SUNTEXT REVIEWS

SunText Review of Medical & Clinical Research
ISSN: 2766-4813

Open Access
Review Article
Volume 3:4

Dynamics of Pre-Hypertension; What is Good, the Bad and the Ugly

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Received date: 10 November 2022; **Accepted date:** 25 November 2022; **Published date:** 30 November 2022

Citation: Alamgir MA (2022). Dynamics of Pre-Hypertension; What is Good, the Bad and the Ugly. SunText Rev Med Clin Res 3(4): 168.

DOI: https://doi.org/10.51737/2766-4813.2022.068

Abstract

Cardiovascular disease risk increases throughout the increased range of blood pressure, including ranges previously considered normal. For example, the person with systolic blood pressure (SBP) of 135 mm/hg has double risk to encounter the coronary heart diseases and stroke than those associated with SBP of 115 mm Hg. Guidelines describe that BP in range of 120-130/80 mmHg is not normal particularly if associated with risk factors and it is termed as pre- hypertension, necessitating screening /identification along with approaches of lifestyle modification.

Keywords: *Pre- hypertension; Lifestyle modification*

Updates of Literature Review

American Heart Association has recently estimated that nearly 108 million or 45% adults in USA has raised blood pressure {BP) and among half of them have uncontrolled hypertension despite treatment [1, 2]. 59 million people living in USA has prehypertension with BP in range of 120-130/80 mm/hg. Pre-hypertension (pre-HTN) is considered as warning sign as mostly it is precursor and leads to hypertension. Elevated blood pressure has always been a threat and modifiable cause of cardiovascular mortality and morbidity worldwide. In 2018, hypertension claimed about half a million deaths as primary or secondary cause. When considering global figures by the 2020 ISH Global Hypertension Committee, 1.39 billion people had raised blood pressure worldwide, claiming for 10.4 million deaths per year particularly in middle- and lower-income countries [3]. Generally, the high mortality is due to fact that raised blood pressure is asymptomatic and population at large is unaware about its complications.

Also, there is illiteracy and lack of well-coordinated approach for control of blood pressure among population of south Asians and other under develop countries [4]. The American and European guidelines have different approach to definitions of prehypertension, hypertension and their treatment thresholds. The old adage, formerly regarded as 140/80 mmHg as normal cut off value, no longer rings true. 2017 American College of Cardiology/American Heart Association (ACC/AHA) guidelines explain new measurements for blood pressure (BP) and categorized normal BP as value <120/80 mmHg, raised as >120-129/ 80mmHg, stage 1 hypertension as systolic blood pressure (SBP) 130-139 mmHg and/or diastolic BP (DBP) 80-89 mmHg. Stage 2 hypertension is defined as SBP ≥140 mmHg and/or DBP ≥ 90 mm Hg [5]. The medical literature says that SBP increases and DBP decreases until 5th decade, after that DBP decreases and pulse pressure increases. These changes are link to development of atherosclerosis and related cardiometabolic risk factors. In presence of diabetes, obesity and dyslipidemias, the pathological process of atherosclerosis begins even during normal BP range. There are increased cardiovascular consequences and all-cause mortality in hypertensives patients with risk factors and recommended to keep threshold level of 120 mmHg and level above this is well defined disease entity called as prehypertension.

What is pre-hypertension; A Wake-up-call

Pre-hypertension (pre-HTN) is an epidemic and poses significant public health challenge for both developed and low- middle income countries. The Sprint Trial was first large prospective randomized trial and concluded that intensive BP control with

target <120/80mm/Hg was more beneficial in terms of reducing cardiovascular mortality and morbidity compared with routine BP control to 140 mm Hg [6]. The landmark Framingham trial revealed some alarming results that 45 percent of cardiovascular (CV) events like coronary heart disease and stroke occurred at systolic BP less than 140 mm/Hg [7]. First time, the 7th report of JNC guidelines coined the term as prehypertension (pre-HPT). With blood pressure >120/80 mmHg and narrated that if values are below this threshold, then the big answer is the "GOOD" [8]. The reported overall worldwide prevalence of pre-hypertension is 31% to 50 percent [9, 10]. During this stage, population at large may have unhealthy lifestyle and do not adopt preventive measures because they are ignorant and unaware to this well-defined disease entity of pre-HTN. It is frequently observed that behavioral risk factors among these groups are physical inactivity, high calorie diet, smoking, binge alcohol drinks and fewer intakes of fruits with vegetables [11]. It means primary preventive strategies should be accomplished in general population and particularly for the population at risk. An important fate of pre-HPT for population is the development of hypertension [12]. Based upon these facts, the aim of our review is to sort out retrospectively the recent evidence-based research about pre-HTN and update some preventive approaches along with lifestyle modifications.

