

## Review of High Blood Pressure HBP Symptoms and Treatment

Anvit Dhruv

Bio-Chemistry Academic Department University of Calcutta, India

---

### ABSTRACT

This article reviews high blood pressure (HBP), also known as hypertension. HBP is a long-term medical condition in which the blood pressure in the arteries is persistently elevated. High blood pressure typically does not cause symptoms. Long-term high blood pressure, however, is a major risk factor for coronary artery disease, stroke, heart failure, atrial fibrillation, peripheral arterial disease, vision loss, chronic kidney disease, and dementia. It can lead to severe health complications and increase the risk of heart disease, stroke, and sometimes death. High blood pressure is classified as primary (essential) hypertension or secondary hypertension. About 90-95% of cases are primary, defined as high blood pressure due to nonspecific lifestyle and genetic factors. Lifestyle factors that increase the risk include excess salt in the diet, excess body weight, smoking, and alcohol use. To measure your blood pressure, your doctor or a specialist will usually place an inflatable arm cuff around your arm and measure your blood pressure using a pressure-measuring gauge. Changing your lifestyle can go a long way toward controlling high blood pressure. Your doctor may recommend you make lifestyle changes including: Eating a heart-healthy diet with less salt, Getting regular physical activity, Maintaining a healthy weight or losing weight if you're overweight or obese, Limiting the amount of alcohol you drink. High blood pressure is the most common primary diagnosis in the world. Although control rates have improved but are still far below the optimal goal. Recent clinical trials have demonstrated that effective blood pressure control can be achieved in most patients who are hypertensive, but the majority will require two or more antihypertensive drugs

Keywords: High blood pressure, HBP, hypertension, symptoms, treatment

---

### INTRODUCTION

High blood pressure (HBP) also known as Hypertension, is a long-term medical condition in which the blood pressure in the arteries is persistently elevated. High blood pressure typically does not cause symptoms. Long-term high blood pressure, however, is a major risk factor for coronary artery disease, stroke, heart failure, atrial fibrillation, peripheral arterial disease, vision loss, chronic kidney disease, and dementia. It can lead to severe health complications and increase the risk of heart disease, stroke, and sometimes death [1].

Blood pressure is the force that a person's blood exerts against the walls of their blood vessels. This pressure depends on the resistance of the blood vessels and how hard the heart has to work. High blood pressure is a common condition in

which the long-term force of the blood against your artery walls is high enough that it may eventually cause health problems, such as heart disease. Blood pressure is determined both by the amount of blood your heart pumps and the amount of resistance to blood flow in your arteries. The more blood your heart pumps and the narrower your arteries, the higher your blood pressure. You can have high blood pressure (hypertension) for years without any symptoms. Even without symptoms, damage to blood vessels and your heart continues and can be detected. Uncontrolled high blood pressure increases your risk of serious health problems, including heart attack and stroke [2]. High blood pressure generally develops over many years, and it affects nearly everyone eventually.

Fortunately, high blood pressure can be easily detected. And once you know you have high blood pressure, you can work with your doctor to control it.

High blood pressure is classified as primary (essential) hypertension or secondary hypertension. About 90-95% of cases are primary, defined as high blood pressure due to nonspecific lifestyle and genetic factors. Lifestyle factors that increase the risk include excess salt in the diet, excess body weight, smoking, and alcohol use [3]. The remaining 5-10% of cases are categorized as secondary high blood pressure, defined as high blood pressure due to an identifiable cause, such as chronic kidney disease, narrowing of the kidney arteries, an endocrine disorder, or the use of birth control pills. Blood pressure is expressed by two measurements, the systolic and diastolic pressures, which are the maximum and minimum pressures, respectively. 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. Ambulatory blood pressure monitoring over a 24-hour period appears more accurate than office-based blood pressure measurement. Lifestyle changes and medications can lower blood pressure and decrease the risk of health complications. Lifestyle changes include weight loss, physical exercise, decreased salt intake, reducing alcohol intake, and a healthy diet [4]. If lifestyle changes are not sufficient then blood pressure medications are used. Up to three medications can control blood pressure in 90% of people. The treatment of moderately high arterial blood pressure (defined as >160/100 mmHg) with medications is associated with an improved life expectancy. The effect of treatment of blood pressure between 130/80 mmHg and 160/100 mmHg is less clear, with some reviews finding benefit and others finding unclear benefit. High blood pressure affects between 16 and

37% of the population globally.[5] In 2010 hypertension was believed to have been a factor in 18% of all deaths (9.4 million globally).

