



Research Article

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Hypertension Diagnosis and Management Approach

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ABSTRACT

Background: Hypertension is one of the most common diseases nowadays. It affects about 25% of the adult global population and can lead to highly morbid cardiovascular or cerebrovascular complications. However, when recognized early, appropriate lifestyle-related measures and occasionally pharmacologic interventions can help greatly reduce its risks. **Objective:** In this study, we aim to provide summarized, yet comprehensive review paper focusing on diagnosis and management of hypertension. **Methods:** We searched PubMed using keywords such as hypertension, its screening, diagnosis, and treatment, and family medicine. **Conclusion:** Essential hypertension is a systemic disease that can kill the affected people silently. Nevertheless, knowing a lot about its risk factors and how they can be tackled to prevent it or even to greatly reduce its effects once it develops is of high importance; and here the major role of a family physician is revealed.

Key words: Hypertension, Diagnosis, Management, Approach.

INTRODUCTION

Increased blood pressure is an important risk factor for cardiovascular diseases and cerebrovascular accidents [1, 2]. Unfortunately, due to what people's lifestyle has evolved, or perhaps regressed into, it is becoming increasingly more prevalent in many parts of the world. Thus, knowledge on how to screen, diagnose and treat it should be known to every health care provider. Hypertension could be primary (aka essential or idiopathic), or secondary. Primary uncomplicated hypertension, to which the vast majority of cases belong to, is what we are going to address in this paper.

METHODOLOGY

PubMed database was used for articles selection, and the following keywords were used: hypertension, screening of hypertension, and management of hypertension. Inclusion criterion was the articles being related to the project. Exclusion criterion considered all other articles not having a related aspect to resistant hypertension as their primary endpoint or repeated studies.

DISCUSSION

Definition and prevalence

Hypertension, or as it is sometimes called the “silent killer”, is a common disease across all populations and races [3]. In the Kingdom of Saudi Arabia (KSA), a prospective study that included 17230 people between 30 and 70 years of age and published in 2007 showed that the prevalence of hypertension was 26.1%, and was significantly lower for females compared to males (23.9% vs. 28.6%). The study concluded that hypertension is increasing in prevalence in KSA and had affected more than 25% of the adult Saudi population [4]. This dramatic picture necessitates that every health care provider is aware of hypertension and all its aspects. At least in terms of how to screen, diagnose, what are the risk factors, how to tackle them and how hypertension, it can be managed.

The cutoff point of blood pressure after which it is considered too high (i.e. hypertension) has been changed over time as our understanding and knowledge of the disease has evolved. In 2017, the American College of Cardiology/American Heart Association (ACC/AHA) has suggested that the normal blood pressure (BP) is when the systolic BP is less than 120 and the diastolic is less than 80 mmHg. The word “hypertension” (HTN) should be used when either the systolic is equal to or more than 130 or the diastolic is equal to or higher than 80 mmHg [5]. These cutoff points are clearly different from what they used to be before 2017 and are based on a relationship between blood pressure and the incidence of cardiovascular events in a large population [6].

BP can be categorized into: Normal, Elevated, Stage I and Stage II HTN. Currently, the class of pre- HTN was removed from the classification, and patients are considered hypertensive when their systolic BP >130 mmHg and diastolic BP is equal or above 80 mmHg (see Table 1) [5].

Table 1: Classification of BP

Term	Definition
Normal BP	Systolic is less than 120 mmHg and diastolic is less than 80 mmHg
Elevated BP	Systolic is between 120 and 129 mmHg and diastolic is less than 80 mmHg
Stage 1 HTN	Systolic is between 130 and 139 mmHg or diastolic is between 80 and 89 mmHg
Stage 2 HTN	Systolic is at least 140 mmHg or diastolic is at least 90 mmHg

In addition to the aforementioned definition of HTN, which actually defined HTN in the setting of in-office measurements, the 2017 ACC/AHA also recommended definitions for measurements obtained by ambulatory blood pressure monitoring (ABPM). ABPM measurements signify HTN when at least one of three points is positive: either a 24-hour mean BP is $\geq 125/75$ mmHg, or daytime (awake) mean BP is $\geq 130/80$ mmHg, or nighttime (asleep) mean BP is $\geq 110/65$ mmHg. The importance of using an integrated approach of in-office and ABPM measurements before diagnosing HTN can be understood from the fact that some patients might show consistently elevated BP in office but normal readings on ABPM. This phenomenon is called “white-coat HTN”, or the reverse can happen, a phenomenon that is called “masked HTN” [7].

