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# Effect of Cyclic Meditation on Primary Hypertensive Individuals A Randomised Controlled Trial

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**Abstract**

**Background and Objectives:** Hypertension is one of the most common cardiovascular disorders worldwide and is considered a major public health problem. It is characterized by persistent elevation of systemic arterial blood pressure above 140/90 mmHg and is commonly known as the "silent killer" because it often remains asymptomatic until serious complications develop. Prolonged hypertension can lead to damage of vital organs such as the heart, kidneys, brain, and eyes, resulting in conditions like stroke, heart failure, renal failure, and blindness. Yoga, an ancient Indian science, has been widely practiced as a holistic mind-body therapy that includes asanas, pranayama, meditation, and relaxation techniques. Cyclic Meditation (CM), developed by H.R. Nagendra based on the principles of Mandukya Karika, is a moving meditation technique that combines yogic postures with guided relaxation and awareness practices. Previous studies have shown that cyclic meditation helps in reducing heart rate, systolic blood pressure, diastolic blood pressure, anxiety, occupational stress, and sympathetic activity while improving parasympathetic dominance and sleep quality. However, very few studies have evaluated the clinical application of cyclic meditation in primary hypertensive individuals. Hence, the present study aims to assess the impact of cyclic meditation on primary hypertensive patients and to evaluate its efficacy on primary hypertension, pulse pressure, and mean arterial pressure

**Materials and Methods:** This randomized controlled study was conducted among 60 adolescents (25 - 50 years) identified as having primary hypertension. Participants were randomly divided into two groups: an Intervention group (n = 30) and a Control group (n = 30). The intervention group practiced xiii cyclic meditation for 30 minutes each, five days per week for the duration of 2 weeks, while the control group followed their regular daily medications. Blood pressure, pulse pressure and mean arterial pressure were measured before and after the study using standardized equipment. Ethical approval was obtained from the Institutional Ethics Committee, and written informed consent was taken from all participants.

**Results:** After 2 weeks, participants who practiced Cyclic meditation showed a significant decrease in blood pressure, pulse pressure and mean arterial pressure. No adverse effects or dropouts occurred during the study.

**Conclusion :** Cyclic Meditation significantly reduced systolic blood pressure, diastolic blood pressure, pulse pressure, and mean arterial pressure in individuals with primary hypertension. These findings suggest that Cyclic Meditation is a safe and effective complementary intervention that may be incorporated alongside conventional medical management to improve blood pressure control and cardiovascular health.

## 1. Introduction

Hypertension is the most leading prevalent cause for cardiovascular conditions in the world. Now a days, it is becoming more widespread in adults and teenagers. The primary clinical indicator of this illness is elevated systemic arterial pressure(1).

Due to population ageing and increased exposure to lifestyle risk factors, such as poor diets (high salt and low potassium intake and inactivity), the prevalence of hypertension is rising internationally(2). However, there are regional variations in the prevalence of hypertension. The prevalence of hypertension has somewhat decreased in high-income countries (HICs) over the last 20 years, but it has significantly increased in low and middle-income countries (LMICs)(3). Hypertension affects over 1.3 billion adults worldwide(4). These differences in the prevalence patterns of hypertension imply that health care systems in LMICs may be dealing with a significant burden of infectious diseases in addition to a fast-rising burden of hypertension and BP-related cardiovascular disorders.

When blood pressure rises over normal and reaches a systolic and diastolic measurement of more than 140/90 mmHg, it is referred to as hypertension. Prolonged and elevated hypertension can harm blood vessels in the kidneys, heart, brain, and eyes, leading to consequences like stroke, heart failure, renal failure, and blindness. Another name for hypertension is the silent killer. Based on the causes of hypertension, it is divided into two, namely primary hypertension (around 90% of total cases of hypertension) and secondary hypertension (around 10% of the 4 total number of hypertension cases). Primary hypertension is a type of hypertension where the cause is idiopathic (5)

Primary hypertension develops due to the interaction of genetic and environmental factors such as stress, obesity, excessive salt intake, physical inactivity, smoking, and alcohol consumption. These factors increase sympathetic nervous system activity and activate the renin–angiotensin–aldosterone system, leading to vasoconstriction and sodium and water retention. Simultaneously, endothelial dysfunction and impaired renal sodium excretion increase peripheral vascular resistance and blood volume. The combined effect results in sustained elevation of blood pressure. Over time, persistent hypertension causes vascular remodeling, arterial stiffness, and ultimately target organ damage affecting the heart, brain, kidneys, retina, and blood vessels(6–8).

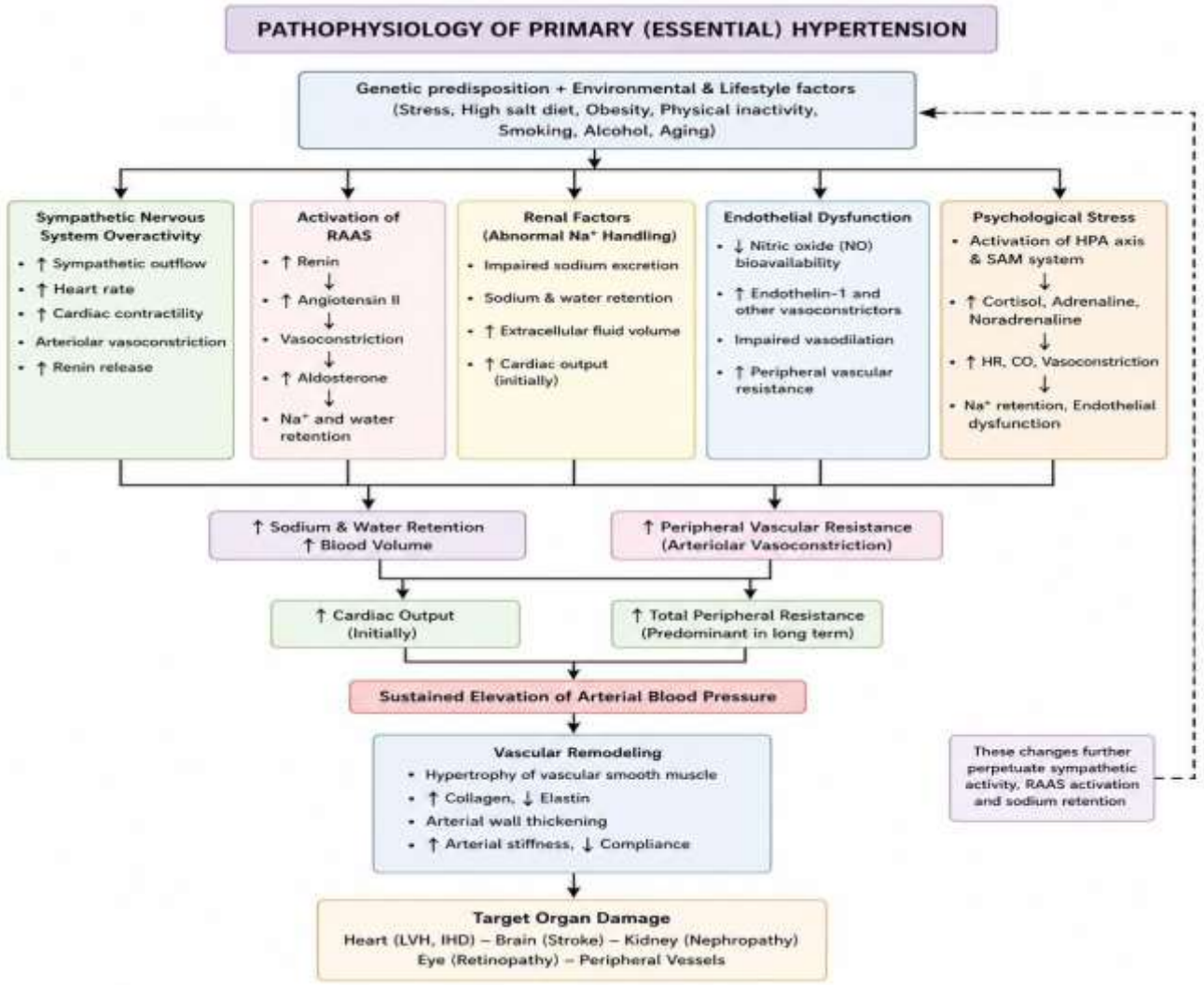



**Figure 1: Pathophysiology of Primary Hypertension**

Yoga is a traditional Indian science that incorporates physical exercise, guided relaxation, and interoception (9)

Yoga includes diverse practices, such as physical postures called asanas, controlled breathing techniques called pranayama, meditation, and philosophical talks (10). The seventh of eight steps that Pathanjali (900 B.C.) prescribes to reach the ultimate state of spiritual emancipation is meditation (11). Although many practitioners do start with the direct study of meditation, others find it simpler to go through the other steps first, such as learning yoga postures (asanas) and regulated breathing techniques (pranayama's). It is hypothesized that when a beginner tries direct meditation, their mind may react in one of two ways: (i) a rajasic – active (personality) mind would be restless all through the session and (ii) a tamasic – a mind with inertia could fall asleep. This problem of the mind is addressed in the Mandukya Kharika. This led to the development of a "moving meditation" method known as cyclic meditation (CM), which blends guided meditation with the practice of yoga poses, by H.R. Nagendra, Ph.D., is based on the Mandukya Kharika, an old Indian book (10).

