

## A Systematic Review of Hypertension and Stress - The Silent Killers

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### Abstract

### Review Article

Hypertension (HTN) and stress are often referred to as the “silent killers”. The reason the condition is termed as 'silent killer' is because more than 30% of people who have high blood pressure are not even aware of it. Most of the times, there are very minor symptoms or no symptoms at all. Some of the signs you must look out for are difficulty in breathing, chest pain or heaviness, headaches, irregular heartbeat (palpitation), problems in vision, problems in urination. These 'small' indicators may harbor some consequences as damage of arteries and vital organs of the body which may further lead to life-threatening medical emergencies. Therefore, we must not only identify and control hypertension but also promote a healthy lifestyle and preventive strategies to decrease the prevalence of hypertension in the general population. Most of the time, high blood pressure (HBP, or HTN) may show no symptoms and puts the patient at an increased risk for heart disease, heart failure, stroke, etc. Though high blood pressure cannot be cured but it can be managed effectively through lifestyle changes and medication. A primary intent of this article is to educate readers about the risk factors associated with high blood pressure as well as to encourage them to follow a healthy lifestyle in order to reduce the chances of developing hypertension later in their lives. This article is designed to serve as a guide to help readers understand the relationship between high blood pressure and stress as well as to suggest various ways to maintain healthy blood pressure.

**Keywords:** Hypertension, High Blood Pressure, Stress, Systolic Blood Pressure, Diastolic Blood Pressure.

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## INTRODUCTION

The term Blood Pressure (BP) refers to the force of blood flowing through the blood vessels. It is measured in millimeters of mercury (mm Hg). High blood pressure (HBP) means the pressure in the arteries is higher than it should be. High blood pressure is also known as hypertension. Hypertension (HTN or HT) is a long-term medical condition in which the blood pressure in the arteries is consistently high (Naish and Court, 2014, Kearney et al., 2014). According to the American Heart Association, high blood pressure is defined as a blood pressure reading of 130/80 or higher. When a person's blood pressure is high, the blood can't flow as easily to essential organs like heart and kidneys. If that lasts only for a short period of time (e.g. while watching a horror movie or a surprise), it is not necessarily a matter of concern. However, when our blood pressure is high over a long period of time like in hypertension, poor blood flow causes organ damage in the long run. High blood pressure typically does not cause symptoms (CDC, 2015). However, long-term high blood pressure is a major risk factor for stroke, coronary artery disease, heart failure, atrial fibrillation, peripheral

arterial disease, vision loss, chronic kidney disease, dementia, and even death (Lackland and Weber, 2015).

A staggering 139 million people in India suffer from uncontrolled hypertension, and that number is growing every year. According to the World Health Organization (WHO) report released in 2012, raised blood pressure in India increased from 5 per cent in 1960 to nearly 12 per cent in 1990 (Kearney et al., 2014). It further increased to 30 per cent in 2008 and a significant number of people afflicted were in their 20s. High blood pressure is responsible for 57 per cent of all stroke deaths and 24 per cent of all coronary heart disease deaths in India. The reason the condition is termed as 'silent killer' is because more than 30% of people who have high blood pressure are not even aware of it. Most of the times, there are very minor symptoms or no symptoms at all. Some of the signs you must look out for are difficulty in breathing, chest pain or heaviness, headaches, irregular heartbeat (palpitation), problems in vision, problems in urination. These 'small' indicators may harbor some consequences as damage of arteries and vital organs of the body which may further lead to life-threatening medical emergencies. Therefore, we

must not only identify and control hypertension but also promote a healthy lifestyle and preventive strategies to decrease the prevalence of hypertension in the general population (Balwan and Kour, 2021).

What is most worrisome fact about hypertension is that it can affect any age group. Thought to be the disease of the elderly or the obese, now a days it is being more frequently diagnosed in the young. Hypertension can affect any organ of the body, be it the brain, the heart or the kidneys. Patients can complain of headaches, tiredness, anxiety, dizziness, weakness, confusion nausea, chest pain and even weakness in one side of the body.

Although hypertension can be genetic or secondary to a disease, most often the cause is poor life style choices like, lack of sleep, weight gain, lack of exercise, stress, long working hours, smoking, junk food, excessive alcohol intake etc. Often overlooked and sometimes ignored causes of hypertension include snoring, thyroid disorders, drugs and supplements. Over-the-counter nasal decongestants and certain herbal supplements, including ginseng, licorice and ephedra, weight loss pills may have the same effect on the blood pressure.

