
بسم الله الرحمن الرحيم

Webinar: Nutrition in cardiometabolic disorders

Nutrition Therapy & Lifestyle Modifications for Hypertension Management

Hossein Farhadnejad

Ph.D in Nutrition Science

Assistant professor at Nutrition and Endocrine Research Center

Research Institute for Endocrine Sciences

Shahid Beheshti University of Medical Sciences

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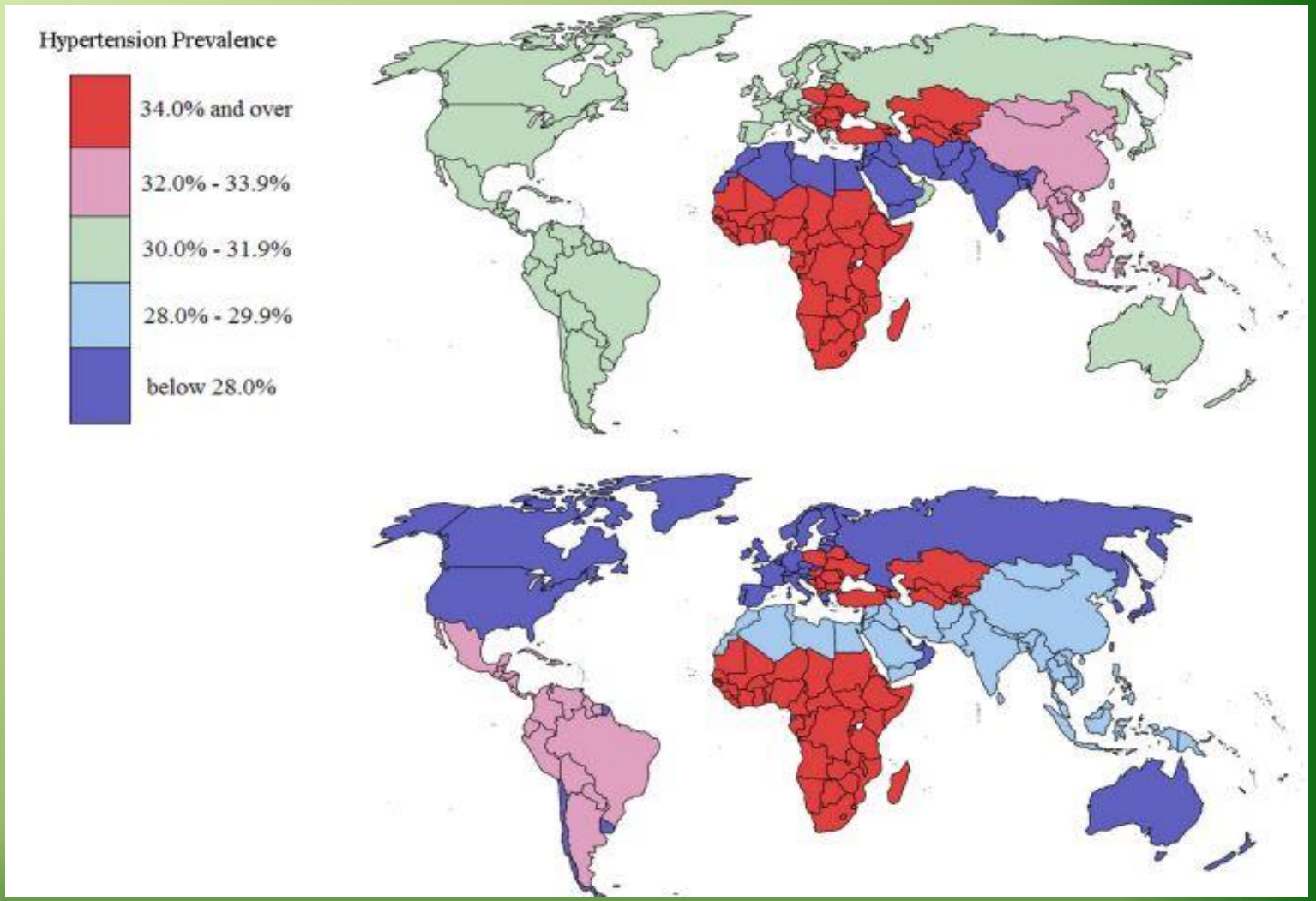
Introduction

- **Hypertension**, also known as the **silent killer** (as a primary risk factor)
- One of the most important **preventable cardiovascular risk factor** which **impacts** **health**, **disease**, and **death**
- **High prevalence** in most of the **developed**, **underdeveloped**, and **developing countries**.
- It is estimated to **affect** around a **third of the adult population worldwide**
- **If not treated properly** can lead to various **serious complications** such as myocardial infarction, stroke, renal failure, and death

Bromfield S, et al. *Curr Hypertens Rep*. 2013; 15(3): 134-136
Aram V Chobanian et al. Hypertension. 2003 Dec;42(6):1206-52.
Whelton PK, et al. JAMA. 2002; 288(15): 1882-1888.
Altawili et al. Cureus. 2023 Dec 7;15(12):e50130.

Epidemiology

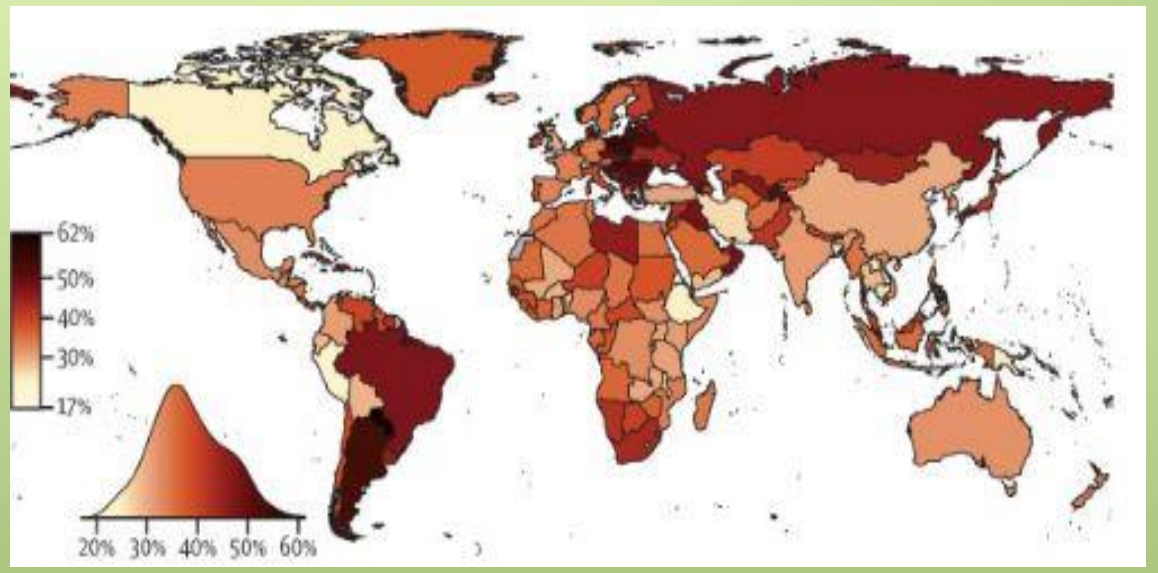
- **Hypertension prevalence** by **world region**
- Prevalence of hypertension defined as **systolic BP ≥140** mmHg or **diastolic BP ≥90** mmHg or **use of antihypertensive medication**



