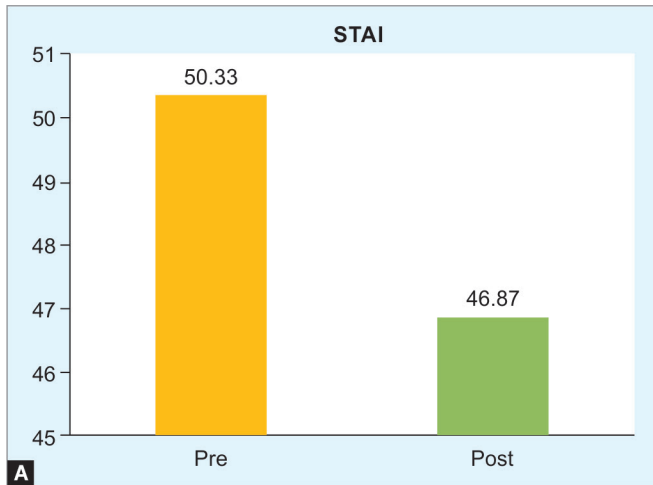
About 30 women were requested to fill out the consent and demographic forms. Physical and psychological parameters were recorded before the commencement of the *Bhramari* practice. They were given *Bhramari pranayama* practice with the *kevalakumbhaka* or *shahaja kumbhaka*—which is an automatic retention of breath or cessation of breath (P.Y.S 2nd chapter sutra 51) 30 minutes every day. Instructions – verbal, in writing, and demonstration were given. They were asked to practice for 10 days. After 10 days of practice, parameters were recorded before *Bhramari* practice and again after a session of *Bhramari* practice.

Intervention: *Bhramari Pranayama*

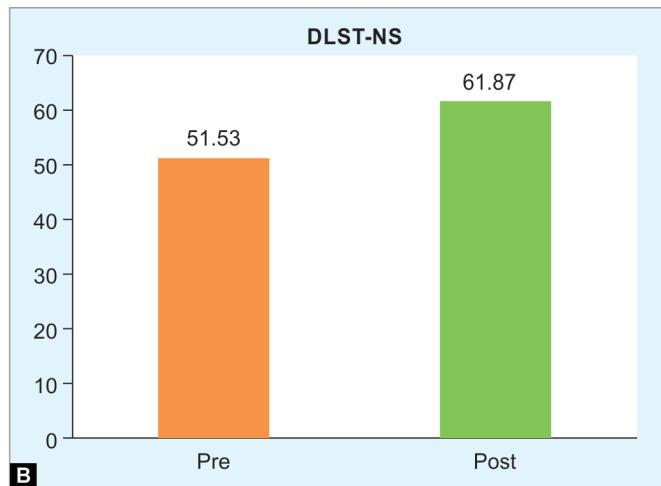
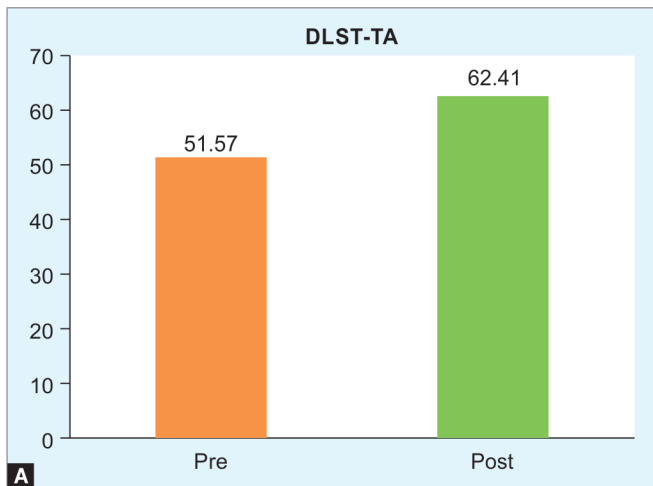
In Sanskrit, the term "*Bhramari*" translates to "female bee." During the practice of this *pranayama*, a humming sound similar to that of a bee is created during the exhalation. The key element in performing *Bhramari Pranayama* effectively is to generate resonant sound vibrations. Consider, for instance, the act of tuning a stringed instrument such as the veena or violin. Plucking a string at one end results in a melodious resonance, with vibrations reverberating throughout the entire instrument. Similarly, in *Bhramari pranayama*, a meticulous tuning process is essential. It involves creating a humming sound akin to the nasal 'n' sound (known as Anunasik sound). This occurs when the frequency of the sound produced in the throat during exhalation harmonizes with the body's natural frequency. To achieve this resonance, we need to precisely adjust the frequency of sound production. As a result, vibrations permeate the entire body, extending from head to toe. Consequently, a heightened three-dimensional (3D) awareness is cultivated throughout the body.