This technique combines the practice of physical postures or asanas (postures name mentioned in Sanskrit) with relaxation techniques. It begins with a repeating a verse from the Mandukya Upanishad,

"awaken the mind in states of activity; calm it in moments of agitation; realize the possibilities of the mind in between these two mental states; and, when the mind reaches a state of equilibrium, not disturb it" (12)

It is a combination of stimulating and calming technique practiced with a relaxation awareness may reduce psycho physiological arousal. The practice of cyclic meditation, includes yoga posture (asana) which involves muscle stretching and this has diverse benefits (10).

On literature review to the best of our knowledge there are few studies conducted to evaluate the effect of cyclic meditation on various aspect of health as well as disease condition shown beneficial results. But none of the studies were conducted to evaluate the effect of cyclic meditation for its clinical application on primary hypertensive patient. Hence the present study is aimed to evaluate the efficacy of cyclic meditation on primary hypertensive patient to give them therapeutical modality.

## 2. Aim & Objectives

**Aim**: To assess the impact of cyclic meditation on primary hypertensive patients.

**Objectives**: To evaluate the efficacy of cyclic meditation on:

- Primary hypertension
- Pulse pressure
- Mean arterial pressure

## 3. Review of Literature

### 3.1 Hypertension and yoga

According to the study by Xianyang Xin, PhD; Yongqing Guo et al, exercise mostly lowers blood pressure by boosting endothelial function, decreasing sympathetic nervous system activity, increasing parasympathetic activity, and improving cardiovascular efficiency. The most antihypertensive effects were seen with combined exercise and high-intensity interval training, while yoga and tai chi also significantly reduced blood pressure through stress-reduction and relaxation techniques. Yoga and other mind-body practices help lower systolic and diastolic blood pressure by regulating breathing, enhancing autonomic balance, reducing stress hormones, and promoting vasodilation. Additionally, a nonlinear dose-response relationship was found in the study, suggesting that moderate activity levels result in the best blood pressure reduction. (13)

Holger Cramer and associates claim that yoga primarily reduces blood pressure by increasing parasympathetic activity and decreasing sympathetic activity. Examples of techniques that reduce cortisol, stress, and anxiety levels are asanas, pranayama, and meditation. This leads to relaxation and vasodilation. Slow breathing helps control blood pressure by increasing vagal tone and baroreceptor sensitivity. Additionally, by improving endothelial function, circulation, and autonomic balance, yoga reduces systolic and diastolic blood pressure. When compared to individual yoga sessions, combined yoga practices exhibited stronger antihypertensive effects. (14)

By relaxing the nervous system and lowering tension, yoga lowers blood pressure. Asanas, pranayama, and meditation are examples of practices that lower heart rate and blood pressure by increasing parasympathetic activity and decreasing sympathetic activity. While relaxing lowers stress hormones like cortisol, slow breathing enhances vagal tone and blood pressure regulation. Additionally, yoga increases vascular flexibility and blood circulation, which aids in better managing hypertension. (15)

### 3.2 Meditation and autonomic nervous system

Meditation Programs for Psychological Stress and Well-Being is a systematic review and meta-analysis that used randomized controlled trials to assess how meditation affected psychological stress and general well-being. According to the study, mindfulness meditation reduced anxiety, sadness, stress, pain, and mental health-related quality of life by a small to moderate amount. According to the authors, meditation increases parasympathetic nervous system activity while decreasing sympathetic nervous system activity. This change enhances emotional control, lowers stress-related autonomic arousal, and encourages relaxation, all of which increase psychological wellbeing. (16)

The association between occupational stress and hypertension among welders was examined in the study "Occupational Stress Mediate the Association Between Occupational-Related Factors and Hypertension: Findings Based on Welders." The findings demonstrated that welders who had higher levels of occupational stress were more likely to develop hypertension, and that characteristics including working nights, welding in tight spaces, earning less money, and working longer hours all markedly raised the risk of both stress and hypertension. The authors talked about how work-related stress might raise blood pressure by activating the sympathetic nervous system, secreting more cortisol and catecholamines, disrupting circadian rhythms, and causing long-term endocrine imbalances. (17)

The study by Haojun Cui et al. (2026) found that mind-body therapies such as Bhramari Pranayama, Sound Relax Meditation, and Specific Qigong effectively reduced systolic and diastolic blood pressure in patients with essential hypertension. The authors explained that these therapies help by reducing sympathetic activity, increasing parasympathetic activity, lowering stress hormones, and promoting relaxation and better vascular function. (18)

In critically ill obstetric patients, guided meditation dramatically improved heart rate variability, decreased anxiety, and lowered heart rate, blood pressure, and breathing rate, according to research by Patel et al. (2025). According to the authors, guided meditation improves autonomic balance and psychological well-being by increasing parasympathetic activity and vagal tone while decreasing sympathetic activity and tension. (19)

According to a study by Yongxin Luo et al. (2025), young adults' theta and beta brain wave activity was changed and their heart and breathing rates were lowered by short concentrated mindfulness meditation. The authors clarified that by boosting parasympathetic activity, decreasing sympathetic activity, and encouraging relaxation and stress reduction, meditation enhances autonomic nervous system homeostasis. (20)

**3.3 Cyclic meditation studies**

The scientific effects of cyclic meditation on autonomic function, stress, sleep, attention, and cognition were examined in research by Pailoor Subramanya and Shirley Telles titled A Review of the Scientific Studies on Cyclic Meditation. According to the review, cyclic meditation improved parasympathetic dominance, attention, memory, and sleep quality while lowering oxygen consumption, sympathetic activity, occupational stress, and anxiety. The authors talked about how cyclic meditation reduces psychophysiological arousal and enhances mental serenity by mixing calming relaxation techniques with stimulating yoga poses to generate profound relaxation and autonomic balance. (21)

Patil Sarang and Shirley Telles (2006) conducted a study to evaluate the effects of cyclic meditation on heart rate variability and autonomic nervous system function in healthy volunteers. The study reported a decrease in low-frequency power and LF/HF ratio along with an increase in high-frequency power after cyclic meditation, suggesting enhanced parasympathetic activity and reduced sympathetic activity. The authors concluded that cyclic meditation induces relaxation and autonomic balance through the

combined effects of yoga postures, guided relaxation, and awareness practices. (22)

A review by Boopalan et al. (2024) assessed how cyclic meditation affected the quality of sleep. The evaluation, which comprised five trials with 277 individuals, discovered that cyclic meditation decreased tension, anxiety, and awakenings during sleep while increasing sleep length, slow-wave sleep, and overall sleep quality. By increasing parasympathetic dominance, lowering sympathetic arousal, and fostering profound mental and physical relaxation through yoga poses and guided relaxation techniques, the authors proposed that cyclic meditation improves sleep. (23)

An other study was conducted on 34 healthy participants where HRV, SBP, DBP is measured before and after the practice of cyclic meditation and it is shown that HR, SBP and DBP decreased after the practice of cyclic meditation. (24)

A study was conducted by HR Nagendra et.al., in Japan where 109 participants were participated in the study, where the following assessment were taken: Breath rate, Heart rate, Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP), Breath holding duration were taken every before and after the practice of cyclic meditation and it is shown statistically highly significant effect on Breath rate, Heart rate, SBP and DBP. (25)

An investigation was carried out on the beneficial effects of cyclic meditation on subsequent sleep. Research findings indicated that 6 engaging in cycle meditation twice a day appeared to enhance both the objective and subjective quality of sleep on the following night. (26)