#### **Symptoms of High Blood Pressure**

Hypertension is generally a silent condition. Many people won't experience any symptoms. It may take years or even decades for the condition to reach levels severe enough that symptoms become obvious. Even then, these symptoms may be attributed to other issues.

Symptoms of severe hypertension can include:

- headaches
- shortness of breath
- nosebleeds
- flushing
- dizziness
- chest pain
- visual changes
- blood in the urine

These symptoms require immediate medical attention. They don't occur in everyone with hypertension, but waiting for a symptom of this condition to appear could be fatal. The best way to know if you have hypertension is to get regular blood pressure readings [6] [7]. Most doctors' offices take a blood pressure reading at every appointment. If you only have a yearly physical, talk to your doctor about your risks for hypertension and other readings you may need to help you watch your blood pressure. For example, if you have a family history of heart disease or have risk factors for developing the condition, your doctor may recommend that you have your blood pressure checked twice a year. This helps you and your doctor stay on top of any possible issues before they become problematic.

#### **Risk Factors of High Blood Pressure**

High blood pressure has many risk factors, including:

- **Age.** The risk of high blood pressure increases as you age. Until about age 64, high blood pressure is more common in men. Women are more likely to develop high blood pressure after age 65.
- **Race.** High blood pressure is particularly common among people

of African heritage, often developing at an earlier age than it does in whites. Serious complications, such as stroke, heart attack and kidney failure, also are more common in people of African heritage.

- **Family history.** High blood pressure tends to run in families.
- **Being overweight or obese.** The more you weigh the more blood you need to supply oxygen and nutrients to your tissues. As the volume of blood circulated through your blood vessels increases, so does the pressure on your artery walls.
- **Not being physically active.** People who are inactive tend to have higher heart rates. The higher your heart rate, the harder your heart must work with each contraction and the stronger the force on your arteries. Lack of physical activity also increases the risk of being overweight.
- **Using tobacco.** Not only does smoking or chewing tobacco immediately raise your blood pressure temporarily, but the chemicals in tobacco can damage the lining of your artery walls. This can cause your arteries to narrow and increase your risk of heart disease. Secondhand smoke also can increase your heart disease risk.
- **Too much salt (sodium) in your diet.** Too much sodium in your diet can cause your body to retain fluid, which increases blood pressure.
- **Too little potassium in your diet.** Potassium helps balance the amount of sodium in your cells. If you don't get enough potassium in your diet or retain enough potassium, you may accumulate too much sodium in your blood.
- **Drinking too much alcohol.** Over time, heavy drinking can damage your heart. Having more than one drink a day for women and more than two drinks a day for men may affect your blood pressure. If you drink alcohol, do so in moderation. For healthy adults, that means up to one drink a day for

women and two drinks a day for men. One drink equals 12 ounces of beer, 5 ounces of wine or 1.5 ounces of 80-proof liquor.

- **Stress.** High levels of stress can lead to a temporary increase in blood pressure. If you try to relax by eating more, using tobacco or drinking alcohol, you may only increase problems with high blood pressure.
- **Certain chronic conditions.** Certain chronic conditions also may increase your risk of high blood pressure, such as kidney disease, diabetes and sleep apnea.

Sometimes pregnancy contributes to high blood pressure, as well.

Although high blood pressure is most common in adults, children may be at risk, too. For some children, high blood pressure is caused by problems with the kidneys or heart. But for a growing number of kids, poor lifestyle habits, such as an unhealthy diet, obesity and lack of exercise, contribute to high blood pressure [8].

### Complications

The excessive pressure on your artery walls caused by high blood pressure can damage your blood vessels, as well as organs in your body [9]. The higher your blood pressure and the longer it goes uncontrolled, the greater the damage. Uncontrolled high blood pressure can lead to complications including:

- **Heart attack or stroke.** High blood pressure can cause hardening and thickening of the arteries (atherosclerosis), which can lead to a heart attack, stroke or other complications.
- **Aneurysm.** Increased blood pressure can cause your blood vessels to weaken and bulge, forming an aneurysm. If an aneurysm ruptures, it can be life-threatening.
- **Heart failure.** To pump blood against the higher pressure in your vessels, the heart has to work harder. This causes the walls of the heart's pumping chamber to thicken (left ventricular hypertrophy). Eventually, the thickened muscle

may have a hard time pumping enough blood to meet your body's needs, which can lead to heart failure.