Hypertension is the single largest contributor to the avoidable deaths and diseases in India. It is a leading risk factor for cardiovascular disease, which accounted for 23% of total deaths and 32% of adult deaths in 2010–2013. India has committed to take an array of actions to meet the Sustainable Development Goals (SDG) target of reducing premature mortality from non-communicable diseases (NCDs) by one-third by 2030. However, much of the success in meeting this target hinges on its ability to check the rise of hypertension. The Global Burden of Hypertension study has highlighted that of the global burden of 212 million Disability Adjusted Life Years (DALYs) related to hypertension, 18% occurred in India in 2015 (Forouzanfar et al., 2017). The burden of hypertension in India is expected to rise considerably in the coming years due to rapid environmental and ‘life-style’ changes that emanate from hazardous working conditions and growing social pressures of survival (Qadeer, 2000; Dev and Ranade, 1998).

As per the reports of Gosh and Kumar, 2019, quite intriguingly, the prevalence of hypertension was highest in the north-eastern (NE) states, namely Sikkim (20.2%), Nagaland (17.6%), Assam (17.6%), Arunachal Pradesh (16.6%) and Tripura (15.4%). Further, hypertension prevalence was very high in few non-NE states, namely Jammu and Kashmir (15.8%), Punjab (14.8%), Himachal Pradesh (14.8%) and Telangana (14.2%). On the other hand, proportion of population suffering from hypertension was relatively low in states such as Kerala (8.2%), Bihar (8.8%), Delhi (8.6%),

Rajasthan (9.1%), Uttar Pradesh (9.6%) and Jharkhand (9.6%) (Ghosh and Kumar, 2019).

### Understanding Blood Pressure Readings

Blood pressure is recorded as two numbers, such as 115/75 mm Hg. It is classified by two measurements, the systolic and diastolic pressures, which are the maximum and minimum pressures, respectively.

- **Systolic Blood Pressure** (The First number) – indicates how much pressure the blood exerts against the artery walls when the heart beats. In other words, the top (systolic) number is the pressure when the heart beats.
- **Diastolic Blood Pressure** (The Second number) – indicates how much pressure the blood exerts against the artery walls while the heart is resting between beats. In other words, the bottom (diastolic) number is the pressure when the heart rests between beats.

For most adults, normal blood pressure at rest is within the range of 100 –130 millimeters mercury (mmHg) systolic and 60–80 mmHg diastolic. For most adults, high blood pressure is present if the resting blood pressure is persistently at or above 130/80 or 140/90 mmHg. Different numbers apply to children (CDC, 2015).

Note: Normal blood pressure is below 120/80 mm Hg. High blood pressure is a systolic pressure of 130 or higher, or a diastolic pressure of 80 or higher, that stays high over time.

### Which Number Is More Important?

In general, more attention is given to systolic blood pressure (the first number) as a major risk factor for cardiovascular disease for people over 50. In most people, systolic blood pressure rises steadily with age due to the increasing stiffness of large arteries, long-term buildup of plaque and an increased incidence of cardiac and vascular disease. However, either an elevated systolic or an elevated diastolic blood pressure reading may be used to make a diagnosis of high blood pressure. According to recent studies, the risk of death from ischemic heart disease and stroke doubles with every 20 mm Hg systolic or 10 mm Hg diastolic increase among people from age 40 to 89 (AHA, 2019).

### Blood Pressure Categories

The American Heart Association (AHA) recognizes five blood pressure ranges:

- **Normal Blood Pressure:** Blood pressure numbers of less than 120/80 mm Hg are considered within the normal range.
- **Elevated Blood Pressure:** Elevated blood pressure is when readings consistently range from 120-129 systolic and less than 80 mm Hg diastolic. People with elevated blood pressure are likely to develop

high blood pressure unless steps are taken to control the condition.

- **Hypertension Stage 1:** Hypertension Stage 1 is when blood pressure consistently ranges from 130-139 systolic or 80-89 mm Hg diastolic. At this stage of high blood pressure, doctors are likely to prescribe lifestyle changes and may consider adding blood pressure medication based on risk of atherosclerotic cardiovascular disease (ASCVD), such as heart attack or stroke (AHA, 2019).
- **Hypertension Stage 2:** Hypertension Stage 2 is when blood pressure consistently ranges at 140/90 mm Hg or higher. At this stage of high blood pressure, doctors are likely to prescribe a combination of blood pressure medications and lifestyle changes.
- **Hypertensive crisis:** A hypertensive crisis is when blood pressure rises quickly and severely with readings of 180/120 or greater. This stage of high blood pressure requires medical attention. If a person's blood pressure readings suddenly exceed 180/120 mm Hg, he or she can wait for five minutes and then test his/her blood pressure again. If the readings are still unusually high, contact the doctor immediately as he/she could be experiencing a hypertensive crisis (Rodriguez et al., 2010).

If a person's blood pressure is higher than 180/120 mm Hg and he/she experiencing signs of possible organ damage such as chest pain, shortness of breath, back pain, numbness/weakness, change in vision or difficulty speaking, then this would be considered a hypertensive emergency. Do not wait to see if your pressure comes down on its own rather visit the doctor or an emergency room immediately for medical help (AHA, 2019).