Compared with Supine Rest (SR), Cyclic Meditation produced a slightly greater increase in parasympathetic activity. The study also reported a significant reduction in low-frequency (LF) power during both SR and Cyclic Meditation, indicating reduced sympathetic nervous system activity and a shift toward parasympathetic dominance. Although the exact mechanism by which Cyclic Meditation influences the autonomic nervous system is not fully understood, it has been suggested that reduced cortical activity may alter hypothalamic function, thereby promoting autonomic balance. Previous studies have also shown that 10 minutes of guided relaxation significantly decreased oxygen consumption and increased breath volume compared with an equal duration of supine rest. Furthermore, guided relaxation was associated with an increase in the high-frequency (HF) component and a decrease in the low-frequency (LF) component of heart rate variability, indicating enhanced parasympathetic activity and reduced sympathetic activation. (27)

In a later study that correlated heart rate variability to Cyclic Meditation, a two-day cyclic meditation program reduced baseline autonomic arousal and occupational stress in 26 middle-aged, asymptomatic male managers, indicating a significant drop in sympathetic activity. The mechanisms underlying the decrease in occupational stress levels may be related to decreased autonomic arousal (sympathetic activation) as well as psychological factors, though this remains a speculation. (28)

A recent study examined the immediate effects of SR and CM on 7 anxiety and memory. A cyclical combination of supine rest and yoga postures in CM reduced state anxiety more than resting in a traditional yoga relaxation posture (shavasana) and enhanced memory scores immediately after practice (29)

**Paranthatta et al. (2024)** conducted a quasi-experimental study to evaluate the effect of cyclic meditation on anxiety and sleep quality among sailors working on merchant ships. Fifty sailors were divided into experimental and control groups, and the experimental group practiced cyclic meditation for 45 minutes daily for 21 days. The results showed a significant reduction in anxiety levels and significant improvement in sleep quality, along with reductions in systolic blood pressure, diastolic

blood pressure, and pulse rate. The authors suggested that cyclic meditation improves psychological well-being and sleep quality by reducing sympathetic nervous system activity, promoting parasympathetic dominance, and inducing deep mental and physical relaxation. (30)

In order to investigate strategies for lowering teacher stress and burnout, Agyapong et al. (2023) carried performed a scoping review. 40 research with 4,344 people from various nations were considered in the review. The results demonstrated the effectiveness of rational emotive behavior therapy (REBT), yoga, cyclic meditation, cognitive behavioral therapy (CBT), and mindfulness-based interventions in lowering stress and burnout. While CBT and yoga enhanced stress management and psychological well-being, mindfulness-based therapies dramatically decreased Teacher Stress Inventory scores and emotional tiredness. According to the authors, these therapies reduce sympathetic nervous system activation and improve teachers' general mental health by improving self-awareness, emotional regulation, cognitive restructuring, relaxation, and resilience. (31)

**Ningthoujam, Singh, and Mukherjee (2021)** published an opinion article titled *"Possible Roles of Cyclic Meditation in Regulation of the Gut-Brain Axis."* The authors discussed the potential role of cyclic meditation in regulating the gut-brain axis through autonomic nervous system modulation. They highlighted previous findings showing that cyclic meditation increases parasympathetic activity, enhances vagal tone, improves heart rate variability, reduces stress and anxiety, and improves cognitive functions. The authors proposed that these effects may positively influence gut-brain communication and gut microbiota, thereby contributing to better mental, neurological, and gastrointestinal health. However, they emphasized that further experimental studies are required to establish a direct relationship between cyclic meditation and gut-brain axis regulation. (32)

**Need for the study**

Despite the growing evidence supporting yoga and meditation for stress reduction and autonomic regulation, primary hypertension remains a major health problem worldwide. Cyclic meditation, a yoga-based relaxation technique combining physical postures, relaxation, breathing awareness, and meditation, has been shown to reduce stress, anxiety, sympathetic activity, autonomic arousal, and improve parasympathetic activity, heart rate variability, sleep quality, and psychological well-being. However, most previous studies have focused on healthy individuals, stress management, sleep, and autonomic function rather than specifically on patients with primary hypertension. Very limited research is available regarding the direct effect of cyclic meditation on blood pressure regulation and autonomic balance in hypertensive individuals. Thus, this study addresses the research gap by evaluating the effect of cyclic meditation on multiple blood pressure parameters in individuals with primary hypertension through a randomized controlled trial.

## 4. Methodology

### 4.1.Study design and Setting

The study was conducted on participants who provided signed informed consent and met the predefined inclusion and diagnostic criteria. Participants will be screened, after fulfilling inclusion and diagnostic criteria, a total of 60 eligible subjects were recruited and randomly assigned into two groups using the lottery method: Study Group A (n = 30) and Control Group B (n = 30).

Pre assessments (blood pressure, pulse pressure and mean arterial pressure) will be recorded for both the groups. Study Group will be practicing cyclic meditation for 30 minutes daily. Control Group will continue their regular daily medications.

The intervention was administered five days per week for a duration of 2 weeks. Following the intervention period, post-assessments (blood pressure, pulse pressure and mean arterial pressure) were recorded for both groups.

All the information about the study will be explained to the participants and an informed consent (Annexure 1) will be obtained from all the participants before starting the study.

**4.2.Study area:**

Alva's Education Foundation®, Moodbidre

**4.3.Study population and Period**:

Approximately 98 adolescents aged 25 - 50 years were screened for eligibility. The total study duration was six month (May 2025), encompassing the screening process, baseline assessments, a 2-week intervention (administered five days a week), post-intervention assessments, and data analysis. The intervention itself lasted for 10 consecutive days within this period.

**4.4.Criteria for Diagnosis**

When blood pressure rises over normal and reaches a systolic and diastolic measurement of more than 140/90 mmHg, it is referred to as hypertension (5)

A standard sphygmomanometer of (Diamond, India) of ISI mark was used along with microtone stethoscope to asses blood pressure. A stop watch (made in Japan) calibrated to 1/100th of a second, was used for counting pulse rate (33)

**4.5.Inclusion criteria**

- Age group between 25 - 50 years will be enrolled for the study.
- Subjects who are willing to participate in the study.

**4.6.Exclusion criteria:**

- Subjects with any co-morbidity.
- Subjects who have undergone surgical procedures with in last 3 months
- Subjects practicing meditation or any yogic practices in the past 6months

**4.7.Ethical Considerations**

The study's purpose and the participants' rights as research subjects were explained to them. For individuals who couldn't comprehend English, an informed consent form was given in their native language, Kannada, and explained. Each subject received enough time to read the information sheet and have all their enquiry. It was explained to them that they had the right to leave the study at any moment and that they had to be willing to take part voluntarily. By signing an informed consent form, each subject indicated their willingness to take part in the study. The institution's ethical committee has given the approvement for the project with the ethical clearance registration certificate no. ACNYS/IECHS/2026/2027 dated 13/11/2025 (format enclosed in Annexure 2).