- **Weakened and narrowed blood vessels in your kidneys.** This can prevent these organs from functioning normally.
- **Thickened, narrowed or torn blood vessels in the eyes.** This can result in vision loss.
- **Metabolic syndrome.** This syndrome is a cluster of disorders of your body's metabolism, including increased waist circumference; high triglycerides; low high-density lipoprotein (HDL) cholesterol, the "good" cholesterol; high blood pressure and high insulin levels. These conditions make you more likely to develop diabetes, heart disease and stroke.
- **Trouble with memory or understanding.** Uncontrolled high blood pressure may also affect your ability to think, remember and learn. Trouble with memory or understanding concepts is more common in people with high blood pressure.
- **Dementia.** Narrowed or blocked arteries can limit blood flow to the brain, leading to a certain type of dementia (vascular dementia). A stroke that interrupts blood flow to the brain also can cause vascular dementia.

#### **Understanding High Blood Pressure Readings**

Two numbers create a blood pressure reading:

- **Systolic pressure:** This is the first, or top, number. It indicates the pressure in your arteries when your heart beats and pumps out blood.
- **Diastolic pressure:** This is the second, or bottom, number. It's the reading of the pressure in your arteries between beats of your heart.

Five categories define blood pressure readings for adults:

- **Healthy:** A healthy blood pressure reading is less than 120/80 millimeters of mercury (mm Hg).
- **Elevated:** The systolic number is between 120 and 129 mm Hg, and the diastolic number is less than 80 mm Hg. Doctors usually don't treat elevated blood pressure with medication. Instead, your doctor may encourage lifestyle changes to help lower your numbers.
- **Stage 1 hypertension:** The systolic number is between 130 and 139 mm Hg, or the diastolic number is between 80 and 89 mm Hg.
- **Stage 2 hypertension:** The systolic number is 140 mm Hg or higher, or the diastolic number is 90 mm Hg or higher.
- **Hypertensive crisis:** The systolic number is over 180 mm Hg, or the diastolic number is over 120 mm Hg. Blood pressure in this range requires urgent medical attention. If any symptoms such as chest pain, headache, shortness of breath, or visual changes occur when blood pressure is this high, medical care in the emergency room is needed.

A blood pressure reading is taken with a pressure cuff. For an accurate reading, it's important you have a cuff that fits. An ill-fitting cuff may deliver inaccurate readings. Blood pressure readings are different for children and teenagers [10]. Ask your child's doctor for the healthy ranges for your child if you're asked to monitor their blood pressure.

#### **Types and Causes of High Blood Pressure**

There are two types of hypertension. Each type has a different cause.

##### **Primary High Blood Pressure**

Primary high blood pressure is also called essential hypertension. This kind of hypertension develops over time with no identifiable cause. Most people have this type of high blood pressure [11].

Researchers are still unclear what mechanisms cause blood pressure to slowly increase. A combination of factors may play a role. These factors include:

- **Genes:** Some people are genetically predisposed to hypertension. This may be from gene mutations or genetic abnormalities inherited from your parents.
- **Physical changes:** If something in your body changes, you may begin experiencing issues throughout your body. High blood pressure may be one of those issues. For example, it's thought that changes in your kidney function due to aging may upset the body's natural balance of salts and fluid. This change may cause your body's blood pressure to increase.
- **Environment:** Over time, unhealthy lifestyle choices like lack of physical activity and poor diet can take their toll on your body. Lifestyle choices can lead to weight problems. Being overweight or obese can increase your risk for hypertension.

#### **Secondary High Blood Pressure**

Secondary high blood pressure often occurs quickly and can become more severe than primary hypertension. Several conditions that may cause secondary hypertension include:

- kidney disease
- obstructive sleep apnea
- congenital heart defects
- problems with your thyroid
- side effects of medications
- use of illegal drugs
- alcohol abuse or chronic use
- adrenal gland problems
- certain endocrine tumors

#### **Diagnosis of High Blood Pressure**

To measure your blood pressure, your doctor or a specialist will usually place an inflatable arm cuff around your arm and measure your blood pressure using a pressure-measuring gauge [12].