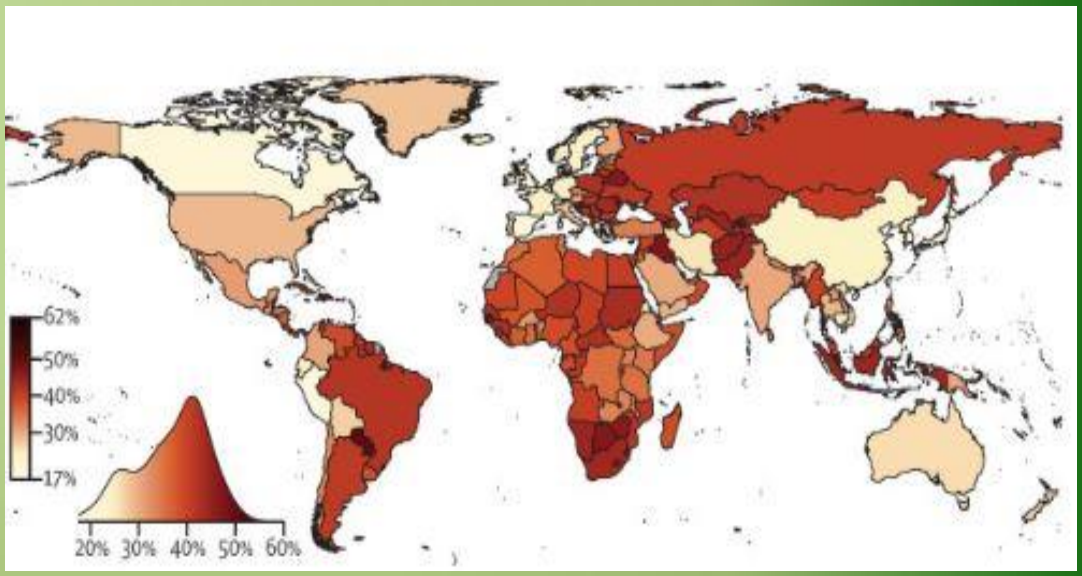
Katherine T Mills et al. Nat Rev Nephrol. 2020 April ; 16(4): 223–237.

Epidemiology

Men



Women

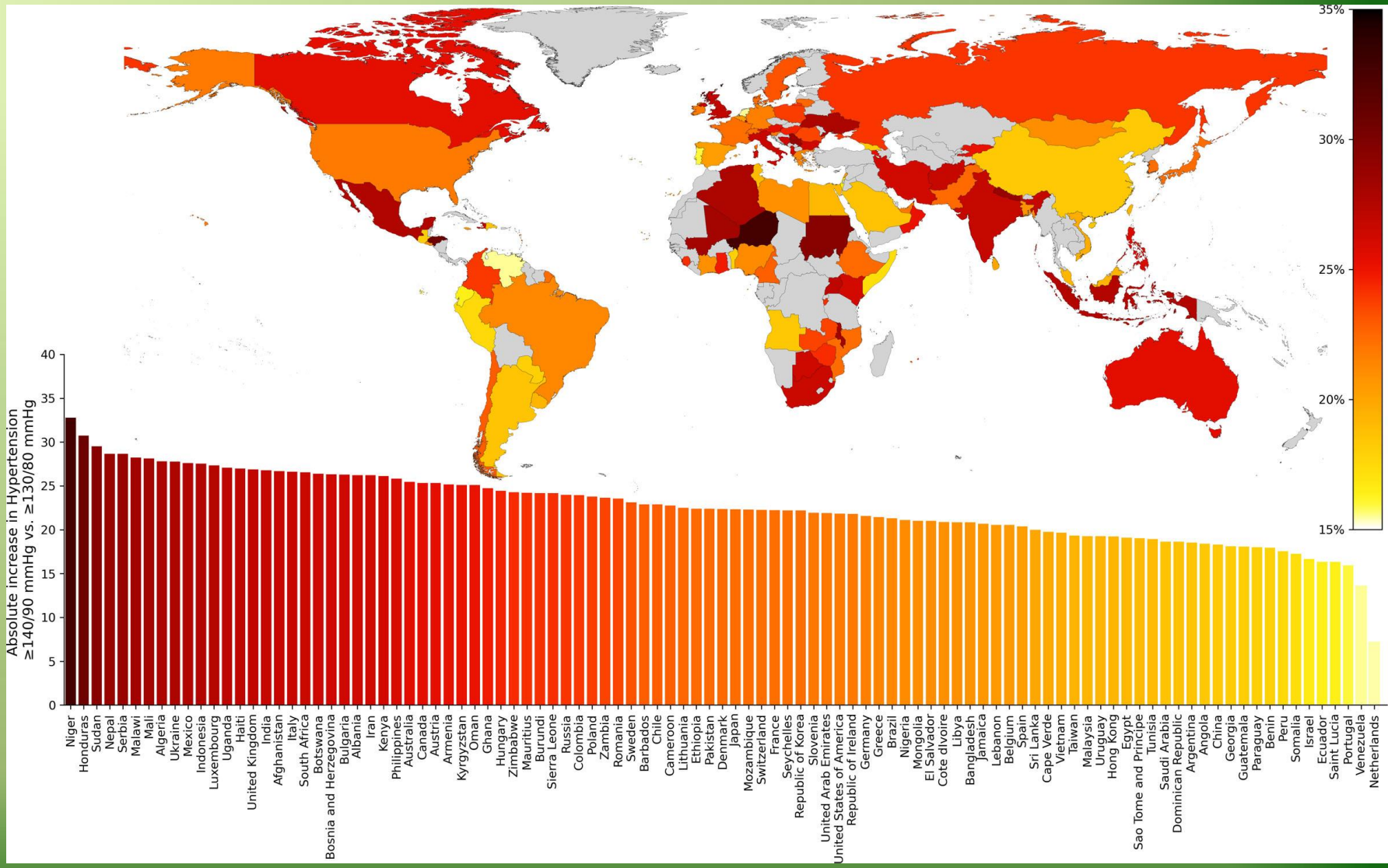


Prevalence of hypertension in 2019 by gender

NCD Risk Factor Collaboration (NCD-RisC). Lancet. 2021 Sep 11;398(10304):957-980.

