

YOGIC PREVENTION OF HYPERTENSION: A SYSTEMATIC REVIEW**NityaSharma¹, Dr.Shraddha Solanky²**¹*Ph.D. Research Scholar, Eklavya University, Damoh, Madhya Pradesh*²*Assistant Professor, Eklavya University, Damoh, Madhya Pradesh***Abstract**

With worldwide high prevalence and as a serious health problem, Hypertension means that due to some reason like unbalanced dietary habits, irregular routine etc. the heart has to work harder to maintain a constant flow of blood through the arteries. Apart from affecting the health of the person suffering from this problem, it also has harmful effects on other systems and organs of the body. Mainly the problem of persistent high blood pressure is a risk factor for heart related diseases as well as for heart attack. The World Health Organization has identified Hypertension as a major risk factor for cardiovascular death and premature death. Thus, in the present times, Yogic therapy is gaining immense popularity for effective and natural treatment of this Hypertension problem without any side effects. Therefore, the main objective of the present research work is to comprehensively review the scientific research works related to the efficacy of yogic therapy in the management of hypertension and its risk factors. Therefore, under the presented research work, the researcher conducted a ambient literature search related to the research topic through electronic databases such as PubMed, BMC Public Health, Biomedcentral, Springnature, National Library of Medicine, ScienceDirect, Elsevier, EBSCO's, ProQuest etc. A total of 403 latest articles published since 2013 were screened and 18 applicable articles were reported which met the inclusion and exclusion criteria using PICO method. Also the articles were selected on the basis of PRISMA flow diagram. Thus, this review study concludes that yoga intervention may be the best adjunctive approach to get natural relief from the problem of hypertension by managing the risk factors of hypertension. However, these review studies lacked standard sample size, heterogeneity, and short experimental duration of yoga interventions, as well as a clear elucidation of the mechanisms underlying the efficacy of different types of yoga on hypertension prevention. Therefore, future studies need to be conducted to explore the efficacy of yoga in the management of hypertension.

INTRODUCTION

The percentage of hypertension prevalence data currently reported by the World Health Organization (Mercado-Asis, et al., 2023; Koya, et al., 2023) indicates that, despite the scientific research on hypertension over the past several decades and the availability of sustainable therapeutic strategies for hypertension, hypertension continues to be a common and difficult problem among the general public. Currently, the prevalence of hypertension among adults is approximately 1.28 billion, in two-thirds of the world's middle- to low-income countries (W.H.O., 2021). According to a scientific report published in 2019 with special reference to Indian adults, almost 1 in 3 adults were found to suffer from hypertension (Ramakrishnan, et al., 2019; Gupta, et al., 2020). This can negatively harm a person's health as a 'silent killer'. With worldwide high prevalence and as a serious health problem, Hypertension means that due to some reason like unbalanced dietary habits, irregular routine

etc. the heart has to work harder to maintain a constant flow of blood through the arteries. Apart from affecting the health of the person suffering from this problem, it also has harmful effects on other systems and organs of the body. Mainly the problem of persistent Hypertension is a risk factor for heart related diseases as well as for heart attack. The World Health Organization has identified Hypertension as a major risk factor for cardiovascular death and premature death. However, it may be possible to prevent the problem of Hypertension by managing its risk factors.

At present, many types of allopathic medicines are available for the treatment of Hypertension. But if a person changes his lifestyle to prevent hypertension, then a systematic lifestyle has been found to be able to reduce the risk of hypertension and thus primary prevention of hypertension and better management of its risk factors can be done naturally without side effects (Anjana, et al., 2022). Yoga as a prime lifestyle-based psycho-physiological practice has its origins in Indian philosophy and currently evidence from scientific clinical trials is also demonstrating significant antihypertensive effects of a yogic lifestyle. Evidence from several clinical and non-clinical research studies concerning the effects of yoga interventions on life-threatening diseases such as Hypertension suggests that yogic lifestyle-based interventions can reduce hypertension and potentially prevent it.