Pre-hypertension with risk factors; "the BAD"

The elevated blood pressure is a frequent cause of cerebrovascular accident, myocardial infarction and angina pectoris. Hypertension exists in isolation in only about 20 percent of cases. Mostly it is accompanied by visceral obesity, dyslipidaemia, insulin resistance or diabetes. Presence of one or more risk factors with hypertension is termed metabolic syndrome [13]. The landmark Framingham study has crafted that risk of CV vascular events doubles for every increment of 20/10 in BP over 110/75 mm/hg (even in pre-HTN range) particularly in presence of risk factors [7]. Compared with normal BP, pre-HTN is associated with a 27% increase in all-cause and 66% increase in CVD morbidity. So, it was suggested that overall cardiovascular risk factors may be more important than actual raised blood pressure and population in pre -HTN range should be advised for lifestyle modification without pharmacological therapy.

When are drugs needed in hypertension?

As mentioned earlier, 80 to 90 percent participant in Framingham trial had at least one additional CV risk factor. Considering the drug treatment of maintaining target BP value <120/80 mm Hg, some controversial results were obtained in ACCORD trial of diabetic patients. Treating BP to less than 130 mm Hg only with drugs, resulted in serious adverse effects in term of heart, kidney and retinal diseases except stroke [14]. It is degree or duration of risk factors along with level of BP that strongly influence CV outcome. So, goal of therapy should be to reduce modifiable risk factors as well. Research shows that with SBP as low as 90 mm/Hg, the CV events increase with step wise increase in BP and this effect is potentiated many folds with associated risk factors [15]. Canadian yearly guidelines had more emphasis on lifestyle modification and in this situation pharmacological treatment is recommended when having "UGLY" macro vascular complications as well. Generally, drug treatment is recommended in addition to lifestyle modification when SBP>160 or DBP >100 mmHg [16]. These prescribers urge to keep BP below 120/80 mmHg. Keeping in view about above mentioned theme, large NIHR-sponsored UK trial compared mortality and risk of cardiovascular events among patients with or without antihypertensive drugs. They don't support recommendations of US (ACC/AHA) clinical guidelines for the initiation of treatment in low-risk patients with mild hypertension [17]. It is worth mentioning for younger age population that while addressing high normal or pre-hypertension, it is needed to manage associated risk factors rather than drug therapy.

Train your brain for Lifestyle modification

To be healer is a privilege. Physician has divine gift of knowledge, skill and can be a role model in the society by educating patients for maintaining healthy lifestyle and preventing complications. It should be reminded that in stage 1 hypertension, 6 months or one-year lifestyle modification plan must be attempted before drug therapy [18]. As way of life changes, it requires strict adherence to combat risk factors. Below is mentioned the updated outlines of essential steps and recent evidence-based recommendations in these regards.

Managing obesity tied with prehypertension

Correlation of pre-HTN and HTN has been extensively studied and simple weight reduction is tremendously rewarding in reducing BP in pre-HTN. Study shows that 5% weight gain was associated with 20-30% increase odd of developing pre-hypertension. Aerobic exercise, stationary indoor or outdoor road cycling and yoga has proven benefit. A heart-healthy diet alone or as part of a holistic healthy lifestyle for hypertension control, weight management, and CVD risk reduction [19]. Expert guidelines recommend 30 minutes brisk walk 6 times per week. More extensive exercise did not prove to be beneficial. Effective BP lowering is achieved even without attaining normal BMI.