Blood pressure measurement

As mentioned in the beginning of our paper, HTN is so common that screening for it is highly warranted. One screening approach is recommended in 2015 by the US Preventive Services Task Force (USPSTF). Their approach advises that all people 18 years of age or older should be screened, and that reassessment should be done annually. This is to be done unless the patient has risk factors for hypertension, such as obesity, or if their previously measured systolic blood pressure is between 120 and 129 mmHg. In such cases, re-assessment should be done every six months by a clinician [8].

Generally speaking, a single abnormal reading detected at the office is not sufficient to diagnose an individual with HTN and commence treatment. To diagnose HTN, ABPM, which is the gold standard tool for the diagnosis of HTN, should show a mean daytime blood pressure of $\geq 130/\geq 80$ mmHg. If not available, an in-office validated measurement device should show a mean “home BP” equal to or more than 130/80 mmHg [8]. The only situations where this rule can be overruled and HTN is diagnosed from a single office visit is when a patient present with severe hypertension of BP equal to or higher than 160/100 mmHg with (emergent HTN) or without (urgent HTN) end-organ damage.

Hypertension risk factors

Risk factors of hypertension are of utmost importance for the prevention of HTN and also its management once diagnosed, as some of its risk factors are lifestyle related, and thus modifiable. The risk factors that have shown strong and independent association with HTN include age, obesity, family history, renal nephron mass, race, alcohol consumption, increased sodium intake and physical inactivity. Clearly, of these, the modifiable ones are obesity, alcohol consumption, sodium intake and physical inactivity. Obesity is an important modifiable risk factor especially since has been associated with age-related rise in BP [9]. In a review from Framingham Heart study, it was estimated that excess body weight accounted for almost 26% of HTN cases in men and 28% in women overall. Also, it accounted for 23% of coronary artery disease cases in men and 15% in women [10].

Management approach

Hypertensive patients can be managed by one of two ways: non- pharmacologic and pharmacologic. Non-pharmacologic therapy should be offered to all patients. And it consists of targeting the aforementioned modifiable risk factors of HTN. Firstly, with regard to restricting sodium intake on the daily diet of the patients, studies have shown that moderate restriction of sodium intake by hypertensive individual results in an average BP reduction of 4.8 mmHg and 1.1 mmHg in the systolic and diastolic components, respectively [11]. Secondly, and unless the hypertensive patient is a known renal patient, dietary potassium supplementation can help reducing the blood pressure [5]. In addition, and independent of physical activity, blood pressure can be reduced by 1-2 mmHg for every 1 Kg] body weight lost [12]. These non- pharmacologic measures and others are summarized in **Table 2**. The benefits of comprehensive lifestyle changes, were assessed in the PREMIER trial, which showed that after 18 months, there was a lower hypertension prevalence (22% vs. 32%) and less use of antihypertensive drugs (14% vs. 19%) [13].

Table 2: The non- pharmacologic measures in the treatment of hypertension

Measure	Note
Dietary salt restriction	Moderate restrictions results in BP fall of about 4.8/2.5 mmHg
Dietary potassium supplementation,	If kidneys are normal
Wight loss	Losing 1 Kg can reduce BP by about 1-2 mmHg
DASH diet	Dietary Approaches to Stop Hypertension (DASH): high in vegetables/fruits, low-fat dairy products,
Exercise	Decrease systolic by 4-6 mmHg and diastolic by 3 mmHg