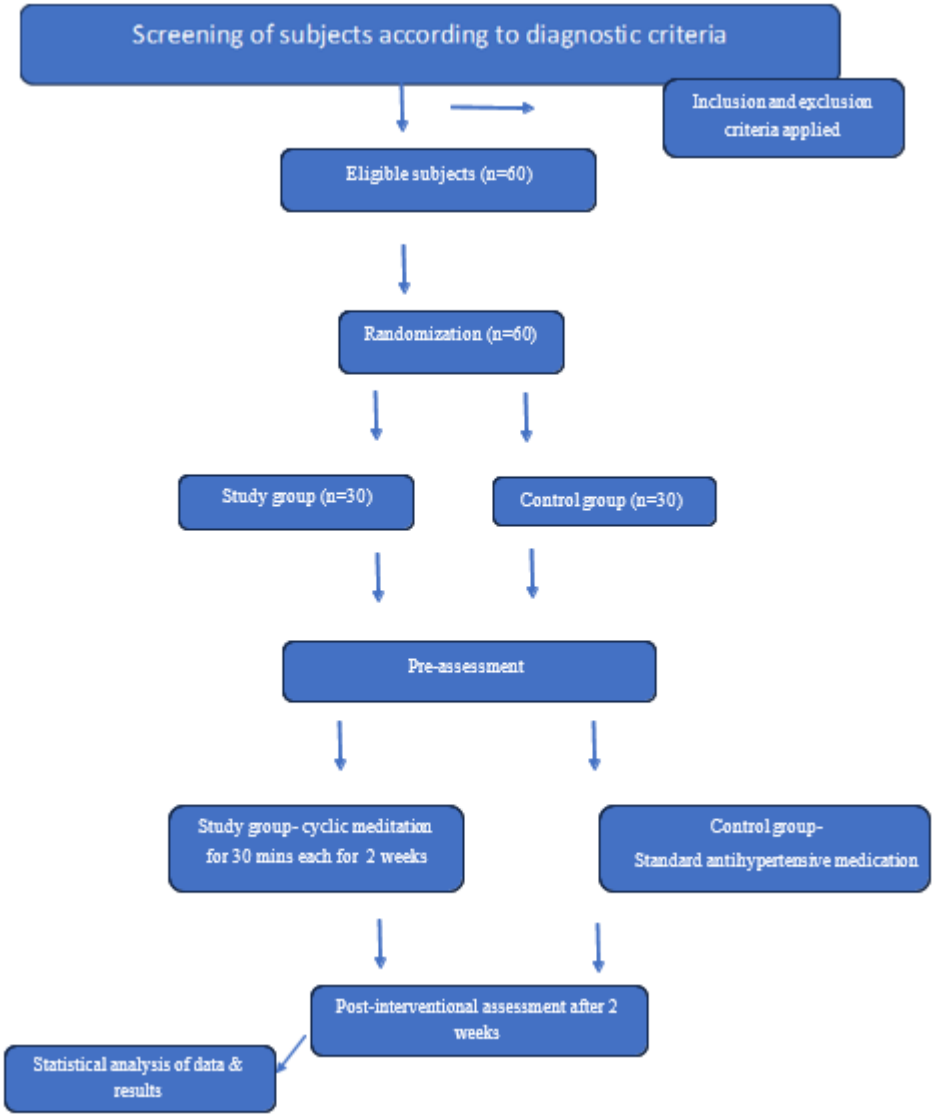
**4.5.1 CTRI Registration number-**

CTRI/2026/02/103360

**4.8.Illustration of study plan**

A total of 98 adolescents were assessed for eligibility for the study, and of these, 60 met the eligibility criteria were randomized into 2 groups, n = 30 each.

**Fig. 2: Subject Recruitment Flow Diagram**




**4.9.Intervention**:

CYCLIC MEDITATION

Step 1

Starting prayer (1 minute)

LAYE SAMBODHAYE CITTAM VIKSIPTAM SAMAYET PUNAH/ SA KASAYAM VIJANIYAT SAMAPRAPTAM NA CALAYET

Lie on your back. Relax the whole body on the ground legs apart, hands apart, palms facing the roof, smiling face, let go all parts of the body. As you repeat the prayer feel the resonance throughout the body.

Step 2

Instant relaxation technique (IRT) (1 minute)

Bring your legs together, join the heels, toes together, palms by the side of the body. Keep your face smiling till the end. Gently bring your awareness to the tip of the toes stretch the toes, tighten the ankle joint, tighten the calf muscle. Pull up the kneecaps. Tighten the thigh muscles. Compress and squeeze the buttocks. Exhale and suck in the abdomen. Make fist of the palms and tighten the arms. inhale and

expand the chest. Tighten the shoulder, neck muscles and compress the face. Tighten the whole body from toes to the head Tighten …...Tighten……tighten Release and relax Linear awareness (2 minute)

Now slowly bring the left hand over head along the ground. Slowly turn over the left side. Place the head on the left arm. The right leg on the left leg, right palm on the right thigh. Let the whole body relax The entire weight of the body coming down to the ground through the left side. Fine linear 11 awareness. Slowly start coming up to the Tadasana. Let all the movements slow down. Let the breathing be deep, slow and continuous. Keep your eyes closed. Carefully feel the changes in your body as you reach the vertical position. Feel the flow of the blood down the heart. Feel the heartbeat and the pulse Chant Mmmm……. (Bhramari) to generate 3D awareness and feel the whole-body resonating. Step 3

Centering (2 minute)

Slowly lean forward. Feel the weight of the entire body on the toes. Pointed awareness. Slowly lean backwards. Feel the weight on the heels. Surface awareness. Come to the center. Lean to the right. the weight of the entire body is on the right edge of the right foot. Linear awareness. Lean to the left. Come to the center. Fine surface awareness. Now the whole body is centered, the weight of the whole body is equally distributed throughout the soles of the feet. Relax the shoulders, arms hanging freely down. Smiling face. Feel all the changes taking place in the body Step 4 Standing Asana

Ardha Kati Chakrasana (7 minutes) (both the side)

Slowly start raising the right arm sideways upwards, 45°raise the arm further slowly and continuously to horizontal position, enjoy the movement. As the right arm reaches 90°position twist the palms at the wrist. Pointed awareness and glide the right arm up to 135°position.beautiful pointed awareness on the deltoid muscles on the right arm. As the right arm reaches up the vertical position feel the nice stimulation in the shoulder muscles. The right biceps touching the right ear, feel the beautiful surface awareness. Feel the blood gushing down 15 the arm. smiling face. Stretch the right arm from the tip of the fingers of the right palm. The entire right portion of the body gets 12 stretched, but not the face. Face always smiling and relaxed. Slowly start bending down to the left. Left palm sliding down along the left thigh. Fine movement of surface awareness. Enjoy the fine stretch of the waist muscles on the right side and compression on the left side. Observe all the changes taking place in your body. Slowly start coming back to vertical position. Feel the blood flowing down, the nerve impulses throughout the body. Again, stretch and pull up the right arm and the entire right portion of the body stretched from the toes to the tip of the fingers. Slowly start bringing the right arm down 135° gliding down smoothly. Feel the pointed awareness at the shoulder as you reach horizontal position and at the wrist as you slowly turn the palm downwards. Further bring down the right arm to 45. Feel the tingling sensation at the tips of the fingers. Continuously glide down the hand by the side of the thigh and hang it freely. Have a glance of the body again from the toes to the head. Entire right portion of the body is beautifully charged with nerve impulse, light and energized.

Same like have to perform on the left side Step 5

Quick relaxation technique (3 minute)

Phase 1- Observing the abdominal movement

Bring your awareness to the movements of the abdominal muscles moving up and down as you breathe in and out. Recognize the haphazardness and jerky movement of the abdominal muscles. Do not manipulate the breathing, let it be natural, simply observe he abdominal movement. Count yourself 5 rounds mentally, one inhalation and one exhalation forming one round.

Phase 2 – Associate with breathing

Synchronize the abdominal movements with the breathing. While inhaling the abdomen 16 bulging up and while exhaling the abdomen –sinking down. Inhale…. deeply and exhale…. completely. 13 Continue up to 5 rounds

Phase 3 – Breathing with feeling

As you inhale, the abdominal muscles are coming up feel the whole body getting energized and feel the lightness. As you exhale, feel the whole-body collapses and sinks down nicely, releasing all the stresses and tension completely. Inhale…. deeply and exhale…. completely. Continue up to 5rounds. Chant an A-kara in low voice (30second) feel the vibration in lower parts of the body.

Bring your legs together and hands by the side of the body. Come up straight with the support of the elbows to the sitting legs stretched relaxation position sithili dandasana

Step 6 Sitting Asana

Vajrasana (2 minutes)

Kneel on the floor. Bring the big toes together and separate the heels. Lower the buttocks onto the inside surface of the feet with the heels touching the sides of the hips. Place the hands on the knees, palms down. The back and head should be straight but not tense. Avoid excessive backward arching of the spine. Close the eyes, relax the arms and the whole body. Breathe normally and fix the attention on the flow of air passing in and out of the nostrils.

Shashankasana (2 minutes)

Sit in vajrasana, placing the palms on the thighs just above the knees. Close the eyes and relax, keeping the spine and head straight. While inhaling, raise the arms above the head, keeping them straight and shoulder width apart. Exhale while bending the trunk forward from the hips, keeping the arms and head straight and in line with the trunk. At the end of the movement, the hands and forehead should rest on the floor in front of the knees.

If possible, the arms and forehead should touch the floor at the same time. Bend the arms slightly so that they are fully relaxed and let the elbows rest on the floor.

Ushtrasana (2 minutes)

Sit in vajrasana. Stand on the knees with the arms at the sides. The knees and feet should be together but may be separated if this is more comfortable. Lean backward, slowly reaching for the right heel with the right hand and then the left heel with the left hand. Do not strain. Push the abdomen forward, trying to keep the thighs vertical, and bend the head and spine backward as far as possible. Try to relax the whole body, especially the back muscles, into the stretch. The weight of the body should be evenly supported by the legs and arms. The arms should anchor the shoulders to maintain the arch of the back. Remain in the final position for as long as is comfortable. Return to the starting position by slowly releasing the hands from the heels one at a time.

