

Introduction

When we understand the working of the heart and the circulatory system, we can build up a visual image of what is actually going on inside our body system, thus leading to a better understanding of our own body. With this understanding, we can sensitize our awareness of the body process.

In this presentation, I would like to talk about Hypertension. With the hope that, increased awareness of the condition, both physically and mentally, will develop awareness, that will prevent future disease and lead to better health by strengthening the mind through Yoga.

Yoga is a scientific system of self-discovery, self-maintenance and self-cure. Knowing the internal workings of the body from a medical and yogic point of view is an advantage. But to actually experience the practical result of this knowledge is the outcome of regular practice of yoga techniques.

A. Structure of the Heart:

The heart has 4 chambers – the upper chambers are called *Atria* and the lower *Ventricles*.

The wall of all chambers contains muscle tissue called *cardiac* muscle.

B. Blood Circulation:

1. De-oxygenated blood flows in to the right Atrium from the lower and upper bodies.

2. Oxygenated blood is pumped out from the left Atrium to all the tissues and cells in the body.

C. What are Blood Vessels:

1. Arteries

2. Capillaries

3. Veins

4. Coronary arteries

D. What is cardiac output:

The volume of blood pumped out of the heart per unit time is cardiac output – approximately 5.5 liters/minute.

What is Hypertension?

Actually Hypertension is not a disease in itself, but a sign that there are underlying problems in the management of the internal environment and the balance of the body at the physical, emotional and mental levels.

By hypertension, we can say that the body is in **excessive tension**. It is this tension of the whole mind body complex, resulting in the imbalance of the nervous system. Coordination of bodily functions is impaired and all systems including the cardiovascular system, suffer as a consequence.

Increased blood pressure results from the damming up of blood behind **constricted arterioles**, upsetting the balance of the heart and its vessels. Blood leaving the heart on the way to the cells of the body meets with excessive resistance; the heart is therefore required to work harder to pump the blood through narrowed vessels.

During times of rest the heart does not strain because it does not have to deliver as much oxygen to the cells as it does during stress and exercise. However as soon as stress is placed on the body, whether this be physical or mental the oxygen demand increases and so does the work of the heart. When this happens over extended periods of time, the hearts becomes permanently strained and eventually does not perform properly. This can lead to serious complications.

In hypertension the body cannot adapt to the needs of the internal and external environment. **When the arterioles have remained in a constricted state for a period of time, the muscles around them spasm.** The blood cannot supply oxygen needs and at the same time pick up waste material produced in time, resulting in fatigue and exhaustion. It takes a great deal of rest to undo the damage caused by this spasm. Recent scientific research has proved that the sort of rest required cannot be gained even through sleep, but only through meditation.

