

**THE ROLE OF LIFESTYLE CHANGES IN MANAGING HYPERTENSION**

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**ABSTRACT**

Numerous variables, such as excessive salt intake, obesity, chronic kidney disease, sleep apnea, thyroid Disorders, noise pollution, and some lifestyle factors like physical inactivity, and stress, cigarette's Smoking, excessive alcohol consumption, contribute to the development and progression of hypertension in elderly people, making it a major cardiovascular risk factor that increases morbidity and mortality in this population. For both non-hypertensive and hypertensive people, non-pharmacologic management also referred to as lifestyle modifications is fundamental. It can prevent the onset of hypertension in non-hypertensive or pre-hypertensive patients, and it will decrease blood pressure and improve cardiovascular problems in hypertensive individuals. Non-pharmacological management of hypertension has become a popular treatment option for the condition in both developed and developing nations. It also offers extra benefits with few to no adverse effects. Modifications in lifestyle that can effectively lower blood pressure include more physical activity, self-monitoring of blood pressure, losing weight, consuming less alcohol, and practising yoga for relaxation among others. Early in the development of the disease, non-pharmacological treatments should be started, and medication should be continued if necessary.

**Keywords:** Hypertension, Non-pharmacologic management, Lifestyle management, Blood pressure.

**INTRODUCTION**

Hypertension is an elevated blood pressure that has been assessed to be 140/90 millimetre of mercury (mmHg) or greater and results from a cardiovascular condition that increases the probability of mortality rates<sup>1</sup>. Hypertension has earned a track record as an unacknowledged killer as a consequence of its lack of presence of strong symptoms alongside the potential for lethal side effects<sup>8</sup>. The necessity of hypertension screening and treatment at an early stage cannot be overstated. The rise in the prevalence of high blood pressure in both industrialised and emerging nations is produced by a range of reasons. The advancing age of the population, dietary modifications, physical inactivity, a rise in body mass index (BMI), and excessive alcohol consumption are among the causes of these<sup>5</sup>. Hypertension can cause several diseases related to the kidney by damaging the blood vessels in the kidney. Kidney diseases such

as chronic kidney disease like hypertensive neuropathy and kidney failure are all led by high blood pressure <sup>2</sup>.

Hypertension is a commonly known problem which according to the statistics in 2023, affects 1.28 billion adults aged worldwide <sup>3</sup>. In contrast with people that have aged between 40-59 years 58%, and those older than 60 years 54%, only 35% of an adult in the U.S. have been diagnosed and treated with hypertension (blood pressure 140/90 mmHg) <sup>4</sup>.

Although children and adolescents have the lowest incidence of increased blood pressure in comparison to middle-aged adults and elderly individuals, promptly identifying and appropriate management of these cases may prevent adverse consequences over time <sup>8</sup>.

Furthermore, among young individuals, a trial of modifications to their lives rather than anti-hypertensive therapy frequently acts as the initial course of participation in the treatment of hypertension<sup>4</sup>. Clinical experience and observational research also demonstrated a relationship between a person's lifestyle choices and their chance of developing cardiovascular disease and death. According to newly available evidence, lifestyle modifications have the potential to reduce blood pressure and overall cardiovascular risk <sup>9</sup>. These modifications to your lifestyle consist of eating a nutritious diet (thereby reducing salt, sodium, and fat), altering your eating routine to include a greater number of vegetables and fruits, giving up cigarettes, consuming less booze, exercising frequently, self-monitoring blood pressure, preserving a weight that is appropriate for your age, and avoiding circumstances that are stressful <sup>5</sup>.

Non-pharmacological techniques have been gaining an abundance of attention due to evidence in the last few years that they are less hazardous and are capable of improving the effectiveness of anti-hypertensive medication administration if utilised additionally to drug management individually<sup>6</sup>. Among the initial clinical practise recommendations for the early identification and management of arterial hypertension has been granted through the World Health Organisation (WHO) in 1978, and it subsequently underwent revisions in 1999 and 2003<sup>7</sup>.

## **RISK FACTORS**

With getting older, both sexes experience elevated BP and a higher prevalence of hypertension <sup>64</sup>. By contrast with women, blood pressure is higher in men while they are younger, but women's BP elevated more over time. When it comes to mean blood pressure and the prevalence of hypertension by the age of sixty, women outnumber males <sup>65</sup>.