Step 7

Deep relaxation technique (6 minutes)

Phase 1- Bring your awareness to the tip of the toes, gently move your toes and relax. Sensitize the soles and relax, relax your feet, loosen the ankle joints, relax the calf muscles, pull up the knee caps, release and relax, relax your thigh muscles, buttock muscles, loosen the hip joints, relax the pelvic region and waist region. Totally relax your lower part of the body R... e…l…a…x…. Chant A-kara (30 seconds) feel the vibration in lower parts of the body.

Phase 2- Gently bring your awareness to the abdominal region and observe the abdominal movements for a while, relax your abdominal muscles, relax the chest muscles. Gently bring your awareness on your lower back, relax your lower back and loosen all the vertebral joints one by one. Relax the muscles and nerves around the backbones. Relax your middle back, shoulder blades and upper back muscles, totally relax. Shift your awareness to the tip of the fingers, gently move them a little and sensitize. Relax your fingers one by one. Relax your 18 palms, loosen the wrist joints, relax the forearms, loosen the elbow joints, relax the hind arms, triceps, biceps and relax your shoulders. Shift your awareness to your neck, slowly turn your head to the right and left, again bring back to the center. Relax the muscles and nerves of the neck. Relax the muscles and nerves of the neck. Relax your middle part of the body, totally relax R…e…l…a…x…Chant U- kara (30 seconds) feel the vibration in the middle part of your body

Phase 3- Gently bring your awareness to your head region. Relax your chin, loosen your lower jaw and upper jaw, relax your lower and upper gums, lower and upper teeth and relax your tongue. Relax your palates-hard and soft, relax your throat and vocal cords. Gently shift your awareness to your lips, relax your lower and upper lips. Shift your awareness to your nose, observe your nostrils, and feel the warm air touching the walls of the nostrils as you exhale and feel the cool air touching the walls of the nostrils as you inhale. Observe for a few seconds and relax your nostrils. Relax your cheek muscles, feel the heaviness of the cheek and have a beautiful smile on your cheeks. Relax your eyeballs muscles, feel the heaviness of the eyeballs, relax your eye lids, eyebrows and the space between the eye brows. Relax your forehead, temple muscles, ears, the sides of the head, back of the head and crown of the head. Relax your head region totally R…e…l…a…x…and chant M- kara (30 seconds) Feel the vibration in your head region. Phase 4-Observe your whole body from toes to head and relax, chant AUM in a single breath A…. U….M…. (30 second) Feel the resonance throughout the body.

Phase 5- Slowly come out the body consciousness and visualize your body lying on the ground completely collapsed.

Phase 6- Imagine the vast beautiful blue sky. The limitless blue sky. Expand your awareness as vast as the blue sky. Merge yourself to the blue sky. You are becoming the blue sky. You are the blue sky. Enjoy the infinite bliss. E... N... J... O... Y... the blissful state of silence and all-pervasive awareness.

Phase 7-slowly come back to body consciousness. Inhale deeply. Chant an Om- kara (30 second). Feel the resonance throughout the body. The soothing and massaging effect from toes to head.

Phase 8-Gently move your whole body a little. Feel the lightness, alertness and energy throughout 16 the body. Slowly bring your legs together and the hands by the side of the body. Turn over to the left or the right side and come up when you are ready. Swami Vivekananda Yoga Prakashan a Special technique with step-by-step instructions for psychosomatic Ailments (34)

**4.10. Assessments**:

**1. SPHYGMOMANOMETER:**

A standard sphygmomanometer of (Diamond, India) of ISI mark was used along with microtone stethoscope to asses blood pressure. A stop watch (made in Japan) calibrated to 1/100th of a second, was used for counting pulse rate (33)

To provide access to the upper arm, ask the patient to take off long sleeves or relax any tight clothing. Never utilize an arm that might be medically problematic. Wrap the upper arm in the cuff and fasten it. Securely attach the cuff tubing to the sphygmomanometer tube. The patient's arm should be rested on a surface that is parallel to their arm. Listen to the pulse by placing the stethoscope over the brachial artery, which is located in the elbow bend. As you gradually pump up the cuff, pay attention to when the pulse

stops. This is a signal to cease blowing air into the cuff. Slowly begin to deflate the cuff while keeping an eye on the sphygmomanometer's mercury level. When the pulse returns, note the sphygmomanometer reading (the number the mercury has reached) and note this as the systolic pressure. Continue to deflate the cuff until the pulse stops; note this measurement as the diastolic pressure. Note these two readings in the patient's notes or chart: the systolic (e.g., 120/80) and the diastolic (e.g., 80/120). Share the blood pressure reading with the patient. Use the alcohol wipe to clean the earpieces and drum of the stethoscope. Hands should be cleaned and dried. Inform the clinically certified carer responsible for the patient's care if the reading is abnormally high or low (35)

**PULSE PRESSURE(PP):** It is the difference between the SBP and DBP NORMAL VALUE – 40 mmHg (120-80=40)

**MEAN ARTERIAL PRESSURE (MAP)** – It is the average pressure existing in the 17 arteries Formula – DBP+1/3 Of PP

80+40/3 = 93.3 mmHg (36)

### 4.11. Data Extraction

The data was collected using 3 outcome variables. The assessments were done on the first day (baseline data) and at the end of the intervention i.e., 12 days (post data). The data was collected and organized in Microsoft Excel sheets.

### 4.12. Data Analysis

The data was analyzed using Jamovi 2.6.44 version 2.7 for statistical analysis and graphs were generated using MS Excel 2021. The data were represented in mean ± standard deviation.

## 5.0 Sample Size Estimation

Sample size was calculated by using G* power 3.1.9 by considering 2-sided p value 1:1 allotment ratio for 95% power, 5% level of significance with effect size of 1 and the total sample size was found to be 60 (obtained sample size is 54 by considering any drop outs additional 6 participants were added, 30 subjects per group).

## 6.0. Results

The collected data were entered and analyzed using *Jamovi version 2.7*. Descriptive statistics (mean ± standard deviation) were calculated for all variables. The Shapiro–Wilk test was applied to check normality. Depending on the distribution, para- metric (paired t-test) and non-parametric (Student's t test, Mann–Whitney U test) analyses were performed to compare within-group and between-group differences.

**Table 1: Demographic Profile of the Participants**

| Characteristics | Study group | Control group |
|---|---|---|
| **N** | 30 | 30 |
| **Male** | 22 | 23 |
| **Female** | 8 | 7 |
| **Age- Mean ±SD** | 40.5±9.86 | 38.8±6.78 |

Table 1 shows the demographic characteristics of the study and control groups. Each group comprised 30 participants with an unequal distribution of males and females. The mean age of participants in the study group was 40.5±9.86 years, and in the control group was 38.8±6.78 years, indicating that both

groups were comparable in age and gender distribution.

**Table 2. Within-Group Comparison of Blood Pressure Parameters in Study Group**

| Variable | Group | Pre-test Mean ± SD | Post-test Mean ± SD | Mean Difference | t-value | p-value |
|---|---|---|---|---|---|---|
| SBP (mmHg) | Study (n=30) | 163.7 ± 9.95 | 140.7 ± 10.01 | 23.00 | 123.90 | <0.001* |
| DBP (mmHg) | Study (n=30) | 99.7 ± 6.56 | 92.0 ± 6.21 | 7.67 | 15.40 | <0.001* |
| PP (mmHg) | Study (n=30) | 64.0 ± 9.08 | 48.7 ± 9.12 | 15.33 | 30.00 | <0.001* |
| MAP (mmHg) | Study (n=30) | 121.0 ± 6.59 | 108.2 ± 6.38 | 12.78 | 37.00 | <0.001* |

Values are expressed as Mean ± SD.
Paired t-test was used for within-group comparisons.
*Statistically significant at $p < 0.05$.

The within-group analysis of the study group showed a statistically significant reduction in all blood pressure parameters following the cyclic meditation intervention. The mean systolic blood pressure decreased from 163.7 ± 9.95 mmHg to 140.7 ± 10.01 mmHg ($p < 0.001$). Similarly, diastolic blood pressure decreased from 99.7 ± 6.56 mmHg to 92.0 ± 6.21 mmHg ($p < 0.001$). Pulse pressure decreased from 64.0 ± 9.08 mmHg to 48.7 ± 9.12 mmHg ($p < 0.001$), while mean arterial pressure decreased from 121.0 ± 6.59 mmHg to 108.2 ± 6.38 mmHg ($p < 0.001$).