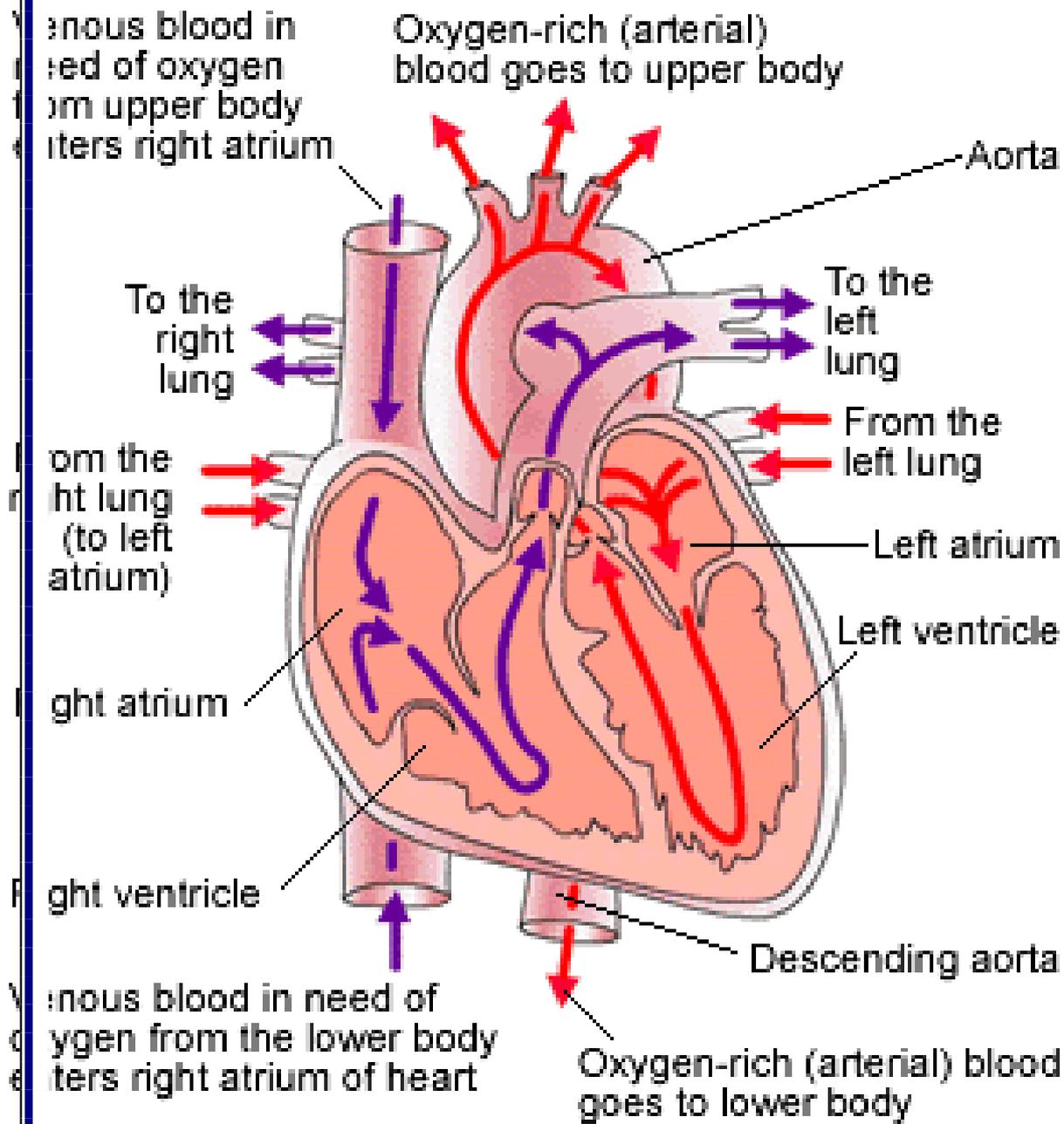
Causes for High Blood pressure

1. Accumulated fat in the artery wall
2. Loss of Elasticity of the arterial walls
3. Pregnancy (in some cases)

Symptoms of Hypertension/High blood pressure

1. Severe headaches
2. Severe anxiety
3. Shortness of breath
4. Nosebleeds
5. Dizziness

How your heart pumps blood around your body



- ➔ Blood in need of oxygen
- ➔ Oxygen-rich blood

What does your heart do?

The purpose of your heart is to pump fresh blood to the organs and tissues of your body that need the oxygen and nutrients it carries. The oxygen-rich blood is pumped out of the left side of your heart (shown on the right in the diagram) into the arteries to these tissues and organs.

Blood that has delivered its nutrients and oxygen and is in need of oxygen comes back to your heart in the veins and enters the right hand side of the heart (on left of diagram). This blood which is in need of oxygen (so-called deoxygenated blood) is sent to your lungs to pick up oxygen and get rid of carbon dioxide.

Your heart pumps all day to circulate blood around the body. On average, a red blood cell in the circulation will pass through the heart every 45 seconds. If you start to exert yourself your heart will start to pump faster to supply your working muscles with the increased amount of oxygen and nutrients they need. The heart is a muscle too, and to enable it to pump effectively, it has its own blood supply bringing it oxygen.