It's important to consider both typical and uncommon risk factors while researching hypertension. In addition to well-known causes of high blood pressure like age, excessive salt intake, obesity, and family history, there are other, less well-known causes. These include chronic kidney disease, sleep apnea, thyroid Disorders, noise pollution, and some lifestyle factors like an unhealthy diet and insufficient exercise, cigarette's Smoking, drinking too much booze are all major contributors to the evolution hypertension.

An additional element that may increase the risk of hypertension is a diet rich in sodium and saturated fats combined with a sedentary lifestyle.

### **High Sodium Intake**

Global sodium intake was estimated by the Prospective Urban Rural Epidemiology (PURE) study to have been 3,950 mg daily in 2010, which is significantly more than the 2,300 mg or less per day that all published guidelines prescribe <sup>66-67</sup>. Moreover, there was a significant regional variation in the amount of salt consumed worldwide, ranging from over 4,200 mg in East Asia, Central Asia, and Eastern Europe to less than 3,300 mg in Latin America and Sub-Saharan Africa.

Increased blood pressure and sodium intake are causally related, according to animal research, observational epidemiological studies, and randomised clinical trials <sup>68</sup>. Among the majority of the observational studies were cross-sectional among the natural world and found a positive, linear, and substantial relationship among blood pressure and hypertension and either dietary intake or 24-hour urine excretion of sodium <sup>69,70</sup>. In the Inter salt study, for instance, 10,074 men and women aged 20 to 59 from 52 population samples across 32 nations were examined to ascertain the connection between 24-hour urine removal of salt and BP <sup>69</sup>. A 100 mmol greater individual 24-hour urine sodium elimination found linked in population analyses to an average blood pressure in systole of 6.0 mmHg and an average diastolic blood pressure of 2.5 mmHg. A 100 mmol greater median 24-hour sodium excretion was linked to a median 4.5 mmHg higher systolic and 2.3 greater diastolic blood pressure in mmHg in across-population analyses. A 25 mmHg increase in systolic BP was associated with 100 mmol increase in median 24-hour sodium excretion, after four isolated groups with abnormally low urine sodium excretion were eliminated from the across-population analysis <sup>69</sup>. Regional variations in BP levels and salt intake were consistently observed in the Inter salt study. In the PURE trial, spot urine waste elimination of salt and arterial pressure was likewise revealed to be positively and significantly associated <sup>71</sup>.

## Obesity

The risk factor ranked sixth in importance for the global burden of hypertension is surplus body mass. Currently, 10% of children and over 1 billion adults are categorized as overweight or obese<sup>92</sup>. As the leading preventable cause of disease and early death in the USA, obesity is expected to surpass smoking in 2005<sup>93</sup>. Over time, hypertension and a higher risk of heart illness have been connected to obesity, especially central obesity. A minimum of two-thirds of the frequency with which hypertension can be directly linked to obesity, according to risk estimates based on population studies<sup>94</sup>. An increasing body of research indicates that obesity both predisposes people to develop chronic kidney disease and speeds up its progression<sup>95</sup>. Increased urinary albumin loss, focal segmental glomerulosclerosis-related progressive loss of renal function, and glomerular hyperfiltration are all potential effects of obesity<sup>96</sup>. Obesity speeds up the progression of renal disease in patients who already have it<sup>97</sup>. Owing to the strong correlation between obesity and heart illness, there have been speculation that the Americans' life expectancy may decline in the twenty-first century consequently of current obesity trends<sup>98</sup>. It's most likely that additional countries will see similar trends.