In addition to the non- pharmacological measures, antihypertensive therapy is integral to lower the blood pressure. Pharmacologic treatment should be started when out-of-office daytime blood pressure is equal to or more than 135 mmHg systolic or equal to or more than 85 mmHg diastolic. Other indications include blood pressure of equal to or more than 130 mmHg systolic or equal to or more than 80 mmHg diastolic if they have established cardiovascular disease, type 2 diabetes mellitus, chronic kidney disease, an estimated 10-year risk of atherosclerotic cardiovascular disease of at least 10 percent or are 65 years of age or older [5]. Thiazide diuretics, calcium channel blockers (CCBs), and ACE inhibitors (or ARBs) are the preferable starting agents in the treatment of hypertension. In black patients, however, a long-acting dihydropyridine calcium channel blocker would be the preferred initial monotherapy (see Table 3) [5]. Unless there is an indication for the use of second line antihypertensive medications (e.g., beta-blocker therapy post-MI), the treating physician should initiate and optimize the first line of antihypertensive agents.

Table 3. Antihypertensive Agents

First line agents	
• ACE inhibitors	Benazepril, captopril, enalapril, fosinopril, lisinopril, moexipril, perindopril, quinapril, ramipril, trandolapril
• ARBs	Azilsartan, candesartan, eprosartan, irbasartan, losartan, olmesartan, telmisartan, valsartan
• Thiazide and thiazide-type diuretics	Chlorthalidone, hydrochlorothiazide, indapamide, metolazone

<ul style="list-style-type: none"> • Calcium channel blockers 	Dihydropyridines: amlodipine, felodipine, isradipine, nicardipine, nifedipine, nisoldipine Nondihydropyridines: diltiazem, verapamil
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Second Line Agents	
<ul style="list-style-type: none"> • Alpha (α)-1 blockers 	Doxazosin, prazosin, terazosin
<ul style="list-style-type: none"> • Beta (β) blockers 	Cardioselective: Atenolol, betaxolol, bisoprolol, metoprolol tartrate, metoprolol succinate Combined α - and β -receptor blockers: Carvedilol, labetalol Cardioselective and vasodilatory: Nebivolol Noncardioselective: Nadolol, propranolol Intrinsic sympathomimetic: Acebutolol, carteolol, penbutolol, pindolol
<ul style="list-style-type: none"> • Other diuretics (besides thiazides) 	Loops (bumetanide, furosemide, torsemide) K-sparing (amiloride, triamterene)
<ul style="list-style-type: none"> • Aldosterone antagonists 	Eplerenone, spironolactone
<ul style="list-style-type: none"> • Central α-1 agonist and other centrally acting drug 	Clonidine, methyldopa, guanfacine
<ul style="list-style-type: none"> • Direct renin inhibitor 	Aliskiren
<ul style="list-style-type: none"> • Direct vasodilators 	Hydralazine, minoxidil

ACE Inhibitors and ARBs share similar indications for clinical use, including the usage as a first-line antihypertensive agents for non-African American patients (add-on therapy for African American patients, after thiazide diuretics and CCBs). This class of drugs can help in albuminuria, heart failure, post-MI care, and secondary stroke prevention as well with variable efficacy. ARBs can be considered as an alternative for patients who develop persistent cough or angioedema as a result of ACE Inhibitors usage. It should be noted that potassium levels should be monitored in patients treated with ACE or ARBs due to its hyperkalemia adverse effect noted in some cases [5].

Thiazide diuretics can be used alone or in combination with (ACE Inhibitors, ARBs, and CCBs). The ACC/AHA 2017 HTN guideline, preferred the usage of chlorthalidone over hydrochlorothiazide due to its role in reduction of CV outcomes. Treating physician should monitor levels of sodium, potassium, and magnesium after initiation of diuretics in general [5].

Calcium channel blockers (CCBs) are the first line of therapy in Black African American patients. Additionally, CCBs are considered to be the starter agent in patients with angina and atrial fibrillation. However, it should be kept in mind that CCBs are moderate CYP450 3A4 inhibitors and may result in serious drug-drug interactions. CCBs should be avoided in patients with heart failure and/or cases with a reduced ejection fraction (<40%). [5] Secondary hypertensive agents are used when BP cannot be optimized with the first line agents or when comorbid conditions dictate their necessity. Management of Stage I hypertensive patients can be started with a single antihypertensive medication with goal of therapy aiming at less than 130/80 mmHg BP. The drug dosage should be titrated with the addition of a second agent to achieve optimized BP if needed. In Stage II hypertensive patients, the treating physician should initiate antihypertensive drug therapy with two first-line agents of different classes [5].