Epidemiology

World map and **bar plot** visualizing the corrected absolute increase of estimated prevalence of hypertension **when applying** the **threshold of ≥130/80 mm Hg** **compared to** a **threshold of ≥140/90 mm Hg**



Janis M Nolde et al. Hypertension. 2022 Jul;79(7):1497-1505.

Definition

Summary Table: Seventh report of the Joint National Committee (JNC7) on Blood Pressure Classification

Category	Systolic BP (mm Hg)	Diastolic BP (mm Hg)	Treatment Recommendation
Non-elevated	<120	<80	**Maintain** healthy lifestyle
Pre-hypertension	120–139	80–89	**Lifestyle modifications alone** can prevent progression.
Stage 1 Hypertension	140-159	90-99	**Lifestyle changes** + **possible medications** (**if no improvement** in 3–6 months or if high-risk).
Stage 2 Hypertension	≥160	≥100	Lifestyle + medications required (**immediate drug therapy** in most cases).

Aram V Chobanian et al. Hypertension. 2003 Dec;42(6):1206-52.
Paul A James et al. JAMA. 2014 Feb 5;311(5):507-20.

Definition

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)**

JNC 8 Key Highlights

Treatment Thresholds by Age & Risk

≥60 years: Start drugs if **SBP ≥150 mmHg** or **DBP ≥90 mmHg** (goal <150/90).

<60 years or CKD/DM: Start drugs if **SBP ≥140 mmHg** or **DBP ≥90 mmHg** (goal <140/90).

First-Line Drug Classes

Thiazide diuretics, ACEIs, ARBs, or CCBs (beta-blockers no longer first-line).

Lifestyle Modifications

Recommended **for all patients**, regardless of hypertension stage.

Similar to JNC 7 (DASH diet, sodium reduction, exercise, weight loss, alcohol moderation).

Paul A James et al. JAMA. 2014 Feb 5;311(5):507-20.

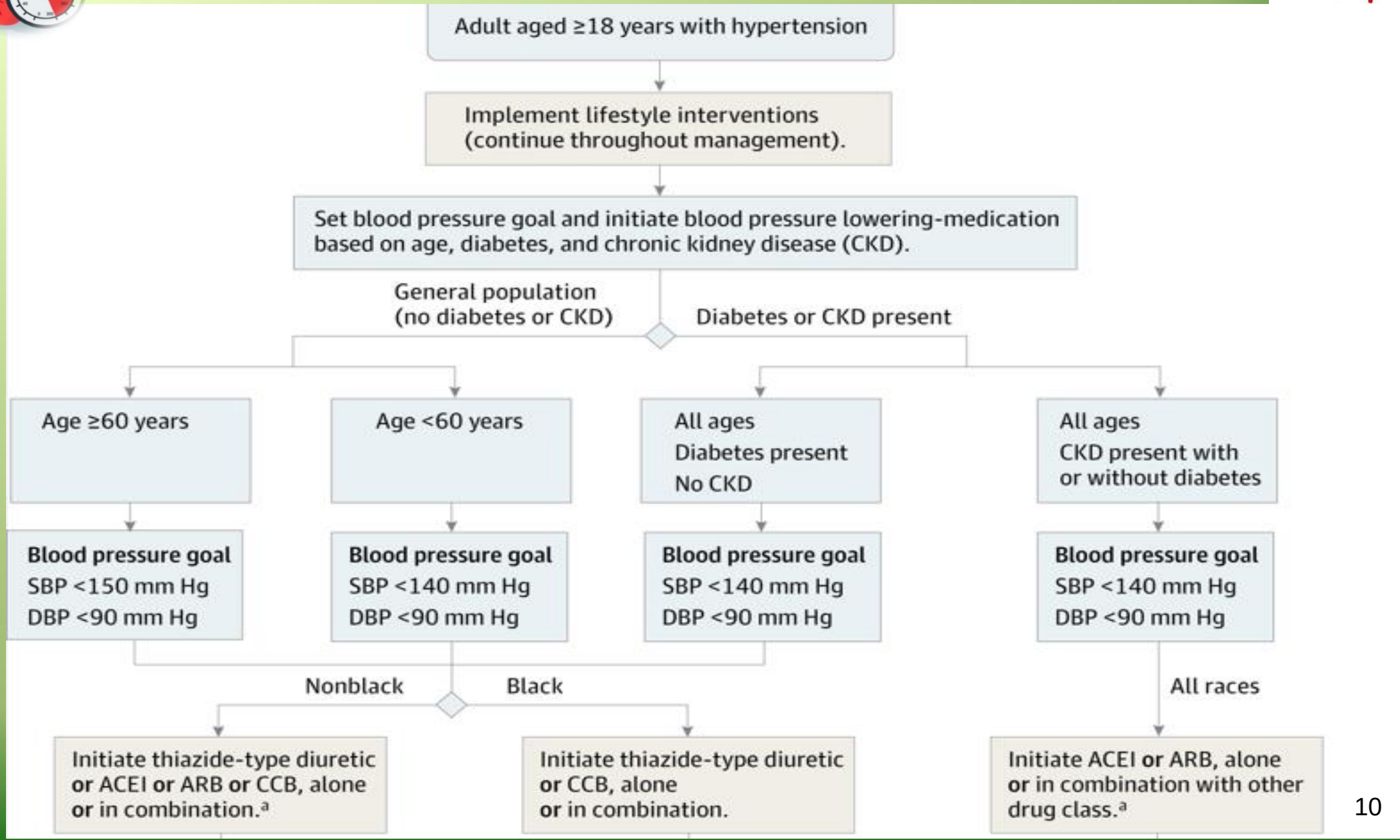
Definition

Key points of the **American College of Cardiology/American Heart Association (ACC/AHA) definition of hypertension**

Category	Systolic BP (mm Hg)	Diastolic BP (mm Hg)	Treatment Recommendation
Normal BP	<120	and <80	**Lifestyle modifications recommended**
Elevated BP	120–129	and <80	**Lifestyle changes strongly encouraged**
Stage 1 Hypertension	130–139	or 80–89	**Drug therapy recommended if** clinical ASCVD, diabetes, CKD, or 10-year ASCVD risk **>10%**
Stage 2 Hypertension	≥140	or ≥90	**Drug therapy recommended** regardless of risk factors

Waqas T Qureshi et al. J Am Heart Assoc. 2017 May 11;6(5):e005045.