## Chronic Kidney Disease (CKD)

10-15% of people are impacted globally with chronic kidney disease (CKD), and the number of people experiencing it is rising<sup>10</sup>. Uncommonly kidney configuration or a feature that has existed for a period of time exceeding three months and has a negative effect on health is referred to as chronic kidney disease (CKD)<sup>11</sup>. Although the majority of those suffering from long-term kidney dysfunction also have hypertension, the direction of the link between diminished kidney efficiency and high elevated blood pressure is still up for debate. The kidneys are essential for controlling blood pressure management<sup>12</sup>. An overlapping and mixed cause and effect relationship exists between CKD and hypertension, which is closely related. Blood pressure (BP) increases are frequently linked to declines in kidney function, and persistently high BP speeds up the process of renal function deterioration<sup>13</sup>. The existing evidence shows a significant component of salt sensitivity to hypertension in CKD patients. As a result, teaching CKD patients on a reduced salt diet is crucial to obtaining blood pressure control while adhering to a basic blood pressure medication regimen<sup>14</sup>. The course of CKD may be slowed by losing weight, which is helpful at lowering BP and proteinuria<sup>15</sup>. Despite the advantages of non-pharmacological therapies in CKD, anti-hypertensive drugs are typically also needed<sup>16</sup>. Some pharmaceutical treatments also have extra renoprotective and or cardioprotective benefits, which may be distinct from their direct BP-lowering effects<sup>17</sup>. The individual's need for risk reduction balance ought to be considered while selecting a medicine. To reach BP targets, combination medication therapy is frequently required<sup>18</sup>.

## Sleep Apnea

In clinical practise, OSA, obstructive sleep apnea is a disorder that is frequently seen but may be underdiagnosed. The high prevalence rate and connection to serious cardiovascular problems make OSA important. It's possible that 37% of men, 50% of women, and up to 67.5% of smokers have OSA<sup>19</sup>. According to estimates, 936 million persons between the ages of 30 and 69 have mild to severe OSA<sup>20</sup>. 60% of OSA patients experience hypertension, in comparison with 20% of hypertensive patients who additionally suffer from OSA<sup>21</sup>. As a result, obviously, not all OSA patients experience the evolution of hypertension. However, it ought to be mentioned that even when the apnea / hypopnea index is within the normal range, the severity of sleep disordered breathing increases over the course of four years after body dimension have been considered<sup>22</sup>. In individuals with resistant hypertension and constant positive airway pressure and obstructive sleep apnea was found to reduce 24-hour blood pressure levels, according to a recent meta-analysis of randomised controlled studies<sup>41</sup>.

## Thyroid Disorders

The danger of hypertension may be increased by thyroid condition, such as hypothyroidism and hyperthyroidism<sup>23</sup>. From asymptomatic hypothyroidism to myxedema, hypothyroidism should be viewed as a graded phenomenon encompassing a wide range of clinical manifestations. Appropriate levels of free triiodothyronine (Ft3) as well as thyroxine (Ft4) plus serum thyrotropin (TSH) above the upper range of reference are indicative of the levels is known as subclinical hypothyroidism<sup>24</sup>. The average incidence of severe hypothyroidism varies between 0.2% and 5.3% in Europe and between 0.3% and 3.7% in the US, depending to the reports. Iodine intake is most likely the cause of this disparity<sup>25</sup>. 7.5% was found to be the incidence of subclinical hypothyroidism in the Wickham experiment<sup>26</sup>. In contrast, 21% of women and 16% of males participated in the Colorado study<sup>27</sup>. The underlying causes of thyroid dysfunction are listed in the table below.

**Table 1 Hyperthyroidism & Hypothyroidism causes**

<b>HYPERTHYROIDISM CAUSES</b>	<b>HYPOTHYROIDISM CAUSES</b>
<b>Over function of the thyroid</b>	<b>Congenital</b>
Graves' disease	Thyroid dysgenesis
Toxic adenoma	Dyshormonogenesis
Toxic multinodular goitre	Inadequacy in TRH/TSH
Iodine induced hyperthyroidism	<b>Developed morphologies in adulthood</b>
Hyperthyroidism mediated by TSH (pituitary adenoma generating TSH)	Primary hypothyroidism
The diseases of trophoblasts and germ cell tumors	Hashimoto thyroiditis

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<b>hyroiditis and other damaging thyroid conditions</b>	iatrogenic causes: - thyroid dissection - radioiodine treatment - outside radioactivity on neck
Thyroiditis classified as mild	Medication (anti-CD52 recombinant antibody, the medicine, lithium, iodine, interferon, tyrosine kinase inhibitors, thyreostatic treatment, etc.)
Hashimoto thyroiditis	Infiltrative disease
Silent thyroiditis	Environmental exposures
Post-partum thyroiditis	Consumptive hypothyroidism
Iodine induced thyroiditis	Fundamental (secondary and tertiary)
<b>Ectopic hyperthyroidism</b>	Low thyroid function
Follicular thyroid carcinoma that has spread	Thyroid hormone resistance Thyrotropin and thyrotropin resistance releasing hormone
Struma ovary	
<b>Exogenous hyperthyroidism</b>	
“Hamburger” hyperthyroidism	
Taking too much thyroxin	