### Risk Factors Associated With HBP

There are various risk factors that increase a person's chances of developing HBP. Some risk factors can be modified while others cannot be. A better understanding of these risk factors can help us to be more aware of how likely we are to develop high blood pressure.

### Modifiable Risk Factors

These are the risk factors that can be changed to help prevent and manage high blood pressure, including:

- **Lack of Physical activity:** Not getting enough physical activity as part of our lifestyle increases our risk of getting high blood pressure. Physical activity is great for our heart and circulatory system.
- **An Unhealthy Diet, especially one high in Sodium:** A diet that is too high in salt consumption, as well as calories, saturated and trans-fat and sugar, puts one at an additional risk of developing high blood pressure. On the other hand, making healthy food choices can help lower blood pressure.
- **Being Overweight or Obese:** Carrying too much weight puts an extra strain on heart and circulatory

system that can cause serious health problems. It also increases risk of cardiovascular disease, diabetes and high blood pressure.

- **Drinking too much Alcohol:** Regular, heavy use of alcohol can cause many health problems, including heart failure, stroke and an irregular heartbeat (arrhythmia). It can cause blood pressure to increase dramatically and can also increase the risk of cancer, obesity, alcoholism, suicide and accidents.
- **Sleep Apnea:** Obstructive sleep apnea may increase risk of developing HBP and is common in people with resistant hypertension.
- **High Cholesterol:** More than half of people with HBP also have high cholesterol.
- **Diabetes:** Most people with diabetes also develop HBP.
- **Smoking and Tobacco use:** Using tobacco can cause your blood pressure to temporarily increase and can contribute to damaged arteries. Secondhand smoke, exposure to other people's smoke, also increases the risk of heart disease for non-smokers.
- **Stress:** Too much stress contributes to increased blood pressure. Also, stress can encourage behaviors that increase blood pressure, such as poor diet, physical inactivity, and using tobacco or drinking alcohol more than usual.

### Non-Modifiable Risk Factors

These risk factors can't be changed or are difficult to control. Common hereditary and physical risk factors for high blood pressure include:

- **Family History:** If a person's parents or other close blood relatives have high blood pressure, there's an increased chance that he or she will get it, too.
- **Age:** The older a person is, the more likely he or she is to get high blood pressure. As we age, our blood vessels gradually lose some of their elastic quality, which can contribute to increased blood pressure. However, children can also develop high blood pressure.
- **Gender:** Until age 64, men are more likely to get high blood pressure than women are. At 65 and older, women are more likely to get high blood pressure.
- **Race:** African-Americans tend to develop high blood pressure more often than people of any other racial background in the United States. It also tends to be more severe in African Americans, and some medications are less effective in treating HBP in blacks.
- **Chronic Kidney Disease (CKD):** HBP may occur as a result of kidney disease. And, having HBP may also cause further kidney damage.

Socioeconomic status and psychosocial stress are also risk factors for HBP. These can affect access to basic living needs, medication, health care providers, and the ability to adopt lifestyle changes.

### How to Maintain Healthy Blood Pressure?

Following are some of the ways to maintain a healthy blood pressure:

- Don't smoke and avoid secondhand smoke.
- Reach and maintain a healthy weight.
- Eat a healthy diet that is low in saturated and trans fats and rich in fruits, vegetables, whole grains and low-fat dairy products. Aim to consume less than 1,500 mg/day of sodium (salt). Even reducing daily intake by 1,000 mg can help to lower BP.
- Eat foods rich in potassium. Aim for 3,500 – 5,000 mg of dietary potassium per day (CDC, 2015).
- Avoid drinking alcohol. Those who cannot quit drinking should try to limit alcohol to no more than one drink per day if it is a woman or two drinks a day if a man.
- Be more physically active. Aim for 150 minutes of moderate-intensity physical activity or at least 75 minutes of vigorous physical activity per week, or a combination of both, spread throughout the week. Add muscle-strengthening activity at least two days per week for more health benefits.
- Take blood pressure medicine as prescribed by the health care provider.
- Know what your blood pressure should be and work to keep it at that level.

### How to Know If One Has High Blood Pressure?

The only way to know if a person has high blood pressure is to get it checked regularly by the health care provider. For proper diagnosis of HBP, the health care provider will use an average based on two or more readings obtained on two or more visits.