How does your heart work?

Your heart is made up of 2 pumps. The pump on the right hand side receives blood that has already delivered its oxygen round the body and sends this blood to the lungs to pick up more oxygen (and get rid of carbon dioxide).

The pump on the left hand side receives oxygen-rich blood and then pumps it out into the arteries to deliver its oxygen around the body.

What does Blood Pressure depend on?

- 1. Cardiac output**
- 2. Blood Volume**
- 3. Quality of Blood Vessels**
- 4. Diameter of Arteries**

Stress

Blood pressure is affected by emotions – fear and anger.

With continued excitation of the sympathetic nervous system, the blood pressure is definitely affected.

Through practice of Yoga, the parasympathetic nervous system is stimulated, having a direct effect on the stress levels in the mind.

Complications

The main danger of having hypertension is not the fact that the blood pressure itself is raised, but the harmful consequences of raised blood pressure. There are many things that can go wrong as the blood vessels feed into every organ of the body. When they are constricted, preventing the inflow of blood and thus the distribution of oxygen and removal of waste, tissue damage occurs. Some manifestations are –

- ***Heart Disease:*** The heart as it becomes more and more strained, increases in size, damaging its internal components such as the valves and thus impairing total function. The heart becomes prone to heart attack (death of a part of the muscle) as high blood pressure is associated with the hardening of the arteries.
- ***The Brain:*** Oxygen supply to the brain is reduced so it cannot function at its optimum level. Resulting in headaches, dizziness and vertigo. Later leading to emotional imbalance, deterioration of concentration and memory occur followed by more serious complications of organic brain deterioration, rupture of arteries (stroke), leading to paralysis and death.
- ***The eyes:*** Blurring of vision and sudden or progressive loss of vision may result due to the bursting of the retinal artery.
- ***Kidneys:*** Dysfunction occurs which may result in the inability to produce urine. This leads to toxin build-up in the body and could result in death.

Most common ill effect of High Blood Pressure are –

Stroke

Renal Failure

The Medical Point of View

From the medical point of view, there are several factors that contribute to the developing of Hypertension. And these are mainly lifestyle related. They are –

- Heredity factors
- Age
- Smoking
- Cholesterol and high fat diet
- Sedentary lifestyle
- Personality, Stress and Emotions (the adrenalin glands are directly affected by stress, and thereby increasing the blood pressure.)

Treatment

Counseling on how to live a healthy life includes diet management, to reduce the intake of fats and salts in order to lower the pressure and reduce the chance of the hardening of the arteries.

Obesity is reduced by diet.

Smoking is stopped and emotional stress is avoided,

Exercise within the range of tolerance is recommended.

Antihypertensive drugs:

Once the drugs are started, one must take them for the rest of their life. In most cases drugs lower the blood pressure without undue side effects. However, even if the symptoms of hypertension seem relieved, the drugs have to be continued. If drug therapy is stopped, there is a risk of the blood pressure shooting up to its original level or higher, with unpleasant effects. This happens because drugs do not remove the root cause of hypertension, it only suppress it.

Only yoga can get to the root cause of hypertension in a safe and efficient manner. However drugs can effectively reduce a dangerously high blood pressure as a prelude to more long range yogic therapy.

Tests and Diagnosis

Blood pressure is measured with an inflatable arm cuff and a pressure-measuring gauge. A blood pressure reading, given in millimeters of mercury (mm Hg), has two numbers.

- 1) The first, or upper, number measures the pressure in your arteries when your heart beats (systolic pressure).
- 2) The second, or lower, number measures the pressure in your arteries between beats (diastolic pressure).