A blood pressure reading, given in millimeters of mercury (mm Hg), has two numbers. The first, or upper, number measures the pressure in your arteries when your heart beats (systolic pressure). 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.
- **Elevated blood pressure.** Elevated blood pressure is a systolic pressure ranging from 120 to 129 mm Hg and a diastolic pressure below 80 mm Hg. Elevated blood pressure tends to get worse over time unless steps are taken to control blood pressure.
- **Stage 1 hypertension.** Stage 1 hypertension is a systolic pressure ranging from 130 to 139 mm Hg or a diastolic pressure ranging from 80 to 89 mm Hg.
- **Stage 2 hypertension.** More severe hypertension, stage 2 hypertension is a systolic pressure of 140 mm Hg or higher or a diastolic pressure of 90 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 is a condition in which the diastolic pressure is normal (less than 80 mm Hg) but systolic pressure is high (greater than or equal to 130 mm Hg). This is a common type of high blood pressure among people older than 65.

Your doctor will likely take two to three blood pressure readings each at three or more separate appointments before diagnosing you with high blood pressure [13]. This is because blood pressure normally varies throughout the day, and it may be elevated during visits to the doctor (white coat hypertension). Your blood pressure generally should be measured in both arms to determine if there is a difference. It's important to use an appropriate-sized arm cuff. Your doctor may ask you to record your blood pressure at home to provide additional information and confirm if you have high blood pressure. Your doctor may recommend a 24-hour blood pressure monitoring test called ambulatory blood pressure monitoring to confirm if you have high blood pressure. The device used for this test measures your blood pressure at regular intervals over a 24-

[www.idosr.org](http://www.idosr.org)

hour period and provides a more accurate picture of blood pressure changes over an average day and night. However, these devices aren't available in all medical centers, and they may not be reimbursed. If you have any type of high blood pressure, your doctor will review your medical history and conduct a physical examination. Your doctor may also recommend routine tests, such as a urine test (urinalysis), blood tests, a cholesterol test and an electrocardiogram a test that measures your heart's electrical activity. Your doctor may also recommend additional tests, such as an echocardiogram, to check for more signs of heart disease [14].

#### **Treatment of High Blood Pressure**

Changing your lifestyle can go a long way toward controlling high blood pressure. Your doctor may recommend you make lifestyle changes including:

- Eating a heart-healthy diet with less salt
- Getting regular physical activity
- Maintaining a healthy weight or losing weight if you're overweight or obese
- Limiting the amount of alcohol you drink

But sometimes lifestyle changes aren't enough. In addition to diet and exercise, your doctor may recommend medication to lower your blood pressure.

Your blood pressure treatment goal depends on how healthy you are.

Your blood pressure treatment goal should be less than 130/80 mm Hg if:

- You're a healthy adult age 65 or older
- You're a healthy adult younger than age 65 with a 10 percent or higher risk of developing cardiovascular disease in the next 10 years
- You have chronic kidney disease, diabetes or coronary artery disease

Although 120/80 mm Hg or lower is the ideal blood pressure goal, doctors are unsure if you need treatment (medications) to reach that level.

If you're age 65 or older, and use of medications produces lower systolic blood pressure (such as less than 130 mm Hg), your medications won't need to be

Anvit

changed unless they cause negative effects to your health or quality of life.

The category of medication your doctor prescribes depends on your blood pressure measurements and your other medical problems [16]. It's helpful if you work together with a team of medical professionals experienced in providing treatment for high blood pressure to develop an individualized treatment plan.