Practice

Sit in a comfortable posture, with your back straight. Rest the hands on the knees, palms upwards. Adopt *cin mudra* (touch the tip of the fore finger to the tip of the thumb, keeping the other three fingers straight). Keep the eyes closed. Do three rounds of slow, deep inhalation and exhalation.



Figs 1A and B: Graphical representation of STAI and pulse rate



Figs 2A and B: Graphical representation of DLST-TA and DLST-NS

Start *Bhramari pranayama*. Keep the tip of your tongue on the upper palate (the lips will be slightly open). Inhale deeply and while exhaling, make a sound resembling that of a female bee nasal sound 'n' kara (Anunasik sound). Prolong the breath and the sound as far as possible, effortlessly without disturbing the feeling of vibrations throughout the body. Try to focus attention inwards and listen to the sounds inside the body. Do 12 rounds (one round-one inhalation and one exhalation). Now adopt *Sanmukhi mudra* (place your thumb over your ears, closing them softly, the fore fingers on the forehead, the middle fingers over the closed eyes – just under the eye brows without putting any pressure on the eyeballs, ring fingers under the nostrils and little fingers under the lips). Keep the elbows relaxed. Continue *Bhramari*. Do nine more rounds and stop (Total 21 rounds). Bring the hands down and keep them on the knees in *cin mudra*. Keep the eyes closed and enjoy the lulling effect of this *pranayama* on the mind by observing the *kevalakumbhaka* or *shahaja kumbhaka* – which is an automatic retention of breath or secession of breath. Do three rounds of normal slow breathing and conclude.³⁰ The above instructions were given to each participant.

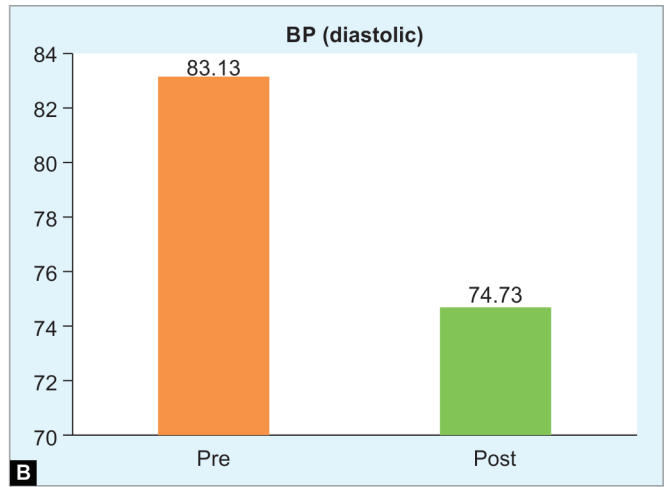
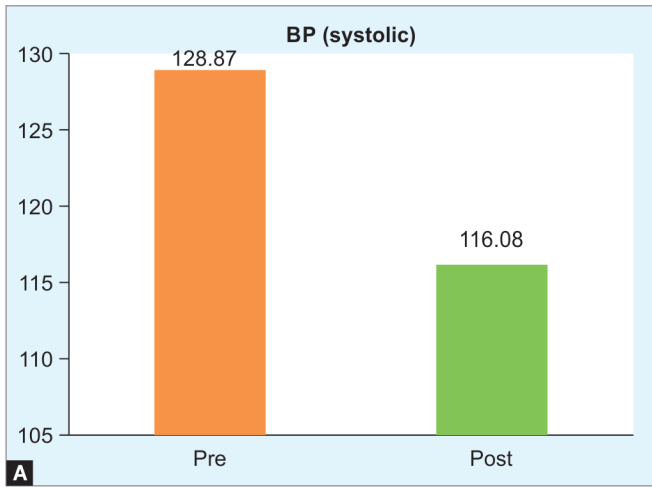
Variables

Sociodemographic data have been collected on the basis of sociodemographic sheet.

