



# Pseudohypertension: Its characteristic features in elderly patients.

Shobin B Varghese<sup>1</sup>, Keerthika Krishnan<sup>2</sup>, Abhirama B R<sup>3</sup>, Julia J J<sup>4</sup>, Prasobh G R<sup>5</sup>

<sup>1</sup> Student, Sree Krishna College of Pharmacy and Research centre, Parassala, Thiruvananthapuram.

<sup>2</sup> Student, Sree Krishna College of Pharmacy and Research centre, Parassala, Thiruvananthapuram

<sup>3</sup> Professor, Department of pharmacy practice, Sree Krishna College of Pharmacy and Research centre, Parassala, Thiruvananthapuram.

<sup>4</sup> Assistant professor, Department of pharmacy practice, Sree Krishna College of Pharmacy and Research centre, Parassala, Thiruvananthapuram.

<sup>5</sup> Principal, Sree Krishna College of Pharmacy and Research centre, Parassala, Thiruvananthapuram.

**Abstract:** Pseudohypertension, also known as non compressibility artery syndrome, happens when a normal person's blood pressure is incorrectly recorded, or when an already hypertensive person's blood pressure is overstated, as measured by a sphygmomanometer. This vascular phenomenon occurs largely in older people due to calcification-thickening of the arterial vascular wall, namely the tunica intima layer, which makes it difficult for the sphygmomanometer to compress and/or occlude the artery. When Osler's sign is positive, a patient is diagnosed with pseudohypertension, and this condition can be clinically verified using Osler's manoeuvre.

**Keywords:** Pseudohypertension(PHT), Low- and middle-income nations (LMICs), brachial-ankle pulse wave velocity (ba-PWV), Pulse pressure (PP), Dietary Approaches to Stop Hypertension (DASH).

## **Introduction**

Hypertension is a common and serious condition that can lead or worsen a variety of health problems. It is directly associated with cardiovascular disease and the risk of death. Stroke, myocardial infarction, angina, congestive heart failure, renal failure, and premature death due to cardiovascular causes are all associated with blood pressure.

Because hypertension usually has no symptoms until major issues occur, it is known as "the silent killer." Hypertension can be classified into three categories. When there is no recognised cause for hypertension, it is referred to as essential or primary hypertension. This type of hypertension is not curable, although it can be managed. Essential hypertension affects about 90% of people with hypertension. Essential hypertension may be caused by