Definition



Paul A. et al. JAMA: February 5, 2014;311;(5):507-520.

Approach for Hypertension Management

- The **management of hypertension** requires a comprehensive approach that **integrates lifestyle modifications** and **pharmacotherapy**.
- **Lifestyle interventions** include a **healthy diet**, **weight management**, **physical activity**, **reduction or avoiding of alcohol consumption**, **smoking cessation**, and **stress management.**
- The **therapeutic strategy** for hypertension strives to **decrease** **arterial pressure** elevations and **minimize** the probability of **cardiovascular pathologies.**

Verma et al. J Clin Hypertens (Greenwich). 2021 Jul;23(7):1275-1283.
Ha Nguyen et al. Int J Hypertens. 2013:2013:698940.
Abdullh A Altawili et al. Cureus. 2023 Dec 7;15(12):e50130.

Dietary Approach for Hypertension Management

- **Dietary pattern** is a very important part of **non-pharmacologic management** of blood pressure.
- It is influenced by **appropriate calorie requirements**, **personal, cultural food preferences**, and nutritional therapy **for other medical conditions**, such as diabetes mellitus and chronic kidney disease.
- **Weight** and **body fat** are key factors in **shaping dietary approaches** for managing hypertension in individuals.
- **Making healthy food choices** and **avoiding** or **reducing unhealthy food choices** is essential for improving blood pressure.
- This can be achieved by **various healthy dietary plans**.
- **Various diet strategies** have been identified **as effective** for management of hypertension: such as **DASH** diet, **Mediterranean** diet, **low-sodium** diet, **vegetarian** diet, and **portfolio** diet.

Verma et al. J Clin Hypertens (Greenwich). 2021 Jul;23(7):1275-1283.
Ha Nguyen et al. Int J Hypertens. 2013:2013:698940.
Abdullh A Altawili et al. Cureus. 2023 Dec 7;15(12):e50130.

Dietary Approach for Hypertension Management

1. Follow healthy dietary pattern

When designing an antihypertensive diet, a **personalized**, **multifactorial approach** is critical **to ensure efficacy**, **safety**, and **adherence**.

Essential factors to evaluate include:

- **Anthropometrics & Metabolic Status** (Current weight/BMI/Body fat distribution)
- **Current Dietary Intake** (Energy intake, food choices, sodium intake, etc.)
- **Pharmacotherapy Interactions** (such as ACE inhibitors/ARBs/potassium-rich foods or Diuretics/magnesium/zinc intake)
- **Comorbidities** (such as Diabetes, CKD)
- **Socioeconomic Factors** (Cost: Recommend affordable Healthy-diet staples).
- **Cultural preferences** (Adapt sodium limits to traditional diets (e.g., using herbs vs. Salty condiments).
- **Physical Activity**
- **Food Preferences**, Address **food allergies**, **intolerances**, and **ethical choices**.

Dietary Approach for Hypertension Management

1. Follow healthy dietary pattern

- **Key point in dietary management of hypertension:**
  - **Portion Control & Weight Management**
  - **A calorie-restricted diet** based on **healthy choices** should be considered for **hypertensive patients with excess weight.**
  - **Avoiding overeating supports blood pressure control** by **minimizing circulatory stress** (Short-term) and **preventing obesity-related hypertension** (long-term)
  - **Losing 5–10% of body weight** (if obese or overweight) **can reduce BP** by **5–20 mmHg**.

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Ha Nguyen et al. Int J Hypertens. 2013:2013:698940.
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Dietary Approach for Hypertension Management

1. Follow a healthy dietary pattern

- **A diet** consisting of **whole grains**, more **vegetables**, and **fruits** is recommended.
- Other recommendations include consuming **low-fat dairy products**, **poultry**, **fish**, **legumes**, **non-tropical vegetable oils (rich in MUFA and PUFA)**, and **nuts.**
- **Reducing** intake of **salts**, **sweets**, **sugar-sweetened beverages**, **saturated fats**, and **red and processed meat**
- This can be achieved by **various healthy dietary plans such as DASH diet, Mediterranean Diet, …)**.

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Dietary Approach for Hypertension Management

1. Follow a healthy dietary pattern

DASH Eating Plan-Number of Daily Servings for three calorie levels

Food Groups	Servings/Day		
	1,600 calories/day	2,600 calories/day	3,100 calories/day
Grains*	6	10–11	12–13
Vegetables	3–4	5–6	6
Fruits	4	5–6	6
Fat-free or low-fat milk and milk products	2–3	3	3–4
Lean meats, poultry, and fish	3–6	6	6–9
Nuts, seeds, and legumes	3/week	1	1
Fats and oils	2	3	4
Sweets and added sugars	0	≤2	≤2

Daily Nutrient Goals Used in the DASH Studies

(for a 2,100 Calorie Eating Plan)

Total fat	27% of calories	Sodium	2,300 mg*
Saturated fat	6% of calories	Potassium	4,700 mg
Protein	18% of calories	Calcium	1,250 mg
Carbohydrate	55% of calories	Magnesium	500 mg
Cholesterol	150 mg	Fiber	30 g

Geissler, C. and Powers, H.J. (2017) Human Nutrition. Oxford University Press, Oxford.

Dietary Approach for Hypertension Management

2. Focus on Whole, Unprocessed Foods

➢ Eat More:

❖ **Fruits & vegetables** (7–10 servings/day)- **provide potassium**, **magnesium**, and **fiber—nutrients** that help **lower BP**

❖ **Whole grains** (6-12 servings/day) (whole wheat bread, oats, brown rice). **contribute** fiber and nutrients **beneficial for BP control**

❖ **Lean protein sources (**3-6 servings/day**)** (consuming lean meats, fish, skinless poultry, beans, seeds, and nuts to **reduce saturated fat and cholesterol intake**).

❖ **Low-fat** or **fat-free dairy products (**2-3 servings/day): **provide calcium** and **protein** while **limiting saturated fat** intake

❖ **Healthy fats** (avocados, olive oil, Flaxseed oil, nuts).

➢ Avoid:

Processed snacks, fried foods, sugary drinks.

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Dietary Approach for Hypertension Management

3. Low Sodium (Salt) Intake

- **Goal: <1,500–2,300 mg/day** (lower is better for hypertension).
- **Why?** Excess sodium increases fluid retention and blood pressure.
- **How?**
  - Avoid processed foods (canned foods, processed meats, fast food).
  - Use herbs/spices instead of salt.
  - **Check food labels** for **"sodium" content**.