### How Stress Affects Our Health?

During a stressful situation, we not only feel emotional discomfort but also our bodies react by releasing stress hormones (adrenaline and cortisol) into the blood. These hormones prepare the body for the “fight or flight” response by making the heart to beat faster and constricting blood vessels to get more blood to the core of the body instead of the extremities.<sup>[7]</sup> Constriction of blood vessels and increase in heart rate raises the blood pressure, but only temporarily. When the stress reaction goes away, blood pressure returns to its pre-stress level. This is called situational stress, and its effects are generally short-lived and disappear when the stressful event is over. “Fight or flight” is a valuable response when we are faced with an imminent threat that we can handle by confronting or fleeing. However, our modern world contains many stressful events that we can't handle with those options. Chronic (constant) stress causes our bodies to go into high gear on and off for days or weeks at a time. The link between chronic stress and blood pressure is a topic of interest for many researchers across the globe.

### Relationship between High Blood Pressure and Stress

High blood pressure and stress have an intimate connection. Our body and brain maintain two-way

communication. Things that affect our brain can affect our body and vice versa. When we endure emotional stress, our blood pressure rises. In the same respect, having elevated blood pressure can make us feel stressed. According to health surveys, patients with hypertension report more feelings of stress and anxiety than those without hypertension. In other words, hypertension increases stress and vice versa (American Heart Association, 2017).

Stressful situations can cause blood pressure to spike temporarily, but researchers aren't sure whether stress can also cause long-term high blood pressure or HTN. While stress isn't directly responsible for causing high blood pressure, it can influence the disease's development in various ways. Our body is designed to handle stress temporarily. When we're under stress, our body makes physiological adaptations to help through the situation. This includes a spike in hormones that causes blood vessels to narrow, known as vasoconstriction. Though researchers aren't sure whether repeated spikes in blood pressure from lasting (chronic) stress cause high blood pressure (Fuster, 2017). However, many heart specialists believe that stress is linked to hypertension and that overall, stress is bad for our heart and circulatory system. Taking steps to reduce our stress can improve our heart health. Exercising three to five times a week for 30 minutes can reduce our stress level. And if one has high blood pressure, doing activities that can help manage stress and improve health can make a long-term difference in lowering the blood pressure (American Heart Association, 2021, Balwan et al., 2021).

### Response to Stress Can Affect Blood Pressure

The way we respond to stress can greatly influence our blood pressure. Smoking, drinking too much alcohol, and eating unhealthy foods are all known to have a negative impact on blood pressure and increase the risk of hypertension. If one wants to maintain healthy blood pressure, it is wise to try to quit smoking, limit alcohol intake and adopt healthy eating habits.

### Managing Stress to Control High Blood Pressure

When it comes to preventing and treating high blood pressure, one often-overlooked strategy is managing stress. Mastering stress management techniques can lead to healthy behavior changes including those that reduce blood pressure (American Heart Association, 2021). Following are some of the best ways to curb stress and get blood pressure in check:

- **Exercise:** Physical activity lowers stress and blood pressure. Exercising 3-5 days a week or engaging in a physical activity like swimming, biking, hiking and rock climbing, not only benefits overall health but also helps to maintain healthy blood pressure. Physical activity is a natural stress buster. Just be sure to get doctor's OK before starting a new exercise program, especially if one has been

diagnosed with high blood pressure (Balwan et al., 2021, Balwan and Kour, 2021).

- **Yoga and Meditation:** Yoga and meditation strengthen our body and help us relax. These techniques also may lower our systolic blood pressure by 5 millimeters of mercury (mmHg) or more.
- **Get plenty of Sleep.** Too little sleep can make the problems seem worse than they really are whereas Good sleep plays a vital role in reducing stress as well as benefits the overall health of a person (Kellerman, 2021).

## CONCLUSION

Environmental factors such as stress, diet, and physical activity play an important role in the pathogenesis of hypertension. Individuals may vary in their response to these factors depending on differences in genes determining physiologic systems that mediate the response. In this article, we have tried to highlight the factors that cause high blood pressure as well as urge the readers to maintain healthy lifestyle to reduce their chances of developing hypertension later in their lives. High blood pressure and stress are also known as “silent killers”. High blood pressure usually has no signs or symptoms. Uncontrolled high blood pressure can silently damage various body organs for years before symptoms develop. That’s why it is so dangerous. However, it can be managed. Ignoring and not treating high blood pressure is fatal as it increases the risk of heart attack and stroke. Reducing stress is often an overlooked aspect of keeping the blood pressure down. This article also throws light on the relationship between stress and high blood pressure. In today’s fast-paced world filled with increasing demands, stress management is a life skill and a lifesaver. It’s also important to note that while the link between stress and high blood pressure (HBP or hypertension) is still being studied, stress is known to contribute to risk factors like a poor diet and excessive alcohol consumption, which in turn are potential factors to develop high blood pressure. Thus, by controlling stress one can help manage high blood pressure or reduce chances of developing hypertension.

**Note:** Our Heart Health Is In Our Hands, Let’s make healthy choices!

**Conflict of Interest:** Authors have no conflict of interest.

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