CONCLUSION

Essential hypertension is a systemic disease that an individual may have for years without even knowing, and it can silently kill its victim. Although we do not know much about what causes it exactly, we know a lot about risk factors. The major role of the physician lies in his ability to recognize these risk factors, in order to prevent or even reduce hypertension effects. The treating physician should identify the patients at risk of developing hypertension, screen them and provide advises about their lifestyle. In addition, when a patient is diagnosed with hypertension, it is the role of family physician to educate them about their condition, control their BP, and help

them to be complaint with their drug regimen. In conclusion, many new drugs are being researched as a treatment option, however, many are still in clinical trial phase and need larger studies to safely adapt them into protocols.

REFERENCES

1. Prisant LM. Hypertensive heart disease. *J Clin Hypertens (Greenwich)*. 2005 Apr; 7(4):231–8.
2. McManus M, Liebeskind DS. Blood Pressure in Acute Ischemic Stroke. *J Clin Neurol*. 2016 Apr; 12(2):137–46.
3. Seedat YK. High blood pressure-the silent killer. *S Afr Med J*. 1981 Feb 7; 59(6):173–6.
4. Al-Nozha MM, Abdullah M, Arafah MR, Khalil MZ, Khan NB, Al-Mazrou YY, Al-Maatouq MA, Al-Marzouki K, Al-Khadra A, Nouh MS, Al-Harhi SS. Hypertension in Saudi Arabia. *Saudi Med J*. 2007 Jan; 28(1):77–84.
5. Whelton PK, Carey RM, Aronow WS, Casey DE, Collins KJ, Himmelfarb CD, DePalma SM, Gidding S, Jamerson KA, Jones DW, MacLaughlin EJ. 2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults: Executive Summary: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. *Hypertension*. 2018; 71(6):1269–324.
6. Collaboration PS. Age-specific relevance of usual blood pressure to vascular mortality: a meta-analysis of individual data for one million adults in 61 prospective studies. *Lancet*. 2002 Dec 14; 360(9349):1903–13.
7. Filipovský J. [White-coat hypertension and masked hypertension]. *Vnitr Lek*. 2015 May; 61(5):401–5.
8. Bloch MJ, Basile JN. Ambulatory blood pressure monitoring to diagnose hypertension--an idea whose time has come. *J Am Soc Hypertens*. 2016 Feb; 10(2):89–91.
9. Sonne-Holm S, Sørensen TI, Jensen G, Schnohr P. Independent effects of weight change and attained body weight on prevalence of arterial hypertension in obese and non-obese men. *BMJ*. 1989 Sep 23; 299(6702):767–70.
10. Wilson PWF, D'Agostino RB, Sullivan L, Parise H, Kannel WB. Overweight and obesity as determinants of cardiovascular risk: the Framingham experience. *Arch Intern Med*. 2002 Sep 9; 162(16):1867–72.
11. He FJ, Li J, Macgregor GA. Effect of longer term modest salt reduction on blood pressure: Cochrane systematic review and meta-analysis of randomized trials. *BMJ*. 2013 Apr 3; 346: f1325.
12. Stevens VJ, Corrigan SA, Obarzanek E, Bernauer E, Cook NR, Hebert P, et al. Weight loss intervention in phase 1 of the Trials of Hypertension Prevention. The TOHP Collaborative Research Group. *Arch Intern Med*. 1993 Apr 12; 153(7):849–58.
13. Elmer PJ, Obarzanek E, Vollmer WM, Simons-Morton D, Stevens VJ, Young DR, et al. Effects of comprehensive lifestyle modification on diet, weight, physical fitness, and blood pressure control: 18-month results of a randomized trial. *Ann Intern Med*. 2006 Apr 4; 144(7):485–95.