HYPERTENSION
Htn, High Blood Pressure, Hbp, Arterial Hypertension

An elevated blood pressure, clinically defined as at or greater than 140/90 (systolic/diastolic) mmHg.

⚠️ Risk factor ♂♂ Male & Female

About Hypertension

Hypertension (HTN) or high blood pressure is a chronic medical condition in which the blood pressure in the arteries (blood vessels that carry blood away from the heart) is elevated. This requires the heart to work harder than normal to circulate blood through the blood vessels. Blood pressure involves two measurements, systolic and diastolic (Pic. 1), which depend on whether the heart muscle is contracting (systole) or relaxed between beats (diastole).

Normal blood pressure at rest is within the range of 100–140 millimeters of mercury (mmHg) systolic (top fading) and 60–90 mmHg diastolic (bottom fading). High blood pressure is said to be present if it is persistently at or above 140/90 mmHg (Pic. 2). The repercussions of chronically elevated blood pressure included widespread damage to the circulatory system, arterial disease, cardiac failure and even neurological impairments (Pic. 3).

It is estimated to occur in about one in three young adults, increasing to about 60% for those over 60 and affects more than three of four people older than 70.

Primary and Secondary Hypertension

Hypertension is classified as either primary (essential) hypertension or secondary hypertension; about 90–95% of cases are categorized as "primary hypertension" which means high blood pressure with no obvious underlying medical cause. The remaining 5–10% of cases (secondary hypertension) are caused by other conditions that affect the kidneys, arteries, heart, or endocrine system.

In most people with established primary hypertension, increased resistance to blood flow (total peripheral resistance) accounts for the high pressure while cardiac output remains normal. This increased peripheral resistance is mainly attributable to structural narrowing of small arteries and arterioles, although a reduction in the number or density of capillaries may also contribute.

Secondary hypertension results from an identifiable cause. Renal disease is the most common secondary cause of hypertension. Hypertension can also be caused by endocrine conditions, such as Cushing's syndrome (abnormally high levels of cortisol), hyperthyroidism (overactive thyroid), hypothyroidism (underactive thyroid), and acromegaly (growth hormone excess). Other causes of secondary hypertension include obesity, sleep apnea, pregnancy, and coarctation of the aorta.

Among those with a diagnosis of hypertension, the World Health Organization (WHO) has stated that low adherence to treatment is a key factor impeding good control and has called for research into adherence promoting interventions. Estimates of the rate of poor adherence or non-adherence to treatment range from 30 to 50%. The causes of poor adherence are complex and include complicated drug regimens, the costs of drugs, older age (Pic. 4), poor social support, cognitive problems, and depression.

Hypertension is diagnosed on the basis of a persistently high resting blood pressure. The American Heart Association recommends at least three resting measurements on at least two separate health care visits.
Ambulatory blood pressure monitoring over 12 to 24 hours is the most accurate method to confirm the diagnosis.

Once the diagnosis of hypertension has been made, healthcare providers should attempt to identify the underlying cause based on risk factors and other symptoms, if present. Secondary hypertension is more common in preadolescent children, with most cases caused by kidney disease. Primary or essential hypertension is more common in adolescents and has multiple risk factors, including obesity and a family history of hypertension. Laboratory tests can also be performed to identify possible causes of secondary hypertension, and to determine whether hypertension has caused damage to the heart, eyes, and kidneys. Additional tests for diabetes and high cholesterol levels are usually performed because these conditions are additional risk factors for the development of heart disease and may require treatment.

The first line of treatment for hypertension is lifestyle changes, including dietary changes, physical exercise, and weight loss. Dietary changes shown to reduce blood pressure include diets with low sodium, the DASH (Dietary Approaches to Stop Hypertension) diet, and vegetarian diets. While potassium supplementation (a mineral and electrolyte that is essential to the function of the heart, muscles, nerves, kidney and digestive system) is useful it is unclear if a high dietary potassium intake is beneficial. Physical exercise regimens which are shown to reduce blood pressure include isometric resistance exercise, aerobic exercise, resistance exercise, and device-guided breathing. Stress reduction techniques such as biofeedback (gaining more control over normally involuntary functions) or transcendental meditation (specific form of mantra meditation) may be considered as an add-on to other treatments to reduce hypertension, but do not have evidence for preventing cardiovascular disease on their own.

Several classes of medications, collectively referred to as antihypertensive medications, are available for treating hypertension. First line medications for hypertension include thiazide-diuretics, calcium channel blockers, angiotensin converting enzyme inhibitors and angiotensin receptor blockers. These medications may be used alone or in combination; the latter option may serve to minimize counter-regulatory mechanisms that act to revert blood pressure values to pre-treatment levels. The majority of people require more than one medication to control their hypertension.