4. High Potassium-Rich Foods

- **Goal: 3,500–5,000 mg/day** (**balances sodium effects**).
- **Why?** Potassium relaxes blood vessels and counteracts sodium.
- **Best Sources:**
  - **Vegetables** and **fruits** (Bananas, oranges, spinach, avocados), **beans**.

5. Magnesium & Calcium for Vascular Health

- **Magnesium (310-420 mg for adults)** (nuts, seeds, leafy greens, whole grains) → **helps** blood vessels relax.
- **Calcium (1000-1300 mg)** (low-fat dairy) → **supports** blood pressure regulation.

Verma et al. J Clin Hypertens (Greenwich). 2021 Jul;23(7):1275-1283.
Ha Nguyen et al. Int J Hypertens. 2013:2013:698940.
Abdullh A Altawili et al. Cureus. 2023 Dec 7;15(12):e50130.

Dietary Approach for Hypertension Management

6. Low Saturated/Trans Fats and cholesterol

Reduce consumption of **red meat**, **full-fat dairy products**, **sweets**

Avoid: Butter, fatty meats, fried foods, packaged baked goods.

Choose: Omega-3-rich foods (fatty fish, flaxseeds, walnuts).

6. Limit Alcohol & Caffeine

Alcohol: Avoid alcohol altogether OR ≤1 drink/day (women), ≤2 (men). **Excess raises BP**.

Caffeine: Moderate intake (**some people are sensitive to BP spikes**).

8. High Fiber for Heart Health

Goal: 25–38 g/day (lowers BP by improving arterial function).

Sources: Legumes, vegetables, whole grains.

Reduce consumption of **refined grains**

9. Hydration with Water & Herbal Teas

Avoid sugary drinks (linked to hypertension).

Hibiscus tea may modestly lower BP.

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Ha Nguyen et al. Int J Hypertens. 2013:2013:698940.
Abdullh A Altawili et al. Cureus. 2023 Dec 7;15(12):e50130.

Dietary Approach for Hypertension Management

Nutrient	Recommended daily intake	Potential benefits
Sodium	Less than 2,300 mg or ideally 1,500 mg for people with hypertension	Lower **sodium** intake can help **reduce blood pressure levels**. High sodium consumption is linked to increased blood pressure.
Potassium	3,500-4,700 mg	**Potassium** can **help balance the amount of sodium in cells**, which can aid in blood pressure control.
Magnesium	310-420 mg for adults	**Magnesium** can **help lower blood pressure levels**. It **also** aids in **nerve function**, **blood glucose control**, and **protein synthesis**.
Calcium	1000-1300 mg for adults	**Calcium** can help **blood vessels tighten and loosen**, thus aiding in blood pressure control. It also helps in muscle function and nerve signaling.
Fiber	25-38 mg per day	A diet high in **fiber** can **contribute to overall heart health** and **indirectly** aid in blood pressure control.

Altawili et al. Cureus. 2023 Dec 7;15(12):e50130.

Dietary Approach for Hypertension Management

Herbs in hypertension management

Findings of several meta-analyses were mixed:

- For various spices administered to humans, **a little evidence of improved BP was reported**.
- For **black seed**, **cinnamon**, **garlic**, **ginger**, and **sesame**, **there is evidence suggestive of clinical benefit** for BP lowering.
- **Based on inconsistencies in the evidence**, **caution is warranted** in establishing intake recommendations for health benefits, **especially for the use of elevated, nonculinary amounts** that can be consumed as supplements containing concentrated whole spices or isolated constituents.
- **Using spices/herbs instead of salt** in the Iranian population can help control blood pressure.

M Akhtar Anwar et al. Front Pharmacol. 2016 Mar 8:7:50.
Keith W et al. Nutrition Today, (2025) 60, 2, 59–71

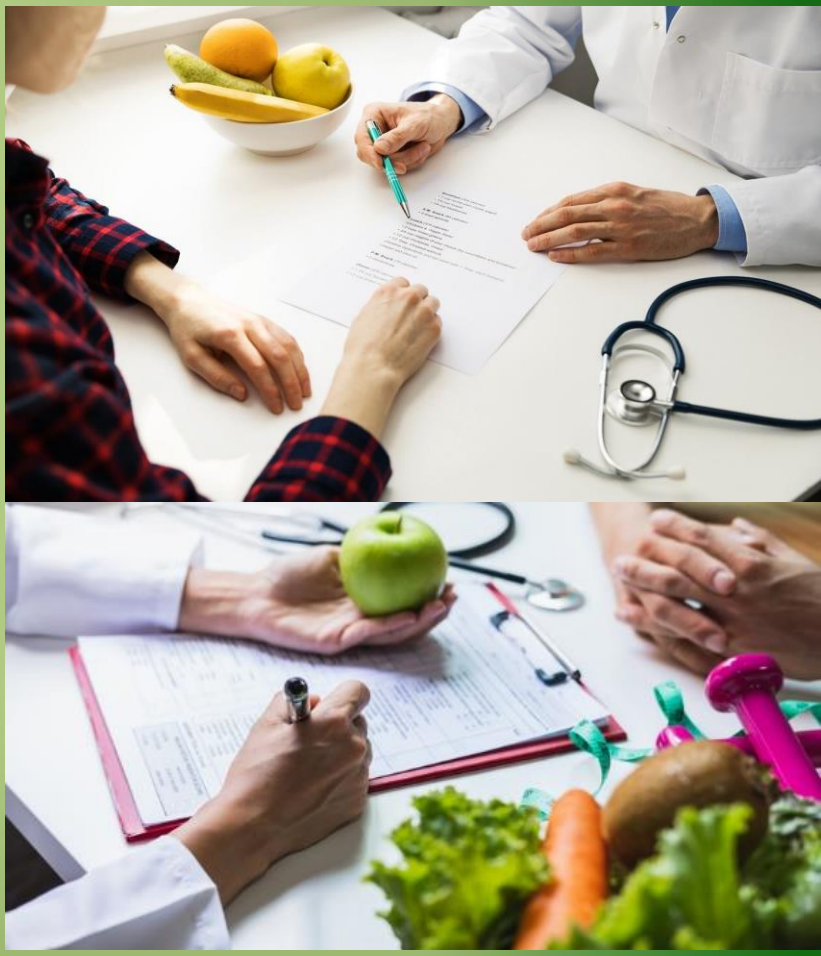
Dietary Approach for Hypertension Management

Summary of BP-Lowering Effects of Nutrition Therapy & Lifestyle Modifications

Intervention	SBP Reduction (mmHg)
DASH Diet	5–11
Sodium Restriction	2–8
Weight Loss (5–10%) (By adopting a healthy, calorie-restricted diet)	5–20
Physical activity	5–8
Alcohol Moderation	2–4
Stress Management	4–5

Dietary Approach for Hypertension Management

- **Healthcare team** (Physicians and Nutritionist) **play a critical role** in **guiding hypertensive patients** to adhere to nutritional interventions.
- The **treatment strategies** is **successful** and **effective when the following are considered**:
  - **Appropriate education**
  - **Motivation in patients**
  - **Use the latest tools, techniques, sciences, technology**
  - **Making behavioral changes**
  - **Personalized advice**
- **All of which are backed** by **empirical evidence** and **influential statistics**.
- **Education** remains the **cornerstone of patient adherence**.