Although various review articles are already available on the effectiveness of yogic interventions in the management of hypertension, these articles lack a clear comprehensive review of the detailed role of yoga exercises on all aspects of hypertension (Mooventhana, & Nivethitha, 2020). Thus, the present review study aimed to comprehensively elucidate the scholarly evidence-based role of yogic interventions in the prevention of hypertension by management of its risk factors.

METHODS:

For the present study, a systematic review was conducted by the researcher by selecting the research studies on the basis of scientific research methodology "PICO Standard 15 as an auxiliary guideline". Prior to evaluation by PICO, all manuscripts initially considered relevant by title and summary were suitable for inclusion. The methodology of the presented review study in accordance with the appropriate PICO guidelines is as follows;

P (population): Hypertensive patients aged 25 and above, including both genders.

I (intervention): Yogic based lifestyle interventions.

C (comparison): Includes studies comparing hypertensive patients who practice yoga versus hypertensive patients who do not practice yoga.

O (outcome): The impact of yogic intervention on Hypertension.

Inclusion and Exclusion Criteria:

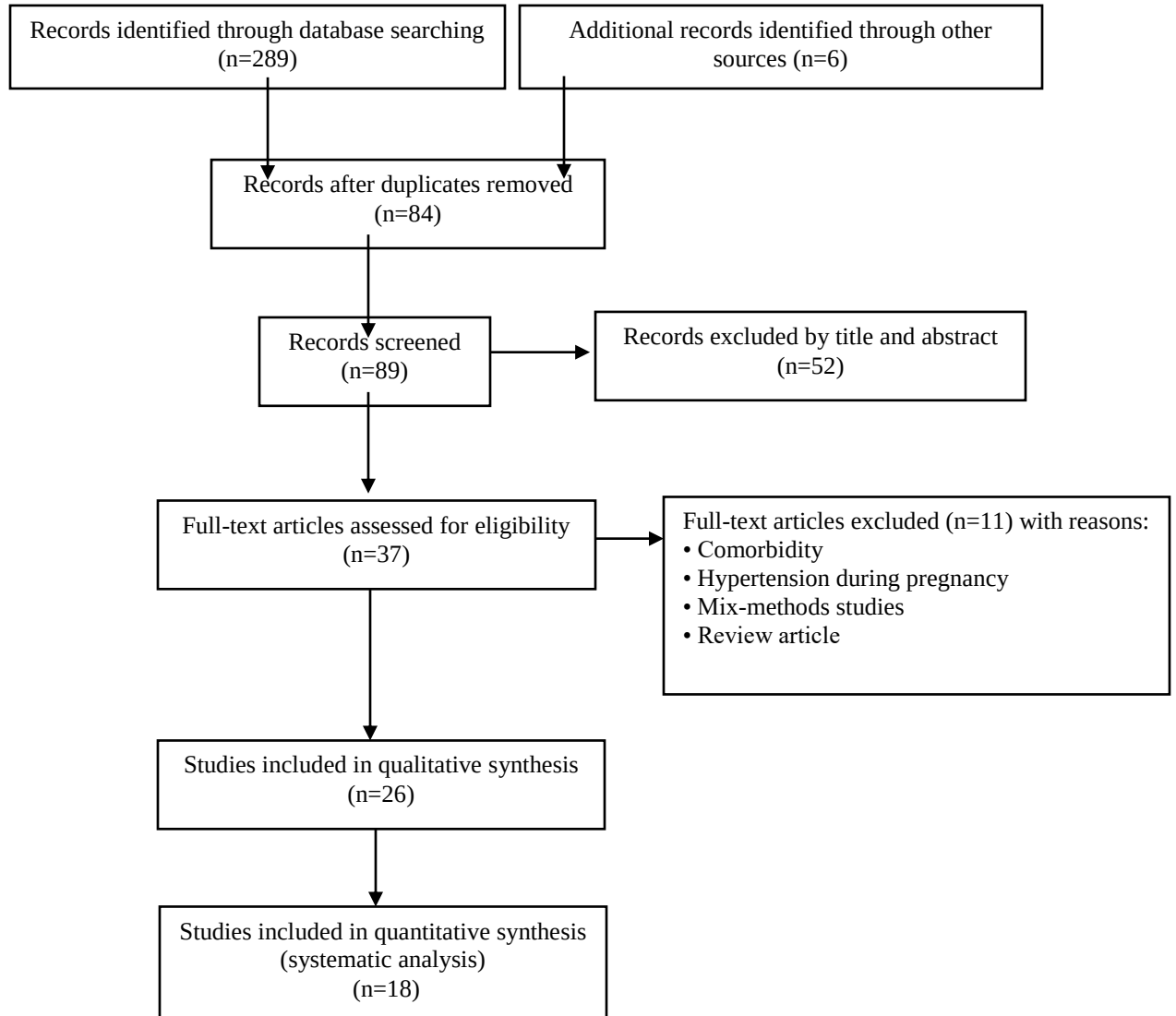
All Hypertensive patients aged 25 and above were selected in this study. No studies were selected for this research that included a sample where there were pregnant women or such samples that were not able to practice yoga for any other reason. In the present study, only quantitative studies and a case study were included for review. Also, researches that explain the effects of yoga on Hypertension with a qualitative method, only abstract, letters, review papers published in more than one place, longitudinal studies have been excluded from this study. The Inclusion and exclusion criteria for this study are shown in Table 1.