Blood pressure measurements fall into four general categories:

- **Normal blood pressure.** Your blood pressure is normal if it's below 120/80 mm Hg. However, some doctors recommend 115/75 mm Hg as a better goal. Once blood pressure rises above 115/75 mm Hg, the risk of cardiovascular disease begins to increase.
- **Prehypertension** is a systolic pressure ranging from 120 to 139 mm Hg or a diastolic pressure ranging from 80 to 89 mm Hg. Prehypertension tends to get worse over time.
- **Stage 1 hypertension.** Stage 1 hypertension is a systolic pressure ranging from 140 to 159 mm Hg or a diastolic pressure ranging from 90 to 99 mm Hg.
- **Stage 2 hypertension.** More severe hypertension, stage 2 hypertension is a systolic pressure of 160 mm Hg or higher or a diastolic pressure of 100 mm Hg or higher.

Both numbers in a blood pressure reading are important. But after age 50, the systolic reading is even more significant. Isolated systolic hypertension — when diastolic pressure is normal but systolic pressure is high — is the most common type of high blood pressure among people older than 50.

Your doctor will likely take two to three blood pressure readings each at two or more separate appointments before diagnosing you with high blood pressure. This is because blood pressure normally varies throughout the day — and sometimes specifically during visits to the doctor, a condition called white-coat hypertension. Your doctor may ask you to record your blood pressure at home and at work to provide additional information.

If you have any type of high blood pressure, your doctor may recommend routine tests, such as a urine test (urinalysis), blood tests and an electrocardiogram (ECG) — a test that measures your heart's electrical activity. Your doctor may also recommend additional tests, such as a cholesterol test, to check for more signs of heart disease.

The Yogic View

According to yoga, the mind is the most important component in the cause of hypertension. It is the common denominator underlying all the aspects considered by medical science. According to yoga, it can be classified in to the following –

1. ***Mental cause*** - The core or essence of hypertensive disease is in the mind.
Manomaya Kosha – affects perception, memory and ego. Can be balanced through *Dharana and Dhyana*.
2. ***Pranic cause*** – Hypertension is also associated with disturbance in the energy systems of the body.
(Stress in the personality – These factors are determined by mind and should come under mental cause but are classified separately for clarity.)
Pranamaya Kosha – affects the breathing – can be balanced through *pranayama* practices like nadi shuddhi (without retention) and Shanmukhi mudra.
3. ***Physical cause*** – This aspect includes five of the six medical causes, most important of which are:
 - a) lifestyle: modern living, sleeping habits, smoking, diet and a sedentary occupation.
 - b) heredity
 - c) age and aging**Anamaya Kosha** – can be controlled through a yogic diet, yoga asanas and kriyas.

Yoga therefore agrees with medicine, but through experience and a deeper understanding of the whole human organism sees that the mind plays an important role in the functioning of the body.

The body is directly influenced by the mind. If a positive attitude as well as strength and health of mind are maintained then the body is well nourished and flourishes.

Cure through Yoga

Yoga aims to remove hypertension and its potentially lethal effects through a system of asanas, pranayama and meditation along with changes in lifestyle. Yoga helps one gain a new dimension of meaning to life by seeing the world with new eyes.

Yoga helps build up physical resistance, emotional harmony and pranic balance through the eradication of the root cause in the mind. Asanas and pranayama help in this process of self-healing.

Our current lifestyles known as the neo-industrial age is also called the age of anxiety. Once we are able to slow down our pace of life, everything, no matter however small takes on a new meaning.

This reflects in our mental and physical circuits and creates order from chaos, toning down our sympathetic nervous system and adrenal over-secretion, thereby removing the excessive peripheral resistance in our blood vessels and the effects of stress from our bodies.