Altawili et al. Cureus. 2023 Dec 7;15(12):e50130.

Other lifestyle modification for management of Hypertension

Other lifestyle modification for Hypertension Management

Physical activity

- **Assessment** and **prescription** of **physical activity** is **an excellent lifestyle-only treatment option** for the large population of mild-moderate–risk patients with elevated blood pressure.
- **All individuals** should be **encouraged** to **be physically active** for the management of hypertension.
- Both **aerobic** and **dynamic resistance exercise** or **their combinations** can be used in **management of hypertension**.
- The **chosen type of activity/exercise** should **be individually tailored**: consider **baseline fitness**, **comorbidities**, **pharmacological treatment**, **situational context** and **be progressive in nature**.
- **Emphasis** should be on **reducing daily sedentary time** and **increasing movement wherever possible**.
- **Any type**, **amount** and **intensity** of **regular exercise/activity** will be beneficial with minimum recommendations for **maintenance** of **health** and **prevention** and **management of hypertension**.

Fadi J Charchar et al. J Hypertens. 2024 Jan 1;42(1):23-49.
Bethany Barone Gibbs et al. Hypertension. 2021 Aug;78(2):e26-e37.
Verma et al. J Clin Hypertens (Greenwich). 2021 Jul;23(7):1275-1283.

Other lifestyle modification for Hypertension Management

Physical activity

Lifestyle modification guidelines published by the American Heart Association (AHA) and the American College of Cardiology (ACC): Physical activity

Aerobic exercise	Muscle-strengthening (resistance) exercise
▪ **150–300 min/week** of **moderate-intensity physical activity** (3 to 5 times a week- 45 to 60 minutes each time), (Brisk walking, water aerobics, Leisure cycling, etc) **OR** ▪ **75–150 min/week** of **vigorous-intensity physical activity** (Running, Fast cycling, Competitive sports, etc) **OR** ▪ An **equivalent combination of moderate-** and **vigorous-intensity** physical activity	▪ **≥2 times/week** ▪ Involving all major muscle groups ▪ At moderate intensity or greater (Push-ups, Pull-ups/chin-up, Squats, Planks, Bench press, Deadlifts, Shoulder press, etc.)

Even greater health benefits are realized by **exceeding these recommendations** (eg, moderate-intensity activity >300 minutes per week or vigorous-intensity physical activity >150 minutes per week).

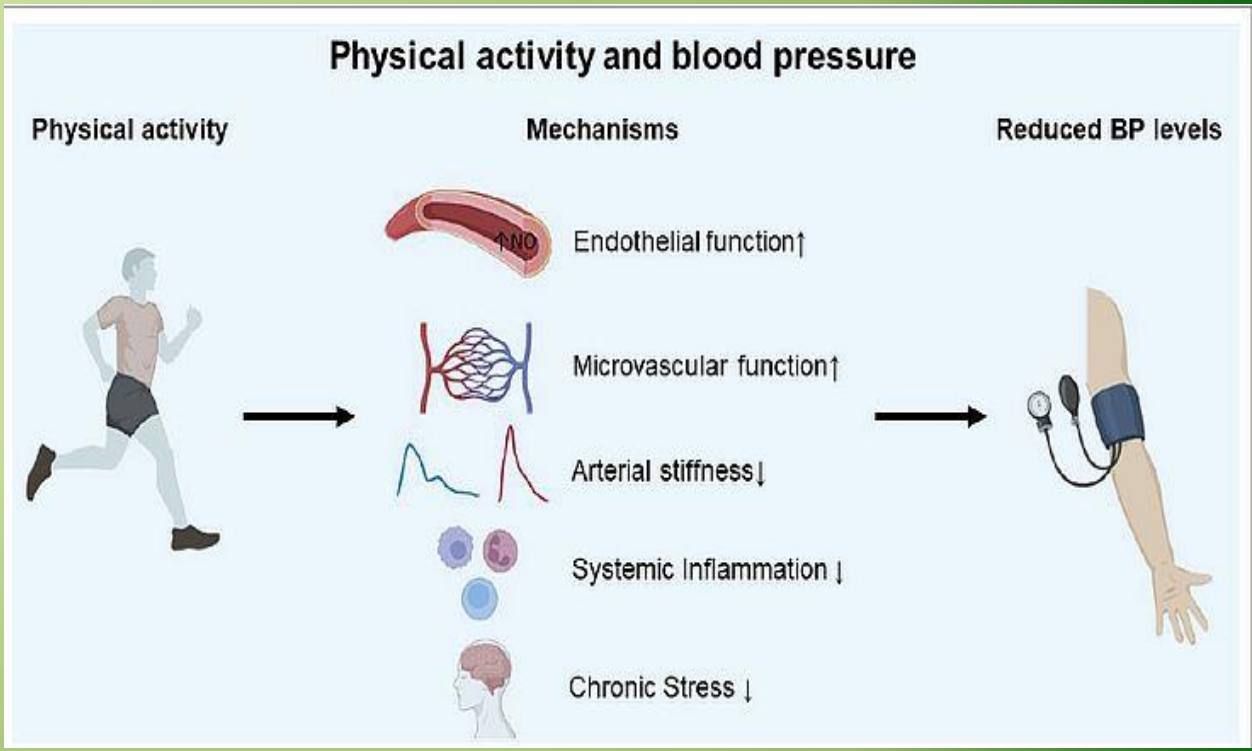
Fadi J Charchar et al. J Hypertens. 2024 Jan 1;42(1):23-49.
Bethany Barone Gibbs et al. Hypertension. 2021 Aug;78(2):e26-e37.
Verma et al. J Clin Hypertens (Greenwich). 2021 Jul;23(7):1275-1283.

Other lifestyle modification for Hypertension Management

Physical activity

How can physical activity reduce blood pressure?