#### **Medications to treat high blood pressure**

- **Thiazide diuretics.** Diuretics, sometimes called water pills, are medications that act on your kidneys to help your body eliminate sodium and water, reducing blood volume. Thiazide diuretics are often the first, but not the only, choice in high blood pressure medications. Thiazide diuretics include chlorthalidone, hydrochlorothiazide (Microzide) and others. If you're not taking a diuretic and your blood pressure remains high, talk to your doctor about adding one or replacing a drug you currently take with a diuretic. Diuretics or calcium channel blockers may work better for people of African heritage and older people than do angiotensin-converting enzyme (ACE) inhibitors alone. A common side effect of diuretics is increased urination.
- **Angiotensin-converting enzyme (ACE) inhibitors.** These medications — such as lisinopril (Zestril), benazepril (Lotensin), captopril (Capoten) and others — help relax blood vessels by blocking the formation of a natural chemical that narrows blood vessels. People with chronic kidney disease may benefit from having an ACE inhibitor as one of their medications.
- **Angiotensin II receptor blockers (ARBs).** These medications help relax blood vessels by blocking the action, not the formation, of a natural chemical that narrows blood vessels. ARBs include candesartan (Atacand), losartan (Cozaar) and others. People with chronic kidney

disease may benefit from having an ARB as one of their medications.

- **Calcium channel blockers.** These medications — including amlodipine (Norvasc), diltiazem (Cardizem, Tiazac, others) and others — help relax the muscles of your blood vessels. Some slow your heart rate. Calcium channel blockers may work better for older people and people of African heritage than do ACE inhibitors alone.

Grapefruit juice interacts with some calcium channel blockers, increasing blood levels of the medication and putting you at higher risk of side effects. Talk to your doctor or pharmacist if you're concerned about interactions.

#### **Other medications sometimes used to treat high blood pressure**

If you're having trouble reaching your blood pressure goal with combinations of the above medications, your doctor may prescribe:

- **Alpha blockers.** These medications reduce nerve impulses to blood vessels, reducing the effects of natural chemicals that narrow blood vessels. Alpha blockers include doxazosin (Cardura), prazosin (Minipress) and others.
- **Alpha-beta blockers.** In addition to reducing nerve impulses to blood vessels, alpha-beta blockers slow the heartbeat to reduce the amount of blood that must be pumped through the vessels. Alpha-beta blockers include carvedilol (Coreg) and labetalol (Trandate).
- **Beta blockers.** These medications reduce the workload on your heart and open your blood vessels, causing your heart to beat slower and with less force. Beta blockers include acebutolol (Sectral), atenolol (Tenormin) and others. Beta blockers aren't usually recommended as the only medication you're prescribed, but they may be effective when combined with other blood pressure medications.

- **Aldosterone antagonists.** Examples are spironolactone (Aldactone) and eplerenone (Inspra). These drugs block the effect of a natural chemical that can lead to salt and fluid retention, which can contribute to high blood pressure.
- **Renin inhibitors.** Aliskiren (Tekturna) slows down the production of renin, an enzyme produced by your kidneys that starts a chain of chemical steps that increases blood pressure. Aliskiren works by reducing the ability of renin to begin this process. Due to a risk of serious complications, including stroke, you shouldn't take aliskiren with ACE inhibitors or ARBs.
- **Vasodilators.** These medications, including hydralazine and minoxidil, work directly on the muscles in the walls of your arteries, preventing the muscles from tightening and your arteries from narrowing.
- **Central-acting agents.** These medications prevent your brain from signaling your nervous system to increase your heart rate and narrow your blood vessels. Examples include clonidine (Catapres, Kapvay), guanfacine (Intuniv, Tenex) and methyl dopa.

To reduce the number of daily medication doses you need, your doctor may prescribe a combination of low-dose medications rather than larger doses of one single drug. In fact, two or more blood pressure drugs often are more effective than one. Sometimes finding the most effective medication or combination of drugs is a matter of trial and error.

**RECOMMENDATION AND CONCLUSION**  
Lifestyle adjustments are the standard, first-line treatment for high blood pressure. We outline some recommendations here:

#### **Regular physical exercise**

People can measure blood pressure using a sphygmomanometer. Current guidelines recommend that all people, including those with hypertension, engage in at least 150 minutes of moderate intensity, aerobic exercise every week, or 75

minutes a week of high intensity exercise. People should exercise on at least 5 days of the week. Examples of suitable activities are walking, jogging, cycling, or swimming.

### **Stress reduction**

Avoiding or learning to manage stress can help a person control blood pressure. Meditation, warm baths, yoga, and simply going on long walks are relaxation techniques that can help relieve stress. People should avoid consuming alcohol, recreational drugs, tobacco, and junk food to cope with stress, as these can contribute to elevated blood pressure and the complications of hypertension.