Yoga helps one to cope with and overcome Hypertension in the following way

1. **Relaxation techniques** - which incorporate the desensitization, autosuggestion and reconditioning to remove mental tensions and complexes. These practices help cultivate a positive attitude towards life and one's own self. Through awareness one can replace mistaken concepts with more realistic, practical and positive concepts of life.
2. **Asana and Pranayama** – it helps re-balance the physical, emotional, pranic, mental and psychic aspects of being.
3. **Meditation** – it induces relaxation and aids in developing self-knowledge. One's awareness moves inward, away from external stress and influences. Helping in cleaning out the mind step by step, purifying, remoulding and realizing more about one's own real self. Through meditation the awareness is disassociated from the physical body and made one-pointed, inducing a meditative state in which alpha and theta waves are produced by the brain. They indicate deep relaxation and spontaneous creativity. The activity of the brain slows down allowing a state of complete rest to occur in the body and mind.

The breath and heart rate are lowered and the whole body enjoys deep state of rest.

In this state the blood vessels dilate and the oxygenated pure blood reaches the body organs, rejuvenating and repairing damaged tissue and maintaining healthy tissue. The circuits of the brain and mind are given the chance to reshape themselves into a more harmonious form, which affects the whole body through the peripheral nervous system.

4. ***Kriyas*** – kriyas are cleansing techniques followed in yoga to activate the prana flow in the body, while getting rid of or cleansing the body of toxins. **They rebalance the sympathetic and parasympathetic nervous systems and re-integrate the endocrine glands.** This brings the adrenal glands back into their proper place so they do not secrete excessive amounts of hormones, which increase blood pressure.

Yoga as a therapy for Hypertension

Yoga can be a very beneficial therapy to lower high blood pressure naturally. A gentle, soothing practice of yoga stretches, settles the mind and body and reduces stress.

Yoga postures tend to switch on the parasympathetic nervous system, responsible for rest and repair, and turn off the sympathetic nervous system, used for the fight-or-flight stress response.

Increased parasympathetic activity has a beneficial effect on many systems in the body, and allows the nervous system to become more balanced, freeing up the body's inherent healing response.

Used correctly, yoga can be a great therapy for high blood pressure. However, there are some cautions that need to be considered, and you are best off working with a yoga therapist that can give you a specifically tailored yoga practice for high blood pressure. If you are on hypertensive medication, you will want to continue your medication and only phase it out under a doctor's supervision. Even though your blood pressure is lowered by medication, it is not stable at that lower reading. So even if your blood pressure has been lowered to normal levels by medication, it is still important to go by the following precautions when beginning yoga.

General Cautions -

If you have cardiovascular disease or risk factors for cardiovascular disease such as diabetes, high cholesterol, atherosclerosis, then a stress test may be crucial before you start. Therefore, seeing your physician if you have these conditions is essential; any medications you may be taking should also be discussed.

Yoga Asana Cautions

In general, asanas that put the body in

a) an inverted position, having the legs and trunk higher than the heart and
c) the heart higher than the head should be avoided by people with cardiovascular disease.

Inversions in particular are contraindicated; you want to completely avoid inverting the body as in Sarvangasana (shoulder stand) or Sirsasana (headstand), which increase blood pressure in the head the most, because the legs and trunk are maximally elevated and the head is as far below the heart as possible. Even gentle, relaxing inversions like Viparita Karani, or Legs Up the Wall pose are generally not recommended.

First, let me explain how inversions affect blood pressure. In an inverted posture, gravity causes pressure to increase inside the blood vessels (arteries, veins, and capillaries) of the head and neck. The vessels of the brain and eyes are largely protected from this pressure increase because they are bathed in fluid—cerebrospinal fluid inside the skull and vitreous humor in the eyes—the pressure of which also increases during inversions: The pressure of the fluid pushing in on the blood vessel walls from outside counteracts the pressure of the blood pushing out on the vessel walls from inside.

Blood vessels that lie outside of the skull and eyes, such as those supplying the inner lining of the nose, do not have this protection. Instead, many are protected by local reflexes that respond to elevated blood pressure by contracting muscles in the vessel walls. This contraction prevents the vessel walls from being overstretched. If inversions are introduced gradually, you are in theory systematically strengthening the vessel wall muscles by challenging them to contract against greater and greater pressure.