- **Enhanced Endothelial Function**
- **Reduced Sympathetic Nervous System Activity**
- **Weight Loss & Adipokine Regulation** (lowering leptin (pro-hypertensive) and increasing adiponectin (vasoprotective)
- **Reduction of systemic vascular resistance**
- **Renin-Angiotensin System Modulation**
- **Stress Reduction**
- **lowers inflammation**
- **Improves lipid profile**
- **Improved Insulin Sensitivity**

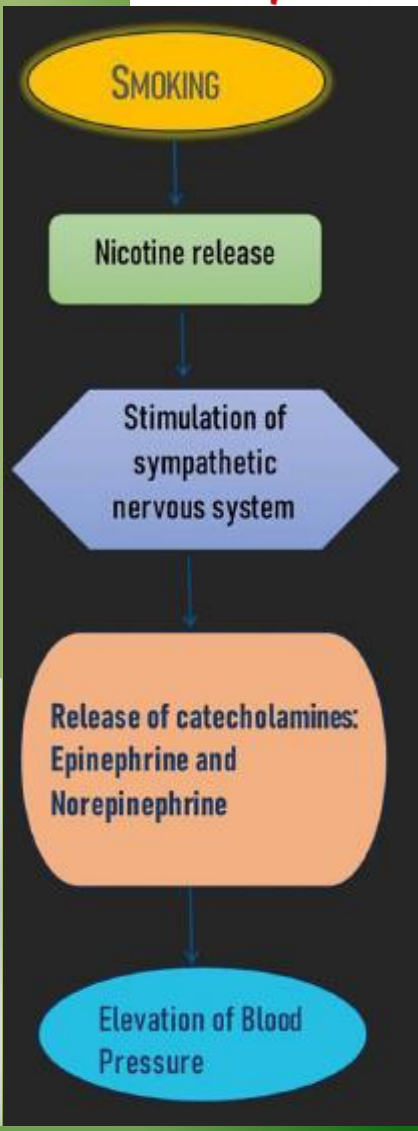


Müller P, et al. Dtsch Z Sportmed. 2023; 74: 74-79.
Fadi J Charchar et al. J Hypertens. 2024 Jan 1;42(1):23-49.
Bethany Barone Gibbs et al. Hypertension. 2021 Aug;78(2):e26-e37.

Other lifestyle modification for Hypertension Management

Smoking

- Is an important risk factor for HTN
- **Physicians** play a key role in **encouraging and helping patients achieve smoking cessation.**
- **HTN** has also **been associated** with **second-hand smoke.**
  - This emphasizes the **necessity to keep places smoke-free** to **reduce the risk of hypertension and cardiovascular disease**



Samadian F, et al . Iran J Kidney Dis. 2016, 10:237-63.
Bernabe-Ortiz A, et al. BMC Cardiovasc Disord. 2021, 21:576.
Pratyusha Kodela et al. Cureus. 2023 Aug 6;15(8):e43022.

Other lifestyle modification for Hypertension Management

Alcohol consumption

- **Longitudinal studies** suggesting that blood pressure changes **are positively correlated** with alcohol drinking changes.
- **Clinical trials involving counseling** or **substitution** of **low alcohol substitutes** for **hazardous drinkers** have confirmed that **BP reduction** will follow drinking reduction in days to weeks.
- **Alcohol-Induced Hypertension:**
  - ✓ **Fluid Retention**: Alcohol suppresses vasopressin, increasing water retention and blood volume.
  - ✓ **Vascular Dysfunction**: Acetaldehyde (alcohol metabolite) reduces nitric oxide bioavailability.
  - ✓ **Weight Gain**: High-calorie content promotes obesity, exacerbating hypertension

Fadi J Charchar et al. J Hypertens. 2024 Jan 1;42(1):23-49.

Other lifestyle modification for Hypertension Management

Alcohol consumption

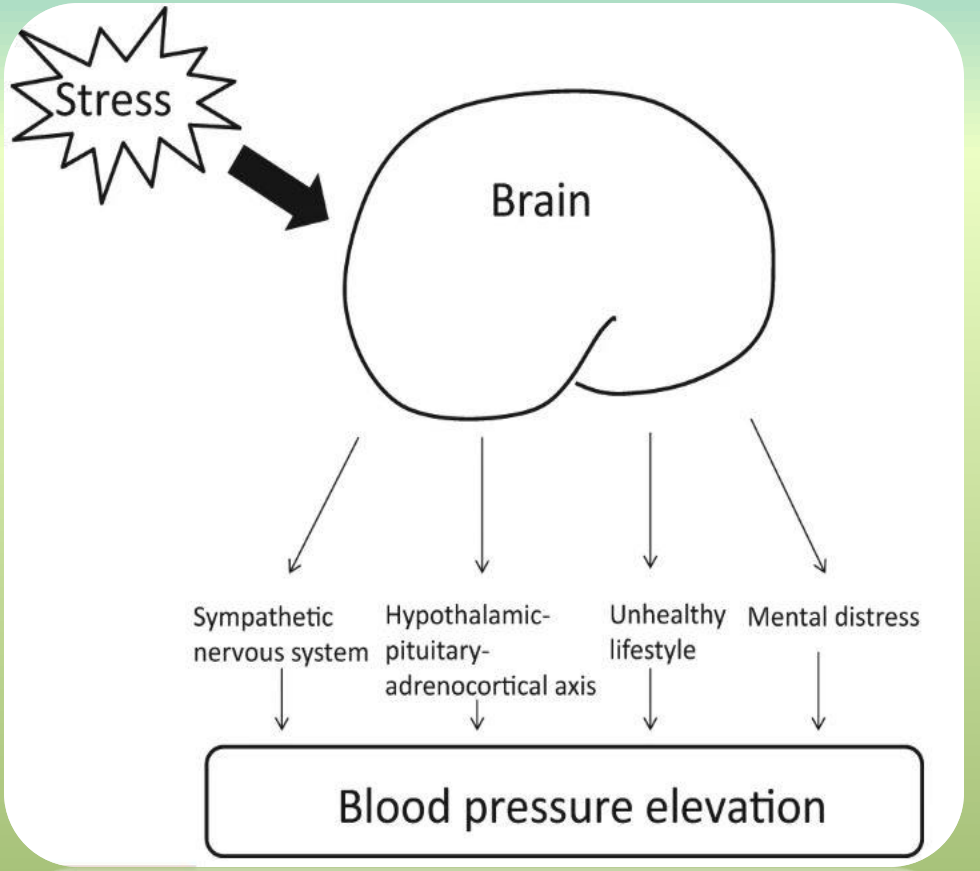
- **Alcohol consumption should be zero** for **the best cardiovascular outcomes.**
- **There is no safe limit** for **alcohol consumption** to prevent hypertension and adverse cardiovascular outcomes.
- **Binge drinking should be avoided**.
- If **you do not drink, do not start.**
- However, **the recommended daily upper limit** for **alcohol consumption** is **two standard drinks** for **men** and **1** for **women** (1 drink:14 grams (0.6 ounces)).