Smoking can increase blood pressure. Avoiding or quitting smoking reduces the risk of hypertension, serious heart conditions, and other health issues.

### **Medication**

People can use specific medications to treat hypertension. Doctors will often recommend a low dose at first. Antihypertensive medications will usually only have minor side effects.

Eventually, people with hypertension will need to combine two or more drugs to manage their blood pressure.

Medications for hypertension include:

- diuretics, including thiazides, chlorthalidone, and indapamide
- beta-blockers and alpha-blockers
- calcium-channel blockers
- central agonists
- peripheral adrenergic inhibitor
- vasodilators
- angiotensin-converting enzyme (ACE) inhibitors
- angiotensin receptor blockers

The choice of medication depends on the individual and any underlying medical conditions they may experience.

Anyone on antihypertensive medications should carefully read the labels of any over-the-counter (OTC) drugs they may also take, such as decongestants. These OTC drugs may interact with the medications they are taking to lower their blood pressure.

### **Diet**

People can prevent high blood pressure by following a heart-healthy diet.

### **Reducing salt intake**

People's average salt intake is between 9 grams (g) and 12 g per day in most countries around the world.

The World Health Organization (WHO) recommend reducing intake to under 5 g a day to help decrease the risk of hypertension and related health problems.

Lowering salt intake can benefit people both with and without hypertension.

### **Moderating alcohol consumption**

Moderate to excessive alcohol consumption can increase blood pressure. The American Heart Association (AHA) recommend a maximum of two alcoholic drinks a day for men, and one for women. The following would count as one drink:

- a 12-ounce (oz) bottle of beer
- 4 oz of wine
- 1.5 oz of 80-proof spirits
- 1 oz of 100-proof spirits

A healthcare provider can help people reduce consumption if they find it difficult to moderate their alcohol intake.

### **Eating more fruit and vegetables and less fat**

People who have high blood pressure or people at high risk of developing high blood pressure should eat as little saturated and total fat as possible.

Instead, experts recommend:

- whole grain, high fiber foods
- a variety of fruit and vegetables
- beans, pulses, and nuts
- fish rich in omega-3 twice a week
- nontropical vegetable oils, for example, olive oil
- skinless poultry and fish
- low fat dairy products

It is important to avoid trans fats, hydrogenated vegetable oils, and animal fats, as well as large portion sizes.

Some fats, such as those in oily fish and olive oil, have protective effects on the heart. However, these are still fats. While they are typically healthful, people with a risk of hypertension should still include them in their total fat intake.

### **Managing body weight**

Excess body weight can contribute to hypertension. A fall in blood pressure usually follows weight loss, as the heart



[www.idosr.org](http://www.idosr.org)

does not have to work so hard to pump blood around the body.

A balanced diet with a calorie intake that matches the individual's size, sex, and activity level will help.

#### **The DASH diet**

The U.S. National Heart, Lung, and Blood Institute (NHLBI) recommend the DASH diet for people with high blood pressure. DASH stands for "Dietary Approaches to Stop Hypertension."

DASH is a flexible and balanced eating plan with a firm grounding in research by the NHLBI who advise that the diet:

- lowers high blood pressure
- improves levels of fats in the bloodstream
- reduces the risk of cardiovascular disease

The NHLBI produce a cookbook called *Keep the Beat Recipes* that provides meal ideas to help reduce blood pressure.

Research from 2014 suggests that using probiotic supplements for 8 weeks or more may benefit people with hypertension.

#### **CONCLUSION**

High blood pressure is the most common primary diagnosis in the world. Although control rates have improved but are still far below the optimal goal. Recent clinical trials have demonstrated that effective blood pressure control can be achieved in most patients who are hypertensive, but the majority will require two or more antihypertensive drugs. Of paramount importance, clinicians should prescribe lifestyle modifications, adequate antihypertensive drug doses, or appropriate drug combinations for effective BP control. JNC 7 sets evidence based guidelines for recommendations of

diagnosis and evaluation of hypertension; the JNC 8 provides updated evidence-based recommendations on treatment. However, neither set of guidelines substitutes for a physicians' clinical decision-making [17]. High blood pressure is a very important disorder in aged people and is associated with higher risk of cardiovascular morbidity and mortality. The fact of reducing blood pressure values decreases the risk for cardiac death as well as neurological, metabolic, and musculoskeletal system sequelae in aged people.