Resistant hypertension is defined as hypertension that remains above goal blood pressure in spite of using, at once, three antihypertensive medications belonging to different drug classes. Low adherence to treatment is an important cause of resistant hypertension. Resistant hypertension may also represent the result of chronic high activity of the autonomic nervous system; this concept is known as "neurogenic hypertension".

**Symptoms**

Hypertension is usually asymptomatic, but patients could feel:

- headache
- dizziness
- palpations/racing heart
- sweating
- tiredness
- neck pain
- nausea/vomiting
- chest pain
- visual changes
- feeling nervous/irritable

**Associated diseases**

- cardiovascular diseases
- kidney disease
- diabetes
- sleep apnea
- pregnancy-induced hypertension
- thyroid disorders
- adrenal gland tumors
- polycystic ovary syndrome (PCOS)

**Complications**

Persistent (permanent) high blood pressure can affect many areas of the body. During pregnancy, new hypertension could occur after 20th week (gestational hypertension). If the gestational hypertension is associated with protein in the uterine, the condition is called preeclampsia. These pregnancies are closely
Hypertension is one of the leading causes of cardiovascular (CV) morbidity and mortality throughout the world due to its many complications. Hypertension is a major risk factor for stroke, myocardial infarction (heart attacks), heart failure, aneurysms of the arteries (weakened and bulged blood vessels), peripheral arterial disease, and is a cause of chronic kidney disease. High blood pressure may also affect the ability to think, remember and learn. In response to high blood pressure, retinal blood circulation and retina could be damaged (hypertensive retinopathy).

Even moderate elevation of arterial blood pressure is associated with a shortened life expectancy. Moreover, the 5-year loss is an average for all hypertensives. This means that it would be more than twice that for people at high risk like heavy smokers, those with high cholesterol, those engaging in no exercise, the obese and individuals with a systolic blood pressure of 190 or more. Such an estimate is too high even for people at especially high risk. Finally, estimates of huge losses in life expectancy due to hypertension cannot be supported at the population level.

Risk factors

- advanced age
- ethnicity (African American)
- family history
- sedentary life
- cigarette smoking
- high salt intake
- vitamin D deficiency
- alcohol drinking
- stress
- obesity
- diabetes
- kidney diseases
- oral contraceptive use
- drugs intake

Prevention

Much of the disease burden of high blood pressure is experienced by people who are not labeled as hypertensive. Consequently, population strategies are required to reduce the consequences of high blood pressure and reduce the need for antihypertensive drug therapy. Lifestyle changes are recommended to lower blood pressure, before starting drug therapy.

Lifestyle factors such as dietary behaviors and physical activity are associated with hypertension. Maintaining a healthy diet; daily exercise; avoiding spicy, sour, or meat-based foods and alcohol; monitoring blood pressure regularly as well as increasing water consumption are suggested as ways to prevent high blood pressure.

Several studies have indicated direct and indirect associations between overweight and increased risk of hypertension. Increased consumption of grains, fruits, vegetables, and milk and reduced consumption of sodium, fat, and alcohol are effective in preventing and controlling hypertension. In addition, some studies have reported a 35% reduction in risk of developing hypertension among individuals who engage in regular physical activity compared to sedentary people.

How it can affect fertility

Male fertility

Untreated hypertension may cause poor semen quality. Also, common drugs used to control hypertension can reduce male fertility by reducing sperm quality. Spironolactone is believed to affect sperm production while other hypertension medication can interfere with the sperm's ability to fertilize an egg. ACE (angiotensin-converting enzyme) inhibitors were found to reduce the chance of having a baby by 9%. Other common medication, beta blockers, were found to decrease semen volume, semen concentration and sperm motility thus reduce the chance by 11%. Beta blockers are known to have side effects including loss of libido, insomnia and impotence. Calcium channel blockers drugs are not seen to have a higher risk of infertility.
Female fertility

In women, hypertension is associated with poor egg quality, possibly affecting embryo quality. Besides, ACE inhibitors can also be dangerous during pregnancy to both mother and her developing baby. The theoretical issue suggests that hypertension affects the lining of the uterus, which could interfere with an embryo’s healthy implantation.

Male and female infertility

Generally, most patients don’t have hypertension standalone but in combination with other condition that may have impact on fertility, e.g. obesity, smoking, and advanced age.

Obesity raises blood pressure by affecting renal function. Also, obesity leads to infertility in both men and women. This is primarily due to excess estrogen interfering with normal ovulation in women and altering spermatogenesis (sperm production) in men.

Smoking and hypertension are two well-known independent risk factors for both heart and blood vessel. There is evidence that the association of cigarette smoking with hypertension exponentially increases the risk of cardiovascular disease and events when compared to that of each of these factors singly acting. Women who smoke are at increased risk for a variety of reproductive problems, including ectopic pregnancy, delay to conception, and infertility. The harmful products of tobacco smoking may damage the testicles and kill sperm, but their effect on male fertility is not clear.

