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Outpatient Management of Essential Hypertension Through Bhramari Kumbhaka: A Case Report

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Abstract: Hypertension is a major global health problem affecting approximately 1.28 billion adults worldwide and is a leading risk factor for cardiovascular diseases, stroke, and renal disorders. Its increasing prevalence is associated with unhealthy dietary habits, sedentary lifestyle, disturbed sleep, and chronic psychological stress. From an Ayurvedic perspective, hypertension can be understood as a disorder involving the vitiation of *Vata*, particularly *Vyana Vayu*, along with *Pitta Dosha* and *Rajoguna*. *Bhramari Kumbhaka*, a yogic breathing technique, may help promote relaxation, reduce stress, and improve autonomic balance. A 42-year-old male presented to the outpatient department of Swasthavritta with complaints of occipital headache, dizziness, fatigue, irritability, anxiety, restlessness, and disturbed sleep for the previous two months. On examination, his blood pressure was 140/94 mmHg and pulse rate was 80 beats/minute. The patient was advised to practice *Bhramari Kumbhaka* under supervision according to the method described in *Hatha Yoga Pradipika*. The practice was performed in gradually increasing rounds of 5, 7, 11, and 15 at two-week intervals over a period of eight weeks. After 60 days of intervention, significant symptomatic improvement was observed. Blood pressure decreased from 140/94 mmHg before treatment to 128/80 mmHg after treatment. The pulse rate also decreased from 80 beats per minute at baseline to 76 beats per minute following the intervention. Serum cortisol levels decreased from 11.38 µg/dL to 9.87 µg/dL, suggesting a reduction in the physiological stress response. *Bhramari Kumbhaka* may be a beneficial complementary intervention for hypertension by reducing stress, improving autonomic balance, and lowering blood pressure. Further clinical studies are needed to confirm its therapeutic effectiveness.

Index Terms - *Bhramari Kumbhaka*, Hypertension, Serum Cortisol, Stress.

I. INTRODUCTION

Hypertension is a major global health problem affecting approximately 1.28 billion adults worldwide and is a leading risk factor for cardiovascular diseases, stroke, chronic kidney disease, and premature mortality.^[1] Despite the availability of effective treatment strategies, a substantial proportion of individuals remain undiagnosed or inadequately controlled, contributing significantly to the global burden of non-communicable diseases. Essential hypertension, which accounts for approximately 90–95% of all cases, is characterized by persistently elevated blood pressure without an identifiable secondary cause. Its development is multifactorial, involving a complex interaction of genetic predisposition, excessive dietary sodium intake, obesity, physical inactivity, psychological stress, ageing, and autonomic nervous system dysregulation.

Chronic activation of the sympathetic nervous system and impaired autonomic balance play important roles in the pathogenesis of hypertension. Psychological stress further contributes to elevated blood pressure through increased sympathetic activity, vascular constriction, and neuroendocrine responses. Persistent hypertension increases cardiac workload and promotes vascular remodeling, arterial stiffness, and atherosclerosis, thereby increasing the risk of cardiovascular and renal complications.^[2]

From an Ayurvedic perspective, hypertension can be correlated with the vitiation of *Vata Dosha*, particularly *Vyana Vayu*, along with *Pitta Dosha* and *Rajoguna*. *Bhramari Kumbhaka*, a yogic breathing technique, may help promote relaxation, reduce stress, and improve autonomic balance. These effects may contribute to blood pressure reduction, making it a potentially beneficial complementary intervention in the management of hypertension.

Physiology of Hypertension:

Genetic Factor

Several genes have been identified that may predispose an individual to essential hypertension. However, genetic susceptibility alone is usually insufficient to cause the disease; environmental and lifestyle-related aggravating factors are often required for its manifestation.^[3] The autonomic nervous system plays a crucial role in maintaining cardiovascular homeostasis through pressure, volume, and chemoreceptor-mediated regulatory mechanisms. Increased sympathetic nervous system activity can elevate blood pressure by altering baroreflex and chemoreflex pathways at both peripheral and central levels. Exposure to psychological or physical stress increases sympathetic nervous system outflow. Repeated stress-induced vasoconstriction may lead to vascular hypertrophy and atherosclerotic changes, resulting in a progressive increase in peripheral vascular resistance and, consequently, elevated blood pressure.