**Table 3. Between-Group Comparison of Blood Pressure Parameters in Study and Control Groups**

| Variable | Post Mean ± SD (Control) | Post Mean ± SD (Study) | Test Statistic | p-Value |
|---|---|---|---|---|
| SBP | 160±10.14 | 140.7±10.01 | 7.43 | <.001 |
| DBP | 96.9±3.74 | 92±6.21 | 3.68 | <.001 |
| PP | 63.1±10.03 | 48.7±9.12 | 5.85 | <.001 |
| MAP | 117.9±4.61 | 108.2±6.38 | 6.74 | <.001 |

The between-group comparison revealed no statistically significant differences between the study and control groups at baseline for systolic blood pressure, diastolic blood pressure, pulse pressure, and mean arterial pressure ($p > 0.05$), indicating comparability of the groups before intervention.

At post-test, statistically significant differences were observed between the groups for all outcome measures. The study group demonstrated significantly lower systolic blood pressure (140.7 ± 10.01 mmHg vs. 160.0 ± 10.14 mmHg), diastolic blood pressure (92.0 ± 6.21 mmHg vs. 96.9 ± 3.74 mmHg), pulse pressure (48.7 ± 9.12 mmHg vs. 63.1 ± 10.03 mmHg), and mean arterial pressure (108.2 ± 6.38 mmHg vs. 117.9 ± 4.61 mmHg) compared to the control group ($p < 0.001$ for all variables).

These findings indicate that cyclic meditation was effective in reducing blood pressure parameters among individuals with primary hypertension.

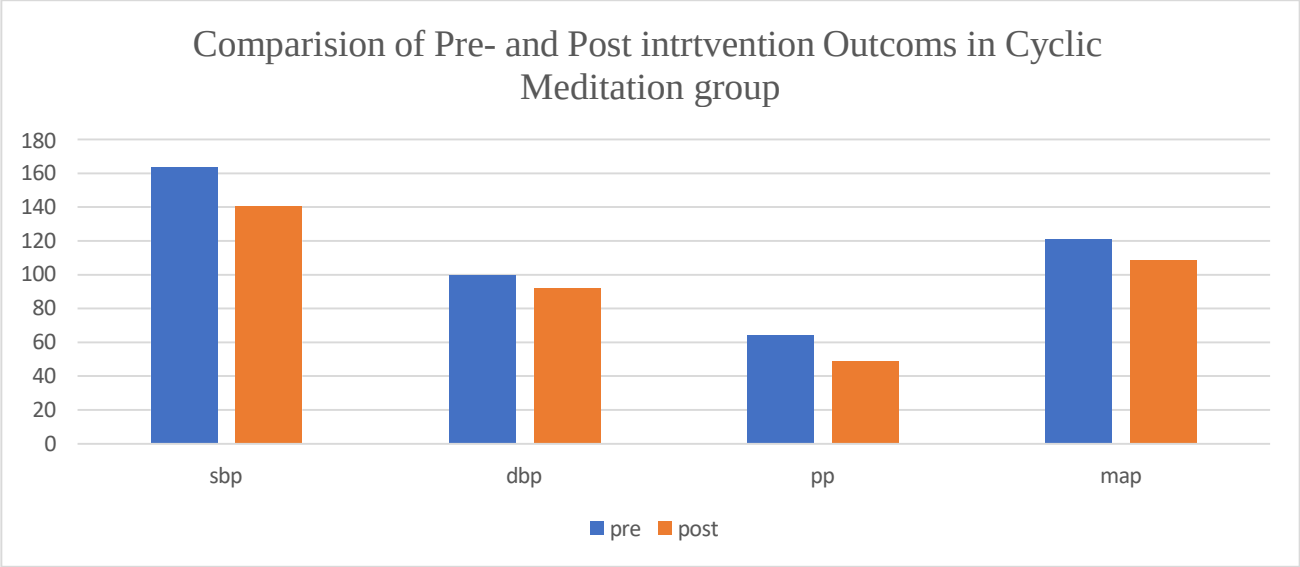



**Fig3.: Comparison of Pre and Post-Intervention Mean±SD Values for SBP, DBP, PP and MAP in Study Groups.**

The post data of the study group demonstrated marked improvement in all parameters

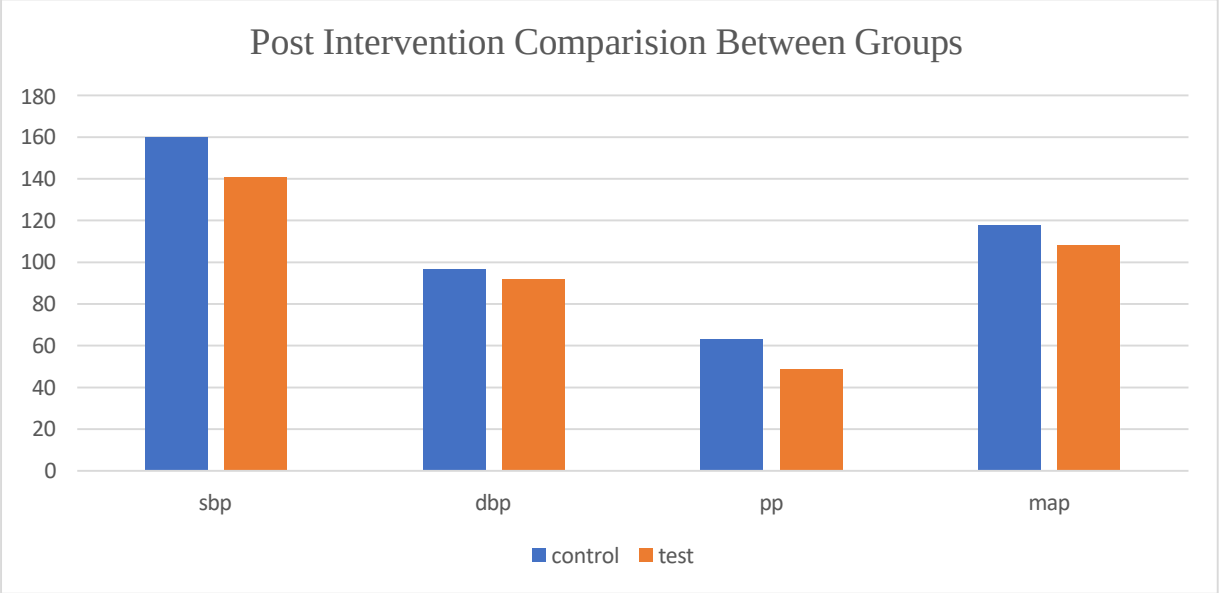



**Fig4.: Post-intervention Comparison between Groups.**

The cyclic meditation group showed greater post intervention SBP, DBP, PP and MAP compared with the control group.

**7.0 Discussion**

The present randomized controlled trial was conducted to evaluate the effect of Cyclic Meditation on blood pressure parameters among individuals with primary hypertension. A total of 60 participants were randomly allocated into a study group (n=30) and a control group (n=30). The study group practiced Cyclic Meditation for 30 minutes daily, five days per week for two weeks, while the control group continued their regular medications without any additional intervention. Blood pressure parameters

including systolic blood pressure (SBP), diastolic blood pressure (DBP), pulse pressure (PP), and mean arterial pressure (MAP) were assessed before and after the intervention.

**7.1 Mechanism of Primary Hypertension**

Primary (essential) hypertension mainly develops due to a complex interaction of genetic, environmental, neural, hormonal, and lifestyle factors. The exact cause remains unknown; however, several pathophysiological mechanisms have been identified.

One of the major mechanisms is **increased sympathetic nervous system activity**, which leads to increased heart rate, cardiac output, and peripheral vascular resistance. Chronic activation of the sympathetic nervous system also stimulates the release of catecholamines (adrenaline and noradrenaline), causing vasoconstriction and sustained elevation of blood pressure(6,37). In addition, activation of the **renin–angiotensin–aldosterone system (RAAS)** increases angiotensin II production, resulting in vasoconstriction and aldosterone-mediated sodium and water retention, both of which contribute to elevated blood pressure (6,38).

The hypothalamic-pituitary-adrenal (HPA) axis is activated by long-term psychological stress, which increases the release of cortisol, corticotropin-releasing hormone (CRH), and adrenocorticotropic hormone (ACTH). Long-term cortisol rise increases vascular reactivity, increases sympathetic nervous system activity, encourages salt retention, and aids in the onset and maintenance of hypertension. (39–41).