Prognosis

Hypertension doesn’t mean the inability to get pregnant, but it is very important to reduce the negative impact of hypertension on pregnancy. Dietary and lifestyle changes can improve blood pressure control and decrease the risk of associated health complications, although drug treatment is often necessary in people for whom lifestyle changes prove ineffective or insufficient. However, hypertension medication should be discussed with your doctor who will recommend you safe medication before trying to get pregnant to enhance the fertility and to avoid the risk on pregnancy. Since the burden of these drugs on fertility increases as the average age of paternity increases, patients should try to have babies sooner rather than coming off hypertension drugs.

If the pregnancy is unplanned, women should visit her doctor as soon as possible to discuss the medication. Once the women get pregnant, she has to be closely monitored to reduce the risk of hypertension on pregnancy.

The morbidity and mortality of hypertensive emergencies depend on the extent of end-organ dysfunction at the time of presentation and the degree to which blood pressure is controlled afterward. With good blood pressure control and medication compliance, the 10-year survival rate of patients with hypertensive crises approaches 70%.

Commonly, ischemic heart attack (the most common type of cardiovascular disease) and stroke are the causes that lead to death in patients with severe hypertension. It is estimated that for every 20 mm Hg systolic or 10 mm Hg diastolic increase in blood pressures above 115/75 mm Hg, the mortality rate for both ischemic heart disease and stroke doubles.

Although severe hypertension is more common in the elderly, it may occur in children (though very rarely). Also, women have slightly increased risks of developing hypertension crises than do men. The lifetime risk for developing hypertension is 86-90% in females and 81-83% in males.

Find more about related issues

Diagnoses
Endometrial cancer
Cancer that arises from the endometrium, the lining of the uterus.
Learn more at: www.fertilitypedia.org/therapy/diag/endometrial-cancer

Endometrial polyp
The finger like overgrowths attached to the inner wall of the uterus that extend into the uterine cavity which are made of endometrial tissue.
Learn more at: www.fertilitypedia.org/therapy/diag/endometrial-polyp

Obesity
A disease of excess body fat that can have a negative effect on health, leading to reduced life expectancy and other health problems.
Learn more at: www.fertilitypedia.org/therapy/diag/obesity

Polycystic ovary syndrome
A condition in which a woman has an imbalance of female sex hormones. This may lead to changes in the menstrual cycle, cysts in the ovaries, trouble g
Learn more at: www.fertilitypedia.org/therapy/diag/polycystic-ovary-syndrome

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**Pic. 1: Heart Systole vs. Diastole**
Blood pressure is usually expressed in terms of the systolic (maximum during one heart beat) pressure over diastolic (minimum in between two heart beats) pressure and is measured in millimeters of mercury (mmHg).

**Pic. 2: Values and classification of blood pressure for adults**

<table>
<thead>
<tr>
<th>Classification of blood pressure for adults</th>
<th>Systolic (mm Hg)</th>
<th>Diastolic (mm Hg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypotension</td>
<td>&lt; 90</td>
<td>&lt; 60</td>
</tr>
<tr>
<td>Desired</td>
<td>90-119</td>
<td>60-79</td>
</tr>
<tr>
<td>Prehypertension</td>
<td>120-139</td>
<td>80-89</td>
</tr>
<tr>
<td>Stage 1 hypertension</td>
<td>140-159</td>
<td>90-99</td>
</tr>
<tr>
<td>Stage 2 hypertension</td>
<td>160-179</td>
<td>100-109</td>
</tr>
<tr>
<td>Hypertensive urgency</td>
<td>≥ 180</td>
<td>≥ 110</td>
</tr>
<tr>
<td>Isolated systolic hypertension</td>
<td>≥ 160</td>
<td>&lt; 90</td>
</tr>
</tbody>
</table>

**Pic. 3: Hypertension**
Persistant high blood pressure can affect many areas of the body.

**Pic. 4: Actual age-adjusted rates for men aged 45–74 years related to systolic blood pressure. The direct age-adjusted rate is the sum of the lower two curves**

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**Main complications of persistent High blood pressure**

- **Brain:**
  - Cerebrovascular accident (strokes)
  - Hypertensive encephalopathy:
    - Confusion
    - Headache
    - Convulsion

- **Retina of eye:**
  - Hypertensive retinopathy

- **Heart:**
  - Myocardial infarction (heart attack)
  - Hypertensive cardiomyopathy:
    - Heart failure

- **Blood:**
  - Elevated sugar levels

- **Kidneys:**
  - Hypertensive nephropathy:
    - Chronic renal failure
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