Renin–Angiotensin–Aldosterone System

It regulates extracellular fluid volume, vascular tone, and blood pressure. Dysregulation of this system contributes significantly to the development of hypertension. Angiotensin II, a potent vasoconstrictor, increases peripheral vascular resistance by causing constriction of arterial smooth muscle, thereby elevating blood pressure. It also stimulates the secretion of aldosterone from the adrenal cortex, which enhances renal sodium and water reabsorption, leading to an increase in blood volume and further elevation of blood pressure. In obesity, activation of the adipose tissue RAAS contributes to hypertension and is closely associated with the development of insulin resistance and other metabolic abnormalities.^[4]

Endothelial Dysfunction

The vascular endothelium plays a vital role in regulating vascular tone, blood flow, and blood pressure through the release of various vasoactive substances. Among these, nitric oxide acts as a potent vasodilator, whereas endothelin is a powerful vasoconstrictor. An imbalance between these mediators can impair endothelial function, resulting in increased vascular resistance and the development of hypertension.^[5]

Potassium deficiency has been recognized as an important contributor to elevated blood pressure. Inadequate potassium intake may promote vascular smooth muscle contraction, increase peripheral vascular resistance, and impair sodium balance, thereby contributing to hypertension. Conversely, adequate dietary potassium intake has been shown to support blood pressure regulation.^[6]

Vitamin D deficiency has also been associated with hypertension through its effects on renal function, regulation of the renin–angiotensin–aldosterone system, and vascular health. Insufficient vitamin D levels may impair cardiovascular homeostasis and increase the risk of developing hypertension.^[7]

Case Report:

The present case is about the Essential Hypertension. A 42-year-old male presented to the outpatient department of Swasthavritta with complaints of occipital headache, dizziness, fatigue, irritability, anxiety, restlessness, and disturbed sleep for the previous two months. Personal history and General examination have been shown in the table no. 1 and 2 respectively. *Dashavidha pariksha* also found out to be normal as shown in the table no. 3.

History of Past Illness

he denied any personal or family history of Mental disorders and also denied taking any use of alcohol, tobacco, sedatives like drugs.

table1: personal history

Name – ABC	<i>Mala pravritti</i> – 1 time /day
Age – 42 years	<i>Mutra pravritti</i> – 3-4 time /day, 1-2 time/night
Gender- male	Marital status- Married
Occupation – Farmer	<i>Jihva – Nirama</i>
<i>Kshudha</i> – Average	<i>Vihara</i> – Nature of Work – Physical (5-6 hrs)
Type of Diet – Vegetarian	- <i>Snana</i> – Daily
<i>Rasa</i> in Diet – <i>Madhura</i> and <i>Kashaya Rasa</i>	- <i>Vyayama</i> – No
<i>Agni</i> – <i>Samagni</i>	Nidra – 6-7 Hrs/night, Divaswap – 1-2 Hrs
Addiction – Tea (2 times)	Current Medication - Nil

table 2: general examination

Weight- 65 kg	Height – 165 cms
BP – 140/94 mm/Hg	Pulse – 80/ min
R/R – 16/ min	Pallor - No
Clubbing – No	Edema - No
Icterus – No	Cyanosis - No

table 3: dashavidha pareeksha

<i>Prakriti</i> – <i>Sharira</i> – <i>VP</i> - <i>Manas</i> - <i>SR</i>	<i>Satva</i> - <i>Madhyama</i>
<i>Sara</i> – <i>Madhyama</i>	<i>Ahara Shakti</i> A) <i>Abhyavarana Shakti</i> - <i>Madhyama</i> B) <i>Jarana Shakti</i> - <i>Madhyama</i>
<i>Samhanana</i> - <i>Madhyama</i>	<i>Vyayama Shakti</i> - <i>Madhyama</i>
<i>Satmya</i> - <i>Madhyama</i>	<i>Vaya</i> - <i>Madhyama</i>

Assessment Criteria:

The primary outcome variables were Arterial blood pressure and Pulse Rate. The secondary outcome variable was Serum Cortisol.