Fadi J Charchar et al. J Hypertens. 2024 Jan 1;42(1):23-49.

Other lifestyle modification for Hypertension Management

Psychological stress

- **Is another contributor** to HTN.
- Stress **induce neuroendocrine responses** and **triggers the release of hormones like adrenaline and cortisol**, which cause the heart to beat faster and blood vessels to narrow, resulting in temporary spikes in blood pressure
- **A range of factors** like **Work-related** (Job pressure, financial strain), **Health-related** (Chronic illness, disability), **Relationship/family** (Marital conflict, loneliness), **Life changes** (relocation, major transitions), and **Psychological** (Anxiety, depression, trauma) have led to an increased number of people experiencing chronic psychological stress in recent times.



Munakata M. Hypertens Res. 2018, 41:553-69. 10.1038/s41440-018-0053-1
Liu MY, et al. Neurol Res. 2017, 39:573-80.
Pratyusha Kodela et al. Cureus. 2023 Aug 6;15(8):e43022.
Masanori Munakata et al. Hypertens Res. 2018 Aug;41(8):553-569.

Other lifestyle modification for Hypertension Management

Psychological stress

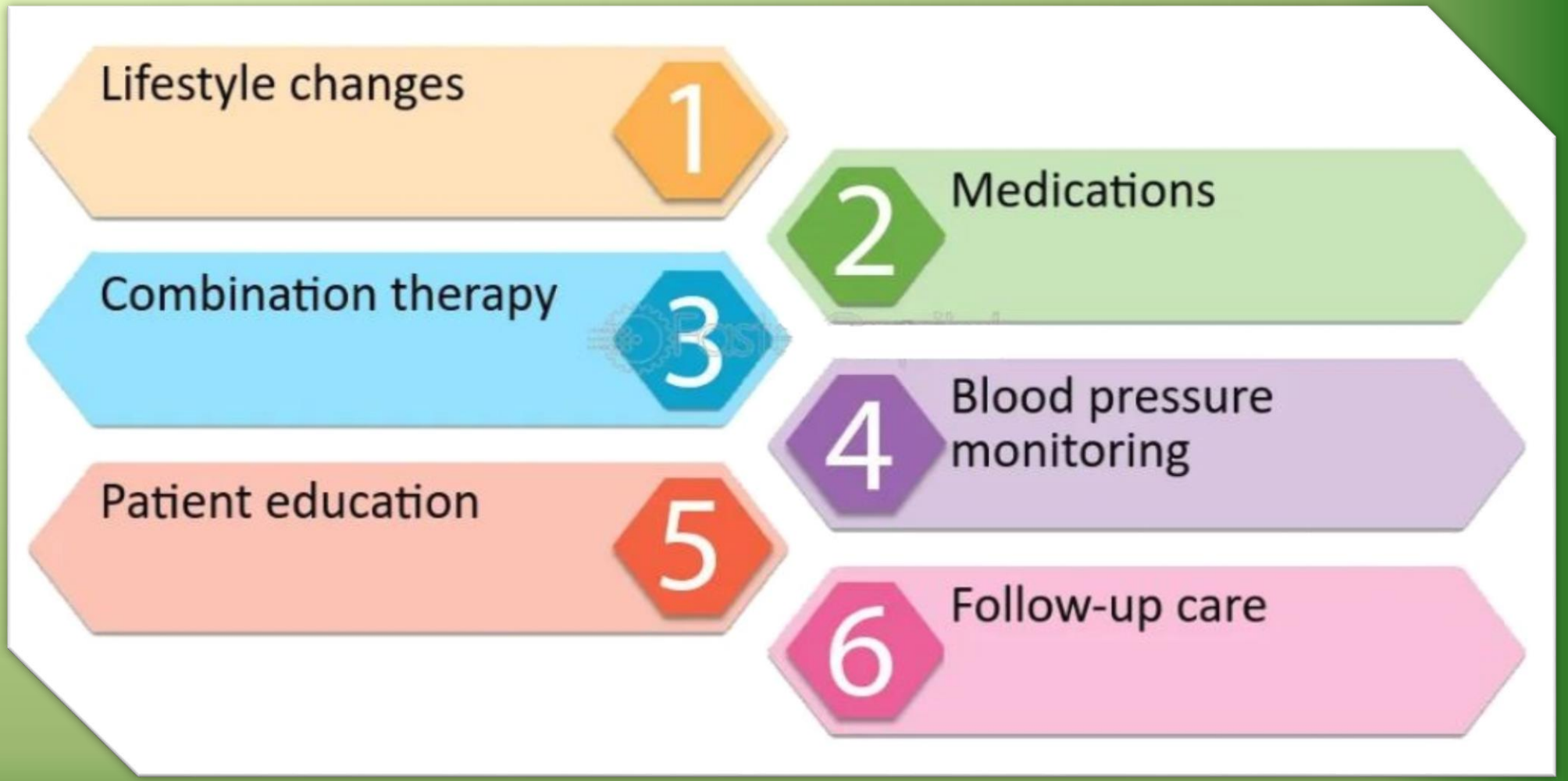
- **Managing stress** effectively begins **with identifying the root causes** (stressors) and tailoring interventions to the individual's needs.
- **Cognitive-Behavioral** Techniques, **Lifestyle Modifications**, **Social Support**, **Professional Referrals**
- **Incorporating stress management techniques,** such as **relaxation exercises**, **meditation**, **deep breathing**, **regular physical activity**, and **maintaining healthy sleep habits can help reduce** the physiological arousal caused by stress, **promote** emotional well-being, and ultimately **support** healthier blood pressure levels.

Munakata M. Hypertens Res. 2018, 41:553-69. 10.1038/s41440-018-0053-1
Liu MY, et al. Neurol Res. 2017, 39:573-80.
Pratyusha Kodela et al. Cureus. 2023 Aug 6;15(8):e43022.

Conclusions

- **A healthy diet** to control high blood pressure should be ***low*** in **sodium** and **saturated fat**, ***rich*** in **fruits**, **vegetables**, **whole grains**, and **low-fat dairy**, and ***include*** **lean protein sources**, while ***limiting*** **processed foods**, **simple sugar**, and **excessive alcohol**.
- **This approach effectively lowers blood pressure** and **reduces cardiovascular risk**.
- **Weight Management, Increasing Physical Activity, Not Smoking, Avoiding Alcohol, Managing Stress**

Conclusions




با تشکر از توجه شما