#### **REFERENCES**

1. Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo JL, Jones DW, Materson BJ, Oparil S, Wright JT, Roccella EJ (December 2003). "Seventh report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure". *Hypertension*. 42 (6): 1206-52.
2. Diao D, Wright JM, Cundiff DK, Gueyffier F (August 2012). "Pharmacotherapy for mild hypertension". *The Cochrane Database of Systematic Reviews*. 8 (8): CD006742.
3. Fisher ND, Williams GH (2005). "Hypertensive vascular disease". In Kasper DL, Braunwald E, Fauci AS, et al. (eds.). *Harrison's Principles of Internal Medicine* (16th ed.). New York, NY: McGraw-Hill. pp. 1463-81.
4. Garrison SR, Kolber MR, Korownyk CS, McCracken RK, Heran BS, Allan GM (August 2017). "Blood pressure targets for hypertension in older adults". *The Cochrane Database of Systematic Reviews*. 8: CD011575.
5. *Harrison's principles of internal medicine* (18th ed.). New York: McGraw-Hill. 2011. pp. 55-61. ISBN 9780071748896.
6. James PA, Oparil S, Carter BL, Cushman WC, Dennison-Himmelfarb C, Handler J, Lackland DT, LeFevre ML, MacKenzie TD, Ogedegbe O, Smith SC, Svetkey LP, Taler SJ, Townsend RR, Wright JT, Narva AS, Ortiz E (February 2014). "2014 evidence-based guideline for the management of high blood pressure in adults: report from the panel members appointed to the Eighth Joint National Committee (JNC 8)". *JAMA*. 311 (5): 507-20.

7. Mancia G, Fagard R, Narkiewicz K, Redon J, Zanchetti A, Böhm M, et al. (July 2013). "2013 ESH/ESC guidelines for the management of arterial hypertension: the Task Force for the Management of Arterial Hypertension of the European Society of Hypertension (ESH) and of the European Society of Cardiology (ESC)". *European Heart Journal*. 34 (28): 2159-219.
8. Marik PE, Varon J (June 2007). "Hypertensive crises: challenges and management". *Chest*. 131 (6): 1949-62.
9. Marshall IJ, Wolfe CD, McKevitt C (July 2012). "Lay perspectives on hypertension and drug adherence: systematic review of qualitative research". *BMJ*. 345: e3953
10. Musini VM, Gueyffier F, Puil L, Salzwedel DM, Wright JM (August 2017). "Pharmacotherapy for hypertension in adults aged 18 to 59 years". *The Cochrane Database of Systematic Reviews*. 8: CD008276.
11. Musini, Vijaya M.; Tejani, Aaron M.; Bassett, Ken; Puil, Lorri; Wright, James M. (2019). "Pharmacotherapy for hypertension in adults 60 years or older". *The Cochrane Database of Systematic Reviews*.
12. O'Brien E, Beevers DG, Lip GY (2007). *ABC of hypertension*. London: BMJ Books. ISBN 978-1-4051-3061-5.
13. Perez MI, Musini VM (January 2008). "Pharmacological interventions for hypertensive emergencies". *The Cochrane Database of Systematic Reviews* (1): CD003653.
14. Rodriguez MA, Kumar SK, De Caro M (1 April 2010). "Hypertensive crisis". *Cardiology in Review*. 18 (2): 102-7.
15. Sundström J, Arima H, Jackson R, Turnbull F, Rahimi K, Chalmers J, Woodward M, Neal B (February 2015). "Effects of blood pressure reduction in mild hypertension: a systematic review and meta-analysis". *Annals of Internal Medicine*. 162 (3): 184-91.
16. Wong TY, Wong T, Mitchell P (February 2007). "The eye in hypertension". *Lancet*. 369(9559): 425-35.
17. Xie X, Atkins E, Lv J, Bennett A, Neal B, Ninomiya T, Woodward M, MacMahon S, Turnbull F, Hillis GS, Chalmers J, Mant J, Salam A, Rahimi K, Perkovic V, Rodgers A (January 2016). "Effects of intensive blood pressure lowering on cardiovascular and renal outcomes: updated systematic review and meta-analysis". *Lancet*. 387 (10017): 435-43.