Table 1: *Inclusion and Exclusion Criteria*

	<i>Inclusion criteria</i>	<i>Exclusion criteria</i>
Population (P)	Hypertensive patients aged 25 and above	Hypertensive patients during pregnancy
Intervention/ exposure(I)	Only qualitative studies and yoga based interventions	Review (systematic review; meta-analysis), longitudinal study (follow-up study or retrospective study), only abstract, letters
Comparison (C)	Contain experimental and controlled groups	Theoretical studies
Outcome (O)	The result elaborated on the effect of yoga on Hypertension	-
Other	published research articles from 2012 to 2022	Research papers written in a language other than the English language

RESULTS***Selection of studies:***

Therefore, under the presented research work, the researcher conducted a ambient literature search related to the research topic through standard electronic databases such as PubMed, BMC Public Health, Biomedcentral, Springnature, National Library of Medicine, ScienceDirect, Elsevier, EBSCO's, ProQuest etc. The following key words were used to select the thesis; 'Yoga for Hypertension', 'Yoga Therapy for Management of Hypertension', 'Yogic Interventions for Hypertension' etc. A total of 289 latest articles published since 2012 were screened and 18 applicable articles were reported which met the inclusion and exclusion criteria using PICO method. Also the articles were selected on the basis of PRISMA procedure. Subsequently, all previous studies compiled for review were filtered in a phased manner. For filtering, the characteristics of the samples, the research methods used were first ascertained based on the title and summary of the study. In this way, after checking the title and summary of all previously selected research studies, each article was thoroughly studied and reviewed. Thereafter, each article was screened based on the above exclusion and inclusion criteria. Ultimately, based on the above investigations, a total of 18 studies were included for review in the present study. The steps of the study selection process described above are clearly and systematically described through Figure-1.

Figure 1: Study Selection Process (PRISMA flow diagram)**Characteristics of Included Studies:**

A brief description of the 18 previously published research articles included for the present review study is described in Table 3. Of the total 18 articles selected for the present research work, the number of samples included in these quantitative studies is approximately 3,128 between the ages of 25 years and above. Based on the eligibility criteria, all these studies are of qualitative research nature. These studies have used various yogic practices as yogic intervention for the management of hypertension. These yogic practices include pranayama (Sheetali, Sitkari, Bhramari, Chandra-nadi and Anuloma-viloma, Nadishuddhi pranayama), asanas (Surya Namaskar, savasana, setu-bandhasarvangasana, paschimottanasana,