Arterial blood pressure (BP)

Blood pressure was measured before and after the *Bhramari Kumbhaka* using a calibrated manual sphygmomanometer and stethoscope. Measurements were taken from the right brachial artery with the participant in a seated position after adequate rest. The systolic blood pressure was recorded at the appearance of the first Korotkoff sound (Phase I), while the diastolic blood pressure was recorded at the disappearance of the Korotkoff sounds (Phase V).

Pulse Rate (PR)

Pulse rate was measured before and after the *Bhramari Kumbhaka* by palpating the radial artery at the wrist while the participant was in a relaxed seated position. The pulse was counted for one full minute, and the rate was recorded in beats per minute (bpm).

Practice Protocol:

Bhramari Kumbhaka for a duration of eight weeks.

Procedure for *Bhramari Kumbhaka*

- The method to perform *Bhramari Kumbhaka* was as per the *Hatha Yoga Pradipika*.^[8]
- Sit comfortably in a stable meditative posture such as *Padmasana*, *Siddhasana*, or *Sukhasana*, keeping the head, neck, and spine erect.
- Close the mouth and breathe gently through the nose.
- Inhale slowly and deeply while producing a humming sound, similar to the buzzing of a male bee.
- Retain the breath comfortably (*Kumbhaka*) according to one's capacity.
- Exhale slowly through the nose while producing a deeper humming sound, resembling the buzzing of a female bee.
- The session was conducted twice daily, in the morning and evening.
- It started with *Prana Dharana* in *Sukhasana*, followed by *Nadi Shodhana*. Finally, 5 cycles were practiced for the first 15 days, 7 cycles for the second 15 days, 11 cycles for the third 15 days, and 15 cycles for the last 15 days.
- Every session was concluded with *Prana Dharana*.
- Blood Pressure (BP) and Pulse Rate (PR) were monitored before and after *Bhramari Kumbhaka*.

Result:

After 60 days of intervention, marked improvement was observed in both clinical symptoms and physiological parameters. The participant's blood pressure decreased from 140/94 mmHg before treatment to 128/80 mmHg after treatment, indicating effective control of hypertension. The pulse rate also decreased from 80 beats/minute before treatment to 76 beats/minute after treatment. Additionally, a significant reduction in serum cortisol levels was observed, from 11.38 µg/dL to 9.87 µg/dL, suggesting a decrease in stress-related neuroendocrine activity. (As per Table no. 4 and figure no 1 and 2)

The reduction in blood pressure may be attributed to improved autonomic balance, enhanced parasympathetic activity, and decreased sympathetic nervous system activation. Similarly, the decline in serum cortisol levels reflects attenuation of the physiological stress response and improved regulation of the Hypothalamic–Pituitary–Adrenal (HPA) axis.^[9] These findings suggest that the intervention not only contributed to blood pressure control but also promoted stress reduction and overall cardiovascular well-being. Therefore, such practices may serve as valuable complementary approaches in the management of hypertension.

table 4: response of *bhramari kumbhaka* on vitals

	Before <i>Bhramari Kumbhaka</i>	After <i>Bhramari Kumbhaka</i>
Systolic	140	128
Diastolic	94	80
Pulse Rate	80 beats/minute	76 beats/minute