Primary Variables

State-Trait Anxiety Inventory (STAI): The STAI is an introspective psychological inventory. It measures one's conscious awareness at two extremes of anxiety affect. Higher STAI scores suggest higher levels of anxiety.³¹ Reliability and validity has been assessed on Indian population (Fig. 1).³²

Digit letter substitution test (DLST): Substitution tests are fundamentally tasks that rely on the subject's speed, necessitating the matching of specific signs, which can be symbols, digits, or letters, to other signs within a designated time frame. These tasks encompass activities, such as visual scanning, cognitive adaptability, prolonged focus, psychomotor agility, and the velocity at which information is processed.³³ Reliability and validity has been assessed on Indian population (Fig. 2).³⁴



Figs 3A and B: Graphical representation of BP systolic and diastolic

Table 1: Participant characteristics (demography)

| Variables | Intervention group (N = 30) | |
|---------------------|-----------------------------|----|
| Age in years | (Mean ± S.D: 49.73 ± 5.28) | |
| Education (N = 30) | SSLC | 2 |
| | PUC | 1 |
| | Graduation | 19 |
| | MSc | 8 |
| Occupation (N = 30) | Working | 17 |
| | Housewife | 13 |

Secondary Variables

Blood pressure (systolic and diastolic) and pulse rate: Blood pressure is a measure of the force of blood inside an artery. Blood pressure can be measured either by the sphygmomanometer or an automatic blood pressure monitor. This apparatus operates by placing a cuff around the upper arm, temporarily obstructing the flow of blood in an artery. As the cuff gradually releases air, it monitors the pressure at which blood recommences its circulation. This study has used Omron Automatic Blood Pressure Monitor – Omron HEM-7201. The accuracy levels for pressure and pulse are +or-3 mm Hg and +or -5% of display readings respectively (Product Manual, 2015) (Fig. 3).

Data Extraction and Analysis

Data have been collected before and after 10 days of *Bhramari* practice. The data have been entered into statistical software for analysis. Since the data are not normally distributed, non-parametric test has been used to see the changes within groups. Descriptive statistics and Wilcoxon’s signed-rank test has been done to see the changes within groups. Data were analyzed using statistics SPSS version 10.0 (Table 1).

RESULTS

State-Trait Anxiety Inventory

Anxiety reduced (7%) with significant changes ($p < 0.001$) within group after 10 days (Table 2).

Table 2: Changes in state anxiety inventory after 10 days of *Bhramari pranayama*

| Variables | Pre (Day-1) | Post (Day-10) | % change | Sig – p-values Within Gps (Wilcoxon) pre/post |
|--------------------------------------|--------------|---------------|----------|---|
| STAI (State-Trait Anxiety Inventory) | 50.33 ± 6.50 | 46.87 ± 5.97 | 7% | *0.001 |

*There is significant difference after intervention within group. Wilcoxon’s signed-rank test (within groups)

Table 3: Changes in pulse rate variable after *Bhramari pranayama*

| Variables | Group N = 30 | Pre | Post | % Change | Sig – p-values Within Gps (Wilcoxon) pre/post |
|------------|------------------|--------------|--------------|----------|---|
| Pulse rate | Ten days effects | 82.87 ± 8.88 | 75.60 ± 7.65 | 9% | *0.001 |

*There is significant difference after intervention within group. Wilcoxon’s signed-rank test (within groups)

Pulse Rate (PR)

Pulse rate improved (9%) with significant changes ($p < 0.001$) within group after 10 days of *Bhramari* practice (Table 3).

Digit Letter Substitution Test

In digit letter substitution test (DLST), the total attempt has been improved by 21%, $p < 0.001$, also the net score has been improved by 20%, $p < 0.001$ significantly after 10 days of *Bhramari* practice within group (Table 4).

Blood Pressure (mm of Hg) Systolic and Diastolic

After 10 days of blood pressure (systolic) reduced (10%) with significant changes ($p < 0.001$) within group. Also, blood pressure (diastolic) reduced (10%) with significant changes ($p < 0.001$) within group (Table 5).



Table 4: Changes in digit letter substitution test after *Bhramari pranayama*

| Variables N = 30 | Pre (Day-1) | Post (Day-10) | % Change | Sig- P-values Within Gps (Wilcoxon) Pre/Post |
|---------------------|----------------|------------------|-------------|---|
| DLST (TA) | 51.57 ± 11.37 | 62.41 ± 11.58 | 21% | *0.001 |
| DLST(WA) | 3.33 ± 02.18 | 3.33 ± 02.18 | 0 | 0 |
| DLST (NS) | 51.53 ± 11.39 | 61.87 ± 11.63 | 20% | *0.001 |

*There is significant difference after intervention within group. Wilcoxon's signed-rank test (within groups)