adhomukhasvanasana), meditation, and ‘OM’ meditation, relaxation practices, yoga nidra and special yoga packages in the form of yoga therapy. The duration of these yogic interventions useful for the management of hypertension ranged from a minimum of 9 days to a maximum of 12 weeks and 3 months and the maximum time limit for yoga practice was between 5 minutes to 1 hour on weekly or monthly basis. All these researches selected for the present review study were published in indexed journals in high quality database between 2012-2022, as well as articles published in the years 2020, 2021, 2022, 2019, 2016, 2015, 2013, 2012 respectively are 5, 2, 1, 5, 2, 1, 1, 1 in numbers. Review studies include experimental and control group studies, comparative studies, randomized control trial studies, single group longitudinal studies, mixed method studies. The following scales were used in these studies to measure the effects of yoga on Hypertension; “Linear mixed-effects models, Mixed effects logistic regression models, perceived stress scale, automatic blood pressure monitor, heart rate (HR) and blood pressure (BP) measurements using non-invasive semi-automatic BP monitor, Mercury sphygmomanometer, stethoscope, and Pulse oximeter, Blood pressure measurements, cardiac and respiratory rate, cardio-metabolic risk factors: SBP, DBP, weight, BMI, waist circumference (WC), hip circumference (HC), waist-hip ratio (WHR), fasting plasma glucose (FPG), serum lipid profile and adipocytokines (plasma leptin and adiponectin levels).

Table 3: The details of selected studies

Sl. no.	Study	Participants	Intervention method	Duration	Study design	Out-come	Measurements to estimate the effect of yoga on Hypertension
1	Penrod, N. M., & Moore, J. H. (2022)	1815 records	Yoga	one time/week	A retrospective, observational case-control study	P.S.E.	Linear mixed-effects models, Mixed effects logistic regression models
2	Hadaye, R. S., Shastri, S., & Salagre, S. (2021)	145 patients (73: 72 in Yoga group and control group) (25 years and above)	Yoga intervention (selected asanas, dhyan, and pranayama)	20–30 min./week for 4 months	an experimental study design with open-label, two-armed, non-randomized controlled trial,	P.S.E.	using 10 items five-point Likert perceived stress scale
3	Jerusha Santa Packyanathan, S. P. (2020)	45 hypertensive patients between (30–60 years)	Yoga (Asanas, Pranayamas, and Savasana)	-	-	P.S.E.	automatic blood pressure monitor
4	Vaghela, N., et al., (2019)	200 patients (51–70 years)	Yoga (pranayama and savasana, followed by	yoga asanas for the mean duration	A cross-sectional descriptive study and	P.S.E.	questionnaire

			setubandhasarva ngasana, paschimottanasa na, balasana and adhomukhasvan asana)	of 13 minutes	convenience sampling		
5	Majumdar, R., et al., (2019)	above 60 years	pranayama module (20:20 rounds of Sitkari and Anuloma- viloma Pranayama, Shavasana)	1 hour/day for 3 months	an experimental study design	P.S.E.	Qualitative analysis
6	Sharma, A., et al., (2016)	100 patients (30-70 yrs.)	Nadishuddhi pranayama	daily for one month		P.S.E.	Patients were assessed on parameters such as Blood pressure, Headache, Palpitation, Dizziness, Nervousness, Fatigue, Insomnia and Breathlessness.
7	Thanalaks hmi, J., (2020)	100 patients (50:50= control and Intervention group)	Sheetali pranaya ma	for a period of 3 months	randomized control trial	P.S.E.	Blood pressure and HRV was assessed
8	Sathe, S., et al., (2020)	40 participants (20:20 in control and Intervention group)	Bhramari pranayama	for 5 minutes	Randomized control trial	P.S.E.	Pre and immediate post- intervention scores
9	Misra, S., et al., (2019)	uncontrolled hypertensive patients (n = 133) mean age of 61 years (in-class instruction (n = 44), DVD/YouTu be group (n = 57), or control (n = 32)	yogic breathing exercises	15 min for 5 times a week	3-arm randomized controlled blood pressure trial	P.S.E.	Blood pressure measurements
10	Gadham, J., Sajja,	50 male subjects (	Yoga intervention	a period of 3	Experimental study	P.S.E.	BP, BMI and lipid profile was