Dyslipidaemia with pre HTN may be 'biological time bomb

Various patterns of lipid abnormalities may be seen. Research had a rational explanation and elaborated that elevated BP associated with hyperlipidemia, is frequently resulting with reduced life expectancy. An epidemiological trial showed significant increase in total cholesterol, LDL, VLDL and serum triglyceride level in pre- HPT compared to normotensives. While there was no significant change in HDL level in later group [20]. Trials have shown that the prevalence of the co-existence of hypertension and dyslipidemia is seen in the range of 15 to 31% and authors have coined the term as 'lipitension' [21]. Evidence based research showed that diabetics commonly have pre HTN or hypertension along with obesity and dyslipidemia ; constellation of these terms is called as metabolic syndrome [22]. The literature explained that among diabetics, development of atherosclerosis and HTN is accelerated due to insulin resistance, leading to 2-4 folds more risk of the atherosclerotic cardiovascular disease (ASCVD) outcome. Lifestyle modification including heart healthy and Mediterranean diet, DASH diet plan and moderate exercise have profound beneficial role [23]. Large epidemiological MRFIT (Multiple Risk Factor Intervention Trial) observed interplay of lipitension among 356,222 men and followed up for 12 years. Their results emphasized that it was multiplicative adverse effect in cardiovascular outcome even with mild elevated levels of both hypertension and lipoproteins [24]. Furthermore, the Framingham study results also reflected that moderate hypertension and hyperlipidaemia had a similar 10-year risk of coronary heart disease as those with highly elevated systolic BP or LDL cholesterol alone. The preventive measures discussed in this paper has beneficial effects along with drugs if needed.

DASH diet have 'mind blowing results'

Dietary Administration to Stop Hypertension or Mediterranean diet has equal outcome as single drug therapy in HTN. This plan comprises vegetables, plenty of fruits, dietary fiber, whole grains and less consumption of meat, carbohydrates and saturated fats. Age and body mass index (BMI) are significant predictors of pre HTN [25]. Junk food and soft drinks have bad effect. Online Mediterranean diet plan can be downloaded. Dietary modification along with planned exercise and weight reduction works synergistically for optimal reduction of high BP. Fermented Diet: Recently a meta-analysis, including 24 randomized control trials concluded that supplementation of yogurt and other fermented diet reduced blood pressure in pre-HTN, but it should be part of other weight reduction plan [26].

Physical activity may ward off pre HTN

Inactivity most common identifiable and recognized risk factor and this term needs understanding. Physical activity means walking, lifting, hauling, shoveling and carpentry etc. Lack of physical activity is sedentary behavior and means activities that do not increase energy expenditure above the resting level e.g. sitting or sleeping, computer use, video gaming and watching television. A recent met-analysis of 15 randomized controlled trials comparing effect of exercise and pharmacological therapy for ambulatory BP monitoring concluded that exercise do have beneficial effect in lowering BP particular as an adjuvant to other modalities [27]. European guidelines strongly recommend aerobic exercise for stage 1 pre-HPT and as adjuvant with drug therapy in stage 2 and 3 as well [28].

Dietary salt reduction go- to- for it

Although there is already established relationship of high sodium intake with hypertension, but there is also recent evidence that dietary salt restriction reduces BP among normotensives or Pre - HTN [29]. It is true among all ethnic groups with children and adults. A first meta-analysis of its kind showed dose response sodium - BP relationship in normotensive /hypertensive papulation and recommend salt as low as 1 to 2 grams per day [30]. There were over 1.8 million deaths, and over 44 million disability-adjusted life years lost (ex CVD, stroke), as a result of excess dietary sodium consumption [31]. It is recommended no added salt in cooking for high-risk individuals.

Alcohol intake and smoking, a lethal combination

Too much booze is harmful. Most studies have conflicting results but half of all related meta -analysis conducted so far show that less than 2 oz per day for men and less than 1 oz per day for women may have independent effect of lowering systolic blood pressure < 3.5mm Hg [32]. Smoking also has well established relationship with accelerated atherosclerosis and developing of hypertension. The only answer in this regard is to "quit smoking plan"

Among afore mentioned practices, let us consider which is most beneficial?

In a recent valuable meta- analysis, 22 non-pharmacologic intervention were assessed from 60 166 potentially relevant articles and 120 eligible articles (14 923 participants) with a median follow-up of 12 weeks. For adults with prehypertension, their evidence indicated that the Dietary Approach to Stop Hypertension (DASH) was superior to all other no pharmacologic interventions in lowering systolic and diastolic BP, compared with usual care. Moderate- to high-quality evidence indicated that aerobic exercise, low-sodium and high-potassium salt, isometric training and meditation could lower SBP and DBP as well [33].

Conclusion

Almost all evidence-based studies and literature favor lifestyle modification in pre-HTN with or without risk factors; results will

be promising by reducing mortality. Health care providers should transform this knowledge to papulation at large and save human lives because “Thousands of hands are waiting to build your home in heaven.”

Acknowledgment

I hereby dedicate this paper to my late parents, Muhammad Aslam Khan and Kaneez Zineb, owing to their affectionate parenting, education and benevolence for me. God bless them ever.

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