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Physician :DR. SHALINI MISHRA Dep.Name/Bed No. :SWASTHVIRITTA Specimen Rec.Time :22/07/2025 11:00 Student/Other :Dr. DIXITA KAPURIYA		IPD/OPD No. : 8832 Date of Collection : 22/07/2025 10:31 Result Release Time : 22/07/2025 14:55 Reg. ID : ITRAC-7055-25		Physician :DR. SHALINI MISHRA Dep.Name/Bed No. :SWASTHVIRITTA Specimen Rec.Time :30/09/2025 11:00 Student/Other :Dr. DIXITA KAPURIYA		IPD/OPD No. : 8832 Date of Collection : 30/09/2025 10:46 Result Release Time : 30/09/2025 12:42 Reg. ID : ITRAC-11802-25																	
CORTISOL REPORT Sample Type: Serum Condition of Specimen Receipt:Normal <table><tr><th>Test Name</th><th>Result</th><th>Units</th><th>Biological Reference Interval</th></tr><tr><td>Cortisol</td><td>11.38</td><td>µg/dL</td><td>6.4 - 21</td></tr></table> Note-Assays performed on " AIA-360 " Fully Auto Fluorescent Immuno Assay Analyzer, TOSOH, Japan Method Electrochemiluminescence Immunoassay "ELIFA" Remark Biochemist				Test Name	Result	Units	Biological Reference Interval	Cortisol	11.38	µg/dL	6.4 - 21	CORTISOL REPORT Sample Type: Serum Condition of Specimen Receipt:Normal <table><tr><th>Test Name</th><th>Result</th><th>Units</th><th>Biological Reference Interval</th></tr><tr><td>Cortisol</td><td>9.87</td><td>µg/dL</td><td>6.4 - 21</td></tr></table> Note-Assays performed on " AIA-360 " Fully Auto Fluorescent Immuno Assay Analyzer, TOSOH, Japan Method Electrochemiluminescence Immunoassay "ELIFA" Remark Biochemist				Test Name	Result	Units	Biological Reference Interval	Cortisol	9.87	µg/dL	6.4 - 21
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Figure-1: Cortisol level before treatment

Figure-2: Cortisol level after treatment

DISCUSSION:

From an Ayurvedic and yogic perspective, regular practice of *Bhramari Kumbhaka* enhances *Sattva Guna* and reduces *Raja Guna*, thereby promoting mental calmness, emotional stability, and improved cognitive control. This reduction in mental agitation helps regulate *Vata Dosha* and stabilize *Chitta*. The harmonization of *Prana* through *Bhramari Kumbhaka* promotes balance within the *Pranamaya Kosha* and *Manomaya Kosha*, resulting in improved psychophysiological equilibrium. These effects are reflected physiologically by reduced stress, enhanced parasympathetic activity, and improved autonomic regulation, which may contribute to the reduction of blood pressure and support the management of hypertension.

Vagus Nerve, Vagal Tone, and *Bhramari Kumbhaka*

The vagus nerve is the main parasympathetic nerve involved in regulating cardiovascular and respiratory functions and maintaining homeostasis. Vagal tone, an indicator of parasympathetic activity, is associated with improved autonomic balance, lower blood pressure, and better cardiovascular health.

Bhramari Kumbhaka, a yogic breathing technique characterized by humming sound, enhances vagal activity and reduces sympathetic nervous system activation. These effects promote relaxation, improve autonomic regulation, and may contribute to blood pressure reduction, making it a beneficial complementary approach in the management of hypertension.

Bhramari Kumbhaka and Nitric Oxide

In *Bhramari Kumbhaka*, Humming sound has been shown to increase nasal nitric oxide production. Nitric oxide is an important signaling molecule that promotes vasodilation, improves endothelial function, and helps maintain vascular homeostasis. These effects support blood flow regulation and blood pressure control. Therefore, *Bhramari Kumbhaka* may contribute to cardiovascular health and aid in the management of hypertension.^[10]

Brain Waves and Health

Brain wave activity reflects different states of consciousness and physiological functioning. Alpha waves are commonly associated with relaxed wakefulness, while theta and delta waves are observed during deep relaxation and sleep. These states are important for mental restoration, emotional regulation, and overall well-being.

Ageing is associated with changes in neuroendocrine function, including reduced secretion of certain hormones involved in tissue repair and recovery. Relaxation practices and adequate sleep, which are associated with increased alpha, theta, and delta brain wave activity, may support hormonal balance and physiological restoration. These states have also been linked to reduced cortisol levels, improved stress management, and enhanced autonomic regulation, which may contribute to better cardiovascular health and overall well-being.

Conclusion:

Bhramari Kumbhaka is beneficial complementary approach in the management of hypertension by promoting relaxation, reducing stress, enhancing parasympathetic activity, and improving autonomic balance. Its simple, safe, and cost-effective nature makes it a useful adjunct to conventional treatment.

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