	S., &Rooha, V. (2015)	35-55 years)	(pranayama and other Asana's)	months			estimated
11	Bhavanani, A. B., & Sanjay, Z. (2012)	22 patients of essential Hypertension	Chandra-nadi pranayama	regularity of 6 breaths/ min 27 rounds	a pilot study	P.S.E.	heart rate and blood pressure measurements using non-invasive semi-automatic BP monitor
12	Jain, P. K., et al., (2019)	50 patients (30-45 years)	Pranayamas namely anulomaviloma and Bhramari, Surya Namaskar, Chandra nadi Pranayama, Shavasana, and 'OM' meditation	40 days		P.S.E.	Heart rate, Bloodpressure
13	PS, S., &Jawadagi, S. (2019)	60 hypertensive patients (Old Age)	Pranayama (Alternative Nostril Breathing)	5-15 minutes		P.S.E.	baseline record (which served as control) of pulse rate/min, systolic blood pressure (mmHg), diastolic blood pressure (mmHg) respiration were recorded
14	Sankar, U. G., &Monisha, R. (2020)	100 patients (ages 40-50 years)	pranayama	4 weeks	Experimental study	P.S.E.	Mercury sphygmomanometer, stethoscope, and Pulse oximeter
15	Mizuno, J., &Monteiro, H. L. (2013)	33 (16:17 in control and yoga group)	yoga exercises	4 months	quasi-experimental study	P.S.E.	Blood pressure measurements, cardiac and respiratory rate
16	Yadav, R., et al., (2016)	-	yoga-based lifestyle intervention (<i>asanas, pranayama</i> , relaxation techniques)	2 hrs./day for 12 week	single arm, lifestyle intervention study	P.S.E.	cardio-metabolic risk factors: SBP, DBP, weight, BMI, waist circumference (WC), hip circumference (HC), waist-hip ratio (WHR), fasting plasma

							glucose (FPG), serum lipid profile and adipocytokines (plasma leptin and adiponectin levels)
17	Hadaye, R. S., Shastri, S., & Salagre, S. (2021)	145 patients (73: 72 in intervention group and control group)	yoga intervention	4 months on a weekly basis	open-label, two-armed, non-randomized controlled trial,	P.S.E.	perceived stress score and blood pressure
18	Subha, M., & Murugesan, S. (2020)	30 Hypertensive women (35-45 years)	Yogic practice	60 minutes, 6 days a week for a total period of 8 weeks	Experimental study	P.S.E.	LDL and HDL monitor

Note: P.S.E.= Positive Significant Effect

Effects of Yoga on Hypertension:

By making positive lifestyle changes through the practice of yoga, a person can keep himself away from health problems like Hypertension. Nevertheless, if a person is suffering from Hypertension, its prevention can also be possible with regular yoga practice (Penrod, & Moore, 2022; Hadaye, Shastri, & Salagre, 2021; Dhungana, et al., 2018; Jerusha Santa Packyanathan, 2020; Moovenanthan, & Nivethitha, 2020; Vaghela, et al., 2019). From the present review study it was found that; the utilization of selected yogic exercises as an intervention by patients suffering from the problem of hypertension can be helpful in overcoming this problem as well as improving their health. With special reference to the control of hypertension by the practice of pranayama, it was found that; The problem of high blood pressure can be controlled by the practice of Pranayama daily. For this, in a research study conducted by researcher Majumdar and colleagues (2019), taking an experimental group of patients above 60 years of age with mild hypertension and practicing pranayama for 1 hour/day for 3 months, it was found that pranayama can control hypertension and also, doing pranayama calms the mind and relieves stress. Similarly, the results of previous conducted studies on the effects of different pranayama techniques on hypertension were promising and significantly observed that nadishodhana pranayama and cooling effects pranayamas especially Sheetali, Shitkari and Chandranadi pranayama can be very beneficial for controlling Hypertension (PS, & Javadgi, 2019; Sharma, et. al., 2016; Thanalakshmi, et al., 2020; Sankar & Monisha, 2020; Bhavanani, & Sanjay, 2012). In another important randomized control trial study, to investigate the association between Bhramari Pranayama and hypertension, a total of 40 participants were divided into two groups, and the experimental groups were asked to practice Bhramari Pranayama daily for duration of 5