Yoga Asanas for High Blood Pressure

Generally speaking, asanas that do not invert the body are beneficial for people with high blood pressure. Calming restorative yoga asanas are particularly useful for reducing stress and lowering blood pressure naturally, as are intensive stretching poses like leg stretches and hip openers.

1. Asanas that put the spine in a horizontal position, which allows the heart to slow down, as it takes less effort to pump the blood to the brain.
2. **Sitting positions** and lying asanas like **Baddhakonasana, Virasana, and Upavista Konasana** are very useful for people with high blood pressure.
3. **Mild inversions can be introduced gradually:** A great alternative to Viparita Karani, for example, with similar relaxing and calming effects, is supported Setu Bandha Sarvangasana (Bridge Pose) breathing . **Bridge pose is energizing for the kidneys and hence soothes the system, lowering high blood pressure.** While the head is slightly below the heart in this pose, supported Bridge Pose is generally considered to be acceptable for students with high blood pressure.
4. **Adho Mukha Svanasana (Downward-Facing Dog)** is a mildly inverted posture, which is considered acceptable; it lifts the heart only a little above the head and does not elevate the legs, increasing pressure in the head very little.

Yoga Program for persons with Hypertension

Presented below is an 8 week yoga program, to be followed at least 3 times a week.

1st & 2nd week –

Toes movement

5. Ankle rotation
6. Knee rotation
7. Waist rotation
8. Finger movement
9. Wrist rotation
10. Shoulder rotation
11. Head movements
12. Ankle stretching breathing
13. Hands in and out breathing
14. Hands stretching breathing
15. Front and back bending breathing
16. Side stretching
17. Spinal twist
18. Parivritta trikonasana breathing
19. Vyagra swasa breathing (tiger breathing)
20. Shashank asana – resting asana
21. Bhujangasana breathing
22. Makarasana resting posture
23. Shalabasana breathing
24. Urdhva Prasarita Padasana (Leg raises)
25. Sethubandasana breathing (bridge)
26. Pavanmuktasana Kriya breathing
27. Jatara Parivritta (stomach twist)
28. Savasana (corpse pose)

Pranayama –

Nadi suddhi (without retention)
Shanmukhi Mudra

Soham Meditation with Hridaya mudra

3rd& 4th week :

1. Ardhakati chakrasana
2. Trikonasana classical
3. Vrikshasana
4. Garudasana
5. Bhujangasana
6. Salabasana
7. Makrasana resting
8. Dandasana
9. Urdva Dandasana
10. Paschimotthanasana
11. Ardhamatsyendrasana
12. Gomukhasana
13. Ustrasana (without dropping the head back)
14. Savasana

5th& 6th week :

1. Surya Namaskar classical (6 rounds)
2. Ardhakati chakrasana
3. Trikonasana classical
4. Vrikshasana
5. Garudasana
6. Bhujangasana
7. Salabasana
8. Makrasana resting
9. Dandasana
10. Urdva Dandasana
11. Paschimotthanasana
12. Ardhamatsyendrasana
13. Gomukhasana
14. Ustrasana (without dropping the head back)
15. Pranayama
 - a. Nadi shuddi (without retention) – 6 rounds
 - b. Sitali
 - c. Sitkari
 - d. Brahmari
16. Savasana

7th& 8th week :

- 1. Surya Namaskar classical (12 rounds)**
- 2. Ardhakati chakrasana**
- 3. Trikonasana classical**
- 4. Vrikshasana**
- 5. Garudasana**
- 6. Bhujangasana**
- 7. Salabasana**
- 8. Makrasana resting**
- 9. Dandasana**
- 10. Urdva Dandasana**
- 11. Paschimotthanasana**
- 12. Ardhamatsyendrasana**
- 13. Gomukhasana**
- 14. Ustrasana (without dropping the head back)**
- 15. Pranayama**
- 16. Hridaya Mudra (introduction)**
- 17. Meditation**
- 18. Savasana**

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