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### Thyroid Disfunction causes

Thyroid hormones influence the cardiovascular system in both directly and indirectly ways. In hyperthyroidism, Ft3 dilates peripheral resistance arterioles, resulting in a reduction in the resistance of systemic arteries, resulting in a decrease in effective arterial filling, after which the synthesis of renin is stimulated as well as a response of the angiotensin-converting enzyme axis of aldosterone <sup>28</sup>.

Earlier research found that 6–16% of hyperthyroid patients experienced heart failure. Individuals who already have high blood pressure or who have coronary artery disease risk factors are more likely to experience hemodynamic alterations that eventually result in chronic heart failure. An independent predictor of the onset of chronic heart failure is atrial fibrillation, a common side effect of hyperthyroidism <sup>29</sup>. Thirty percent of people having overt hypothyroidism had elevated diastolic arterial pressure. The heart's output and contractility decrease, which narrows the pulse pressure. Hypothyroidism causes a decrease in both salt sensitivity and renin synthesis. The blood volume increases by 5.5% as a result of renal removal of salt <sup>23</sup>. Thyroid health must be assessed in cases of pulmonary hypertension since a number of medical records indicate that an autoimmune thyroid condition is responsible for the development of primary pulmonary hypertension, which encompasses both hypothyroidism and hyperthyroidism <sup>30</sup>.

## Noise Pollution

Loud, unwelcome, or loud noises that could be detrimental to the environment and human health is what is known as noise pollution<sup>31</sup>. Noise pollution has gradual, complex impacts. While it may cause displeasure right away, repeated exposure to damaging noises encourages its effects to worsen. Its pollutants are waves that interfere with similarly existing naturally occurring waves in the same environment, as opposed to physical particles like those found in air and water pollution<sup>32</sup>.

Noise pollution originates from various sources, including manufacturing equipment and procedures, excessive traffic in motor vehicles, commuter trains, airliners, appliances that require electricity, loudspeaker systems, and power stations utilised for residential as well as business purposes. The environment is made inhospitable by construction operations such as extraction of minerals, building bridges, dams, construction sites, media outlets, road networks, and noise from social gatherings<sup>31</sup>. Abnormal noise levels have been documented to have an adverse impact on the heart. High blood pressure, vascular constriction, and plaque in the coronary arteries have all been associated with it<sup>33</sup>. According to studies, being around really loud noise raises blood pressure. The study evaluated the impact of industrial noise on the cardiovascular system in employees at lock manufacturing, where noise levels exceeded 80 decibels. When comparing the workers' mean arterial pressure, pulse pressure, systolic blood pressure (SBP), diastolic blood pressure (DBP), and rhythm to those who had never lived or worked in a noisy environment, a substantial rise was seen<sup>34</sup>.

## LIFESTYLE FACTORS

A vital aspect of managing hypertension is implementing lifestyle changes. The DASH study demonstrated the benefits of a diet high in fruits, vegetables, and calcium and low in sodium in the management of hypertension<sup>75</sup>. Exercise is essential, particularly for kids and adolescents with hypertension, as they frequently exhibit elevated sympathetic nervous system activity. Stress exacerbates blood pressure in those who have hypertension, who experience it frequently. People can adopt these lifestyle modifications to lower their blood pressure, according to several short-term studies<sup>76</sup>. People can simultaneously make multiple lifestyle changes, according to a more recent trial. However, the extent to which people can sustain these changes over time remains a challenging question<sup>77</sup>. Multiple long-term trials, including phase 2 of the Trials of Hypertension Prevention (TOHP2), have addressed this issue<sup>78,79</sup> as well as Trials of Non-pharmaceutical interventions in the Elderly (TONE)<sup>80</sup>. These studies found that diet, exercise-induced weight loss, and sodium restriction can be sustained and are associated with significant blood pressure reductions in middle-aged (TOHP2) and elderly (TONE) subjects with

mild to moderate hypertension. Nevertheless, it's critical to assess each factor separately in terms of how crucial it is to the early management of hypertension.