**7.2. Effect of Cyclic Meditation on Systolic Blood Pressure**

The present study demonstrated a significant reduction in systolic blood pressure in the study group from 163.7 ± 9.95 mmHg to 140.7 ± 10.01 mmHg ($p < 0.001$), whereas no significant change was observed in the control group.

The present study showed a significant reduction in systolic blood pressure following the practice of Cyclic Meditation. Elevated systolic blood pressure in individuals with hypertension is often associated with increased sympathetic nervous system activity, endothelial dysfunction, and chronic psychological stress. Cyclic Meditation combines yogic postures with guided relaxation and mindful awareness, which may help reduce sympathetic nervous system activity while enhancing parasympathetic activity. This improvement in autonomic balance is likely to have contributed to the significant reduction in systolic blood pressure observed in the present study. (21,22).

Similar findings have been reported by Cramer et al., who concluded that yoga interventions significantly reduce systolic blood pressure through improvements in autonomic regulation and stress reduction (14). Posadzki et al. also reported significant antihypertensive effects of yoga-based interventions in patients with hypertension(15). (Cramer, 2016; Posadzki et al., 2014). Similarly, Xin et al. (2026) reported that yoga and mind-body therapies significantly lower systolic blood pressure in hypertensive individuals through relaxation and improved vascular function.(13)

**7.3. Effect of Cyclic Meditation on Diastolic Blood Pressure**

The present study demonstrated a significant reduction in diastolic blood pressure from 99.7 ± 6.56 mmHg to 92.0 ± 6.21 mmHg ($p < 0.001$) following the intervention. No significant changes were observed in the control group.

Diastolic blood pressure is primarily influenced by peripheral vascular resistance and autonomic nervous system activity. Previous studies reported that practice of CM could significantly reduce stress by shifting the sympatho-vagal balance in favor of parasympa thetic dominance(42,43). This may reduce catecholamine secretion and sympathetic overactivity, resulting in decreased vascular resistance and

lower diastolic blood pressure(16,19).

These findings are supported by Patel et al. (2025), who reported significant reductions in blood pressure following guided meditation due to enhanced vagal tone and improved autonomic balance(19). Goyal et al. reported that meditation practices effectively reduce psychological stress and improve emotional regulation, which may indirectly contribute to blood pressure reduction(16). Furthermore, Yang et al. demonstrated that meditation-based interventions significantly improve blood pressure control among hypertensive individuals(1).

**7.4 Effect of Cyclic Meditation on Pulse Pressure**

In the present study, pulse pressure showed a statistically significant reduction from 64.0 ± 9.08 mmHg at baseline to 48.7 ± 9.12 mmHg after two weeks of Cyclic Meditation practice ($p < 0.001$), whereas no significant change was observed in the control group. Pulse pressure is defined as the difference between systolic blood pressure and diastolic blood pressure and is considered an important indicator of arterial stiffness and cardiovascular risk. Increased pulse pressure reflects reduced elasticity of large arteries and is associated with adverse cardiovascular outcomes such as coronary artery disease, stroke, left ventricular hypertrophy, and cardiovascular mortality. Therefore, the significant reduction in pulse pressure observed in the present study suggests an improvement in vascular health and cardiovascular function among primary hypertensive individuals(44,45).

Arterial stiffness is one of the major pathophysiological changes observed in hypertension. Chronic elevation of blood pressure causes structural and functional changes in the arterial wall, including endothelial dysfunction, collagen deposition, reduced elastin content, and increased vascular resistance. These changes reduce the ability of arteries to expand during systole and recoil during diastole, resulting in elevated pulse pressure. The reduction in pulse pressure observed following Cyclic Meditation may indicate improved arterial compliance and restoration of vascular elasticity. Such improvements may contribute to reduced cardiovascular workload and better long-term cardiovascular outcomes(45,46).

One possible mechanism responsible for the reduction in pulse pressure is autonomic nervous system modulation. Hypertensive individuals often exhibit increased sympathetic nervous system activity and reduced parasympathetic activity. Excessive sympathetic stimulation causes vasoconstriction, increased peripheral resistance, and reduced arterial compliance. Cyclic Meditation is a unique yogic relaxation technique that combines physical postures, relaxation, breathing awareness, and meditation. Previous studies have shown that Cyclic Meditation decreases sympathetic activity and enhances parasympathetic dominance. Enhanced parasympathetic activity promotes vascular relaxation and improves arterial flexibility, which may contribute to the reduction in pulse pressure observed in the present study(21,22).

Another possible mechanism is the reduction of psychological stress and hypothalamic-pituitary-adrenal (HPA) axis activation. Chronic stress increases the secretion of cortisol, adrenaline, and noradrenaline, which contribute to endothelial dysfunction, vascular constriction, and increased arterial stiffness. Cyclic Meditation has been shown to reduce stress, anxiety, and autonomic arousal, thereby lowering stress hormone secretion. Reduced circulating stress hormones improve vascular tone and endothelial function, leading to enhanced arterial compliance and lower pulse pressure.(16,19). (Goyal et al., 2014; Patel et al., 2025)

The findings of the present study are supported by previous research demonstrating beneficial cardiovascular effects of yoga and meditation. Brook et al. reported that mind-body interventions improve endothelial function, reduce sympathetic activation, and enhance vascular health. Cramer et al. concluded that yoga-based interventions significantly improve cardiovascular risk factors through

autonomic regulation and stress reduction. Furthermore, Xin et al. reported that yoga and mind-body therapies effectively reduce blood pressure and improve vascular function among hypertensive individuals. The reduction in pulse pressure observed in the present study is consistent with these findings and indicates that Cyclic Meditation may improve arterial elasticity and reduce cardiovascular risk among primary hypertensive patients. (13,14,47). (Brook et al., 2013; Cramer, 2016; Xin et al., 2026)

Therefore, the significant reduction in pulse pressure observed in the present study may be attributed to a combination of autonomic balancing, stress reduction, improved endothelial function, enhanced arterial compliance, and reduced vascular resistance. These physiological adaptations may not only improve blood pressure regulation but may also decrease the risk of future cardiovascular complications. Hence, Cyclic Meditation may serve as a valuable complementary therapy in the management of primary hypertension and associated cardiovascular risk factors.

**7.5 Effect of Cyclic Meditation on Mean Arterial Pressure**

The present study demonstrated a statistically significant reduction in mean arterial pressure (MAP) from 121.0 ± 6.59 mmHg to 108.2 ± 6.38 mmHg ($p < 0.001$) following two weeks of Cyclic Meditation practice. In contrast, no significant change was observed in the control group. Mean arterial pressure represents the average pressure within the arterial system during a complete cardiac cycle and is considered an important determinant of tissue perfusion and organ blood flow. Maintenance of an optimal MAP is essential for ensuring adequate perfusion of vital organs such as the heart, brain, and kidneys. Elevated MAP is commonly observed in hypertensive individuals and is associated with increased cardiovascular workload and a higher risk of target organ damage in hypertensive individuals(6,36).

The significant reduction in MAP observed in the present study may be attributed to improvements in autonomic nervous system regulation induced by Cyclic Meditation. Hypertension is characterized by increased sympathetic nervous system activity and impaired parasympathetic function, resulting in vasoconstriction, increased heart rate, and elevated arterial pressure. Meditation-based interventions have been shown to restore autonomic balance by reducing sympathetic discharge and enhancing vagal activity. Improved autonomic regulation reduces peripheral vascular resistance and cardiac workload, thereby contributing to a decrease in mean arterial pressure (47,48).

The significant reduction in MAP observed in the present study may be attributed to the combined reduction in systolic and diastolic blood pressure following Cyclic Meditation. Since MAP is primarily influenced by cardiac output and peripheral vascular resistance, any intervention capable of reducing sympathetic activity and vascular resistance may contribute to lowering MAP. Cyclic Meditation involves a combination of physical postures, relaxation techniques, breathing awareness, and meditation, which together induce a state of deep psychophysiological relaxation. This relaxation response may reduce peripheral vascular resistance and improve cardiovascular efficiency, thereby lowering mean arterial pressure(14,47).

Autonomic nervous system modulation appears to be one of the major mechanisms underlying the reduction in MAP. Hypertensive individuals commonly exhibit increased sympathetic nervous system activity and reduced parasympathetic activity, resulting in vasoconstriction, elevated heart rate, and increased arterial pressure. Previous studies on Cyclic Meditation have demonstrated increased parasympathetic dominance and reduced sympathetic activation, as evidenced by improvements in heart rate variability. Enhanced parasympathetic activity promotes vasodilation and improves cardiovascular regulation, leading to reductions in both blood pressure and mean arterial pressure(21,22).