Table 5: Changes in blood pressure after *Bhramari pranayama*

| Variables | Pre | Post | % Change | Sig- p-values Within Gps (Wilcoxon) Pre/Post |
|----------------------------|----------------|----------------|-------------|---|
| Blood pressure (systolic) | 128.87 ± 12.80 | 116.08 ± 12.33 | 10% | *0.001 |
| Blood pressure (diastolic) | 83.13 ± 9.54 | 74.73 ± 8.52 | 10% | *0.001 |

*There is significant difference after intervention within group. Wilcoxon's signed-ranks test (within groups)

DISCUSSION

The present study had a sample of 30 women in the age range of 40–60 years. Intervention of 10 days of *Bhramari pranayama* with *kevalakumbhaka* was given. Changes in the measures of STAI, DLST, blood pressure (systolic and diastolic) and pulse rate were assessed. Significant reductions in STAI, blood pressure and pulse readings were seen. Significant improvement was seen in the DLST scores.

A pre-post controlled study, similar in some parameters to the present study, was done by Ritu Chattha in 2008.¹⁹ The study included a sample of 120 women between the ages of 40–55 years. These participants received an integrated yoga intervention for a duration of 8 weeks. To measure the outcomes, the Green Climacteric Scale, Perceived Stress Scale, and Eysenck's Personality Inventory were employed. The results revealed a noteworthy improvement in vasomotor symptoms within the yoga group and a slight but notable difference in scores on the Perceived Stress Scale was observed. *Bhramari pranayama* enhanced response inhibition and cognitive control in nonclinical participants.²⁸ The benefit of *Bhramari pranayama* has been explored in detail in a review study by Kuppusamy et al., in 2018.²⁹ *Bhramari pranayama* modulates the breathing rhythm, it so happens due to prolonged exhalation and lesser duration of inhalation, which impacts the physiological system.³⁵ Engaging in *Bhramari pranayama* continuously for 5–10 minutes has the effect of eliciting subjective sensations of mental rejuvenation and a state of blissfulness. Notably, *Bhramari pranayama* induces comparable and positive alterations in various brainwave patterns associated with a relaxed state, regardless of whether the practitioner is experienced or new to the technique.³⁶ These studies were focused more on the effect of *Bhramari pranayama* on healthy conditions.

Anxiety as measured by STAI has reduced significantly after 10 days of *Bhramari pranayama* (7%, $p < 0.001$). Attention and concentration levels as well as eye-hand coordination have

improved as reflected in the pre- post-DLST scores, the effect after 10 days of *Bhramari* practice is 20%, $p < 0.001$). Systolic and diastolic blood pressure showed significant reduction after 10 days of *Bhramari pranayama* practice (10%, $p < 0.001$) and (10%, $p < 0.001$), respectively. Whereas pulse rate showed significant improvement (9%, $p < 0.001$) after 10 days. Earlier studies have measured the effect of *Bhramari pranayama* on blood pressure and pulse rate; hence, this present study has assessed the cognitive changes along with earlier variables. The present study focuses on the easiness, convenience of time and duration, so that the busy working women will be able to practice a short session of *Bhramari pranayama* daily.

Strength of the Study

A yogic lifestyle represents a manner of living that exerts an influence on an individual's physical well-being, mental state, and daily routine. *Bhramari pranayama* stands out as a straightforward, easily graspable, brief, advantageous practice that carries no financial burden or adverse effects. This study marks the inaugural effort to explore the advantages of *Bhramari pranayama* for menopausal women, and it adopts a self-as-control methodology. The results indicate that engaging in 10 days of consistent *Bhramari* practice yields a substantial enhancement in psychological and cognitive factors.

Limitations of the Study

In this study, the sample belonged to a particular demographic profile—educated upper middle class. Hence, generalization of the results will not be possible. The sample size of this study is very small. More objective tests can be assessed in deeper aspects. This is a self-as-control study and so limited in its scope for verifiability.

Suggestions for Future Studies

Future studies can include pre-, and post-menopausal women. Separate studies on each section of menopausal women with more variables may give better insight into multitudes of menopausal problems and efficacy of addressing these problems with the practice of *Bhramari pranayama*. Such studies can be conducted in other cultures. As yoga is gaining world-wide popularity, the benefits of *Bhramari pranayama* can be demonstrated to wider population.

CONCLUSION

Ten days of *Bhramari pranayama* showed significant improvement in blood pressure, pulse rate, attention and concentration by reducing anxiety among menopausal women.

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