### **Healthy Diet**

A diet rich in whole grains, vegetables, and fruits is recommended to lower blood pressure. Other suggestions include eating low fat dairy products, chicken, fish, legumes, nontropical vegetable oils, and nuts, as well as limiting your consumption of sweets, sugar, sweetened, beverages, and red meat <sup>59</sup>. The nation's poor diet and rising fondness for food that is fast are contributing factors to high blood pressure. Furthermore, studies have indicated that the increased consumption of fat and oil in recent years may be a component in the rise in the frequency of obesity <sup>35</sup>. Most hypertension patients eat a poor diet heavy in fats that are saturated and low in carbs and protein. Research indicates that consuming a diet low in fruits and vegetables is connected to an increased risk of hypertension, the way of life of an individual and insufficient physical activity are also significant factors when hypertension first begins appearing <sup>36</sup>. Over 50% of the subjects in these studies were sedentary and ate fewer fruits and vegetables. Eating a diet heavy in fatty and greasy foods, exercising seldom, and participating in less physical activity can all have a substantial effect on hypertension risk, which is increased by being overweight. To stop this, awareness campaigns about healthy eating are crucial <sup>37</sup>.

### **Quitting Smoking**

Due to the consequences of certain substances, namely nicotine and the poisonous gas carbon monoxide, the use of cigarettes is widely acknowledged can be a significant cardiovascular risk element for the heart and blood vessels <sup>38</sup>. Smoking from cigarettes therefore affects vasculature resistances in two ways: it increases catecholamine-dependent vasoconstriction and decreases endothelium-dependent vasodilatation. The evidence also shows that smoking causes particles to become more aggregation and sticky, which alters blood rheology this raises the possibility of clotting <sup>39</sup>. Additionally, there has been recently discovered proof of a considerable improvement in blood pressure in both systolic and diastolic forms among individuals who have cut back or ended smoking <sup>40</sup>. Cigarette smoking is regarded as a significant separate danger element for the development of cardiovascular complications, including enlarged heart, myocardial infarction, stroke, and renal failure. The chance of developing heart disease increases exponentially when smoking and elevated blood pressure are combined <sup>38</sup>. For these reasons, stopping smoking is among the highest of the most significant things individuals with elevated blood pressure can do to improve their cardiovascular health <sup>60</sup>. Positive improvements in BP were observed



not only in quitters, but also in patients who reduced their consumption of traditional cigarettes (i.e., dual users). It is highly advised that individuals who suffer from high blood pressure, diabetes, coronary heart disease, or other risk factors give up smoking.

### **Dietary Sodium Reduction**

For 30 days, in a cross-over design, 412 participants in the nutritional methods for treating hypertension-Sodium trial were randomly assigned to high sodium (mean urine excretion of 142 mmol per day), intermediate sodium (mean urinary excretion of 107 mmol per day), and lower sodium diets (mean urinary excretion of 65 mmol per day). The participants' average systolic blood pressure was 120–159 mmHg, and their average diastolic blood pressure was 80–95 mmHg<sup>72</sup>. The findings demonstrated that consuming a typical American control diet reduced blood pressure in systolic form by 2.1 mmHg and the DASH diet reduced blood pressure in systolic form by 1.3 mmHg. Additional blood pressure in systolic form reductions of 4.6 mmHg during the control diet and 1.7 mmHg during the diet known as DASH were observed when consumption of sodium was further reduced from an intermediate to a lower level<sup>72</sup>. In both hypertension and normotensive people, lowering sodium intake dramatically lowers blood pressure, according to multiple meta-analyses of clinical trials<sup>73</sup>. An Agency for Healthcare Research and Quality (AHRQ) meta-analysis, which comprised 48 randomised control studies, revealed that dietary sodium reduction significantly lowered blood pressure in persons with and without hypertension<sup>74</sup>. In this investigation, a reduction of 42 mmol in the weighted mean salt consumption was linked to drop in the blood pressure's systolic level of 3.23 mmHg and a reduction in diastolic blood pressure of 2.24 mmHg<sup>74</sup>. To sum up, lowering population BP and the potential for hypertension should be encouraged through dietary sodium reduction. To find the ideal salt consumption in food for prevention of CVD, CKD, and mortality, more research is necessary.

### **Less Alcohol Consumption**

Among the world's most significant risk factors for illness and death is alcohol Consumption<sup>50</sup>. The consequences of alcohol on health can be diverse and varied, contingent on the amount and mode of intake<sup>48</sup>. The conventional description of the effects of alcohol on cardiovascular health is a J-shaped curve, where lifetime abstainers are at the greatest risk and low-to-moderate drinkers are at the lowest level of risk<sup>49</sup>. Hypertension and frequent alcohol consumption discovered to be related in individuals that drink various alcohol-based substances from every corner of the entire globe<sup>46</sup>. Approximately 16% of cases of hypertension globally are caused by excessive alcohol use<sup>49</sup>. Alcohol enhances blood acidity, thickens blood, and increases heart rate because it has actions that are almost exactly the same as carbon

monoxide. For this reason, drinking alcohol might aggravate hypertension<sup>47</sup>. The relationship between BP and hypertension in relation to alcohol intake must be viewed as causal and reversible, with experimental evidence demonstrating that reducing alcohol consumption reduces blood pressure in both systolic and diastolic forms in a dose-response relationship with clinically significant effects<sup>61</sup>. The decrease in systolic blood pressure is significant, with a mean difference of 5.50 mmHg (95% CI: 6.70 to 4.30) for persons who drink 72 g per day on average and cut their consumption by roughly half. There was no noticeable difference between drinkers of up to 24 g per day and abstainers; however, data were limited. Please visit for a description of mechanisms<sup>62-63</sup>.

### **The Indian Vegetarian Diet**

Low BP has been linked to vegetarian diets. Those who follow a vegetarian diet in advanced countries have significantly lower blood pressure than those who do not<sup>81</sup>. A lower age-related rise in blood pressure is also observed in vegetarians. In strict vegetarians, blood pressure discovered to be among the lowest in developed nations. High potassium, low weight, low-to-moderate alcohol consumption, and other vegetarian diet-related characteristics, such as high fiber and no meat, are examples of non dietary factors that may reduce BP in addition to established dietary risk factors. Some aspects of vegetarian diets lower BP, as well as consequences of vegetarian diets on blood pressure are not entirely attributable to established dietary risk factors and non-dietary factors, according to limited trial evidence. Many rural and urban populations in India consume primarily vegetarian diets<sup>82</sup>. Moreover, these subjects experience lower levels of blood pressure<sup>83</sup>. There are no extensive studies from India that have assessed complete dietary patterns with BP levels. Chhajer *et al.* transformed the Ornish diet into a low-fat, vegetarian Indian diet and found that several cardiovascular risk factors, such as blood pressure, significantly decreased<sup>84</sup>. It has been noted how crucial a comprehensive diet change is for the management and prevention of elevated blood pressure within Indians<sup>85</sup>. The superiority of a specific kind of vegetarian diet from India over other diets that are similar needs to be confirmed by larger-scale, regulated treatment studies, as there are many "healthy" diets that are traditional in India<sup>86</sup>.

### **Self Monitoring of Blood Pressure**

Self-measured blood pressure monitoring (SMBP) is a focused-on patient's methodology aimed at lowering blood pressure whereby patients utilize their own instruments to regularly assess their personal blood pressure and present what they discover to their doctors<sup>51</sup>. SMBP is recommended by numerous national and international organisations as a tool for patients to monitor and manage their blood pressure<sup>52</sup>. A patient's understanding of the need of self-management can significantly impact how well a

chronic illness is managed<sup>53</sup>. By facilitating successful self-management and empowering patients to take a more active part in their own care, blood pressure self-monitoring (BPSM) may help bridge the gap between patients' and doctors' expectations<sup>54</sup>. SMBP is recommended by major U.S. and worldwide clinical recommendations for the detection and management of high blood pressure<sup>55</sup>. An appeal for action regarding the usage of SMBP was issued through the American Heart Association, American Society for Hypertension, and the Preventive Cardiology Nurses Association<sup>56</sup>. These organisations suggested paying clinicians for their time to teach patients how to use devices, validate patient devices against office machines, interpret home BP measurements metres, and offer adjustment or lifestyle modification advice based on those readings. They also suggested offering insurance coverage for devices and advising patients to use only high-quality, validated devices<sup>57</sup>.

### **Stress Management**

Yoga can be a useful strategy for managing hypertension because of its beneficial benefits on stress reduction and functional ability, a pair of closely related variables to hypertension<sup>45</sup>. Approximately 5000 years ago, the Indian subcontinent gave birth to the ancient health and lifestyle system known as yoga<sup>42</sup>. Despite yoga's roots are in literature and religious faith, it is mostly practised nowadays as a type of exercise and meditation, moreover a health regimen<sup>43</sup>. The significance of yoga workouts for blood pressure regulation is contentious. Many research from India discovered that yogic activities lower blood pressure and other cardiovascular risk factors<sup>58</sup>. Moreover, research has demonstrated that yoga promotes increases in functional capacity and reduces age-related vascular stiffness<sup>44</sup>.

### **Weight Management**

Weight and blood pressure are directly correlated, according to a large and reliable collection of research from epidemiological research and human trials<sup>76</sup>. Both the elevated and rising frequency of obesity and overweight worldwide, including in India, serves as further evidence of the significance of this relationship<sup>87</sup>. Between 30 and 35 percent of urban Indian adults are considered too large or fat if their BMI is greater than 25 kg/m<sup>2</sup><sup>88</sup> and there is a clear and significant relationship between rising body weight and hypertension<sup>89</sup>. Clinical trials have demonstrated nearly universally that reducing weight lowers blood pressure. It's important to observe that the blood pressure decreases both before and after reaching a target body weight. A 5.1 kg bodyweight decrease on average was linked to mean blood pressure's diastolic and systolic values reductions of 4.4- and 3.6-mm Hg, respectively, in one meta-analysis that combined data from 25 trials<sup>90</sup>. Additional research has revealed that even a small reduction in body weight, combined whether or not lowering sodium intake, can help overweight people with

prehypertensive conditions avoid hypertension by roughly 20%. It can also help with medication reduction and drug withdrawal <sup>78</sup>. Therefore, weight loss achieving a BMI of less than 25 kg/m<sup>2</sup>, or even less than 23 kg/m<sup>2</sup> in Indians is powerfully strengthened by the evidence that is currently available as a method of treating and preventing hypertension. More significantly, among people who currently weigh a typical amount, attempts to avoid gaining weight are vital given the well-known challenges of maintaining weight loss. For Indians, truncal or central overweight represents a further important risk component for hypertension <sup>91</sup>. It is therefore advised to maintain a healthy waist circumference (less than 90 cm for men and less than 80 cm for women) and body weight (ideally between 18.5 kg/m<sup>2</sup> and 24.9 kg/m<sup>2</sup>, preferred < 23.0 kg/m<sup>2</sup>).

## **CONCLUSION**

All things considered, modifications in lifestyle are necessary for controlling hypertension because they offer a thorough method of improving cardiovascular health and controlling blood pressure. People can significantly impact in controlling their hypertension and general health by combining many factors such dietary changes, self-monitoring blood pressure, exercise, stress management, and addressing bad habits. Blood pressure can be significantly lowered while improving general cardiovascular health by emphasizing diets plenty of fruits and veggies and minimal in salt, whole grains, and lean proteins, such as the Indian vegetarian diet as well as DASH (Dietary Approaches to as Stop Hypertension) diet. Regular blood pressure self-monitoring encourages greater adherence to treatment plans and proactive management of hypertension by enabling people to track their progress and make educated decisions about lifestyle modifications. Additionally, it is essential to optimize blood pressure control and lessen the possibility of cardiovascular problems by obtaining as well as keeping an appropriate body weight through a combination of dietary changes and frequent physical activity. Regular physical activity, such as brisk walking, cycling, or yoga, not only aids individuals in managing their body mass index (BMI) but also has a direct impact on blood pressure regulation. This highlights the need of including physical activity in daily routines for cardiovascular health. Good stress-reduction methods, such as yoga, mindfulness meditation, and relaxation, are important resources for reducing the negative effects of stress on blood pressure and enhancing one's general quality of life. In order to achieve the best possible health results, it is imperative that harmful habits like tobacco use and excessive alcohol use be addressed. Promoting smoking cessation and moderation in alcohol intake are also crucial components of comprehensive hypertension care.

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