minutes. As a result, the practice of Bhramari Pranayama was found to reduce the risk of hypertension by managing stress (Sathe, et. al., 2020). In another 3-arm randomized controlled blood pressure trial, which studied the effects of compound breathing on 133 hypertensive patients, hypertension was found to be controlled. In addition, it was also found that breathing exercises can also be helpful in reducing the use of high blood pressure drugs while acting as an antihypertensive practices (Misra, et. al., 2019). Similarly, studies involving the combined practice of asanas and pranayama under a combined form of yoga practice also show positive significant results that the combined practice of asanas and pranayama can be effective in normalizing blood pressure. Consequently, this research further indicates that patients with Hypertension should continue to practice yoga regularly (Gadham, Sajja, & Rooha, 2015; Mizuno, & Monteiro, 2013). Along with this, yoga-based lifestyle intervention based research has also revealed that it can be helpful in preventing problems like high blood pressure by keeping the functions of the heart smoothly as well as strengthening the functionality of the heart (Yadav, et. al., 2016). Similarly, if hypertensive patients take a balanced diet along with yogic exercises, it can be beneficial in curing hypertension as an adjunct therapy (Hadaye, Shastri, & Salagre, 2021).

DISCUSSION

Based on the latest statistics published by the World Health Organisation, it can be inferred that the problem of Hypertension, which is spreading rapidly all over the world, is affecting the population of India as well. This problem of high blood pressure has become a major risk factor for heart diseases today (Franklin, & Wong, 2013). Despite the availability of several allopathic medicines to get rid of the problem of Hypertension, more and more people are turning to lifestyle modification based measures for a permanent solution to the problem. Yoga is becoming one of the most popular interventions among the general public for reducing the risk factors of hypertension and prevention of hypertension under lifestyle modification based interventions.

In this context the contemporary review summarizes and elucidates the findings of almost published studies on role of selected yoga practices, dietary intake, lifestyle modification etc. for the prevention of hypertension and its associated risk symptoms. Yoga-based lifestyle interventions along with selected asanas and pranayamas have been given prominence in these yogic practices suitable for prevention and control of hypertension. Some research has also presented a combined effect of asanas and pranayamas, providing evidence that the combined practice of selected asanas and pranayamas can be very useful for normalizing blood pressure and for mental peace. The review study also presents an interesting fact that regular practice of only selected pranayamas such as Sheetali, Sheetakari, Barmari and Nadishodhan Pranayama keeps a person stays away from diseases like Hypertension. Similarly, the practice of meditation along with yogic relaxation techniques has a significant effect on the mental risk factors of hypertension. Maintaining the health of the heart by following a yogic aahar-vihaar has also provided positive energy and enthusiasm to the person.

Thus, yoga practice has an important role in the management of hypertension with antihypertensive benefits. This may be a strong explanation for the effects of yoga on Hypertension as the review presented supports the conclusion that yoga is positively effective

for Hypertension for 25 and above age group. Also, based on this contemporary review, it is clear that about 3 months of yoga practice can be really effective for the prevention of hypertension. Even when the duration of the yoga intervention in some studies was very short, the intervention showed beneficial results for Hypertension. The results of the review in relation to age suggest that the practice of yoga is helpful in the management of Hypertension in adults by managing its associated risk factor, mental regulation. Thus, the practice of yogic intervention can be suggested for the management of Hypertension in adults.

CONCLUSION

The main objective of the present research work is to comprehensively review the scientific research works related to the efficacy of yogic therapy in the management of hypertension and its risk factors. It is concluded from the present review study that; yoga based lifestyle intervention is a very effective method for management, prevention and treatment of hypertension, and it can be less expensive, completely safe, and best intervention without any other side effects. At the same time, by reducing the stress level of the person affected by the problem of hypertension, the use of yogic intervention gives mental peace. In this way, a person suffering from the problem of high blood pressure can find a solution to this problem by including the above selected yoga exercises in his lifestyle daily. Along with these yogic practices, following a yogic aahar-vihaar can lead to a better lifestyle and overall health by staying away from harmful health problems like Hypertension.

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