Another possible mechanism involves the reduction of psychological stress. Chronic stress activates the hypothalamic-pituitary-adrenal axis and sympathetic-adrenal-medullary system, leading to increased secretion of cortisol, adrenaline, and noradrenaline. These neurohormonal changes promote vasoconstriction, endothelial dysfunction, and sustained elevation of blood pressure. Cyclic Meditation incorporates relaxation, mindfulness, and awareness practices that may attenuate stress responses and reduce neuroendocrine activation. Consequently, reduced stress hormone levels may contribute to lower vascular resistance and improved cardiovascular regulation, resulting in decreased MAP(16,19,49,50).

The findings of the present study are consistent with previous reports indicating beneficial cardiovascular effects of yoga and meditation. Cramer et al. reported significant reductions in blood pressure among hypertensive individuals following yoga-based interventions. Similarly, Brook et al. concluded that mind-body therapies improve autonomic balance, vascular function, and cardiovascular health. Therefore, the reduction in MAP observed in the present study may reflect improved cardiovascular regulation, enhanced tissue perfusion efficiency, and reduced cardiovascular risk among individuals with primary hypertension(14,47).

Therefore, the significant reduction in mean arterial pressure observed in the present study suggests that Cyclic Meditation may improve cardiovascular function through autonomic regulation, stress reduction, improved vascular compliance, and reduced peripheral vascular resistance. These beneficial effects support the role of Cyclic Meditation as a complementary therapeutic approach in the management of primary hypertension.

**a) Strengths of the study:**

- There were no adverse effects observed during the study.
- Randomization of the groups was done.
- Though there are studies on cyclic meditation, there are not many studies on cyclic meditation on primary hypertensive individuals.
- Assessment of Multiple Cardiovascular Parameters
- Standardized and Structured Intervention
- Cost-effective and convenient to practice.
- Clinically relevant population of primary hypertensive individuals.
- Simple intervention that can be incorporated into routine hypertension management.
- No Dropouts.

**b) Limitations of the Study**

- Small sample size limits generalizability.
- Short intervention duration (2 weeks).
- Concurrent use of antihypertensive medications, making it difficult to determine the independent effect of Cyclic Meditation.
- Lack of follow-up phase to assess retention of effects.
- Lifestyle factors such as dietary habits, sleep quality, physical activity, occupational stress, and daily routine were not strictly controlled and may have influenced the study outcomes.
- The study population was restricted to individuals aged 25–50 years; therefore, the findings may not be directly applicable to elderly hypertensive patients or other age groups.

**c) Future discussion**

- Larger sample sizes and longer follow-up durations.

- Studies with longer intervention durations with long-term follow-up assessments
- Additional physiological parameters such as heart rate variability, autonomic function tests, serum cortisol, inflammatory markers, and endothelial function
- Studies may be conducted in different populations, including elderly hypertensive individuals, patients with resistant hypertension, and individuals with associated comorbidities such as diabetes mellitus, obesity, and cardiovascular diseases.
- The effect of Cyclic Meditation on medication requirements may be explored.

**8.0 Conclusion**

This randomized controlled trial evaluated the effects of Cyclic Meditation on blood pressure parameters in individuals with primary hypertension. After two weeks, participants practicing Cyclic Meditation showed significant reductions in systolic and diastolic blood pressure, pulse pressure, and mean arterial pressure, unlike the control group.

These improvements suggest enhanced cardiovascular regulation, likely due to better autonomic balance, reduced stress, and improved vascular function. Cyclic Meditation appears to be a safe, simple, and cost-effective complementary therapy that can support conventional hypertension management.

Despite the study's short duration and small sample size, the findings are promising. Further research with larger samples and longer follow-up is needed.

Overall, Cyclic Meditation may be an effective addition to routine care for improving cardiovascular health in individuals with primary hypertension.

**9.0 SUMMARY**

Hypertension is one of the most prevalent non-communicable diseases and a leading cause of cardiovascular morbidity and mortality worldwide. It is characterized by persistent elevation of arterial blood pressure and is recognized as a major risk factor for coronary artery disease, stroke, heart failure, chronic kidney disease, and premature death. Despite the availability of effective pharmacological therapies, achieving optimal blood pressure control remains a significant challenge because of poor adherence, adverse drug effects, and persistent psychosocial stress. Consequently, complementary and integrative approaches such as yoga and meditation have gained increasing attention as adjunctive therapies in the management of hypertension.

Cyclic Meditation (CM) is a unique yoga-based moving meditation technique developed by Dr. H. R. Nagendra based on the principles of the *Mandukya Karika*. It consists of a sequence of yogic postures interspersed with guided relaxation and awareness practices, producing a harmonious balance between physical activity and mental relaxation. Previous scientific studies have demonstrated that Cyclic Meditation improves autonomic nervous system balance, reduces sympathetic activity, enhances parasympathetic dominance, decreases stress and anxiety, improves heart rate variability, and promotes cardiovascular relaxation. However, only limited evidence is available regarding its therapeutic efficacy in individuals with primary hypertension. Therefore, the present study was undertaken to evaluate the effect of Cyclic Meditation on blood pressure parameters in primary hypertensive individuals.

The study was conducted with the aim of evaluating the effect of Cyclic Meditation on individuals with primary hypertension. The specific objectives were to assess its effect on SBP, DBP, PP, and MAP. A randomized controlled trial design was adopted for the study. Sixty participants diagnosed with primary hypertension and aged between 25 and 50 years were

recruited based on the predefined inclusion and exclusion criteria. After obtaining written informed consent, participants were randomly allocated into a study group (n = 30) and a control group (n = 30). The study group practiced Cyclic Meditation for 30 minutes per session, five days per week for a period of two weeks, while the control group continued their routine antihypertensive medication without any yoga intervention. Blood pressure was measured using a standard sphygmomanometer, while pulse pressure and mean arterial pressure were calculated using standard formulas. Pre- and post-intervention assessments were recorded, and the collected data were analyzed using Jamovi statistical software.

The demographic characteristics revealed that both groups were comparable with respect to age and gender distribution. Baseline comparison demonstrated no statistically significant differences between the study and control groups in SBP, DBP, PP, and MAP, indicating that randomization was successful and both groups were comparable before the intervention.

Within-group analysis revealed a statistically significant reduction in all cardiovascular parameters in the study group following the Cyclic Meditation intervention. Significant reductions were observed in systolic blood pressure, diastolic blood pressure, pulse pressure, and mean arterial pressure ($p < 0.001$). In contrast, the control group did not demonstrate statistically significant changes in any of the measured parameters.

Between-group comparison showed no statistically significant differences between the groups at baseline. However, after completion of the intervention, the study group demonstrated significantly lower SBP, DBP, PP, and MAP compared to the control group, indicating the beneficial effect of Cyclic Meditation in improving cardiovascular parameters among individuals with primary hypertension.

The findings of the present study suggest that the antihypertensive effects of Cyclic Meditation may be mediated through several physiological mechanisms. The practice promotes autonomic nervous system balance by reducing sympathetic activity and enhancing parasympathetic dominance. It also decreases psychological stress, reduces activation of the hypothalamic-pituitary-adrenal axis, lowers the secretion of stress hormones such as cortisol and catecholamines, improves endothelial function, promotes vasodilation, decreases peripheral vascular resistance, and enhances cardiovascular efficiency. These physiological adaptations collectively contribute to improved regulation of blood pressure and cardiovascular functions.

The study possesses several strengths, including its randomized controlled design, use of a standardized Cyclic Meditation protocol, and comprehensive assessment of multiple cardiovascular parameters. However, certain limitations should also be acknowledged. The study was conducted with a relatively small sample size, the intervention duration was limited to two weeks, long-term follow-up was not performed, and participants continued their prescribed antihypertensive medications during the study period.

Based on the findings of the present study, future research with larger sample sizes, longer intervention periods, and assessment of additional physiological markers such as heart rate variability, cortisol levels, endothelial function, and inflammatory biomarkers is recommended to further establish the therapeutic role of Cyclic Meditation in hypertension management.

In conclusion, the present randomized controlled trial demonstrated that Cyclic Meditation significantly reduced systolic blood pressure, diastolic blood pressure, pulse pressure, and mean arterial pressure among individuals with primary hypertension. The findings suggest that Cyclic Meditation is a safe, feasible, cost-effective, and effective complementary therapeutic intervention that can be incorporated alongside conventional medical management to improve cardiovascular health and assist in the comprehensive

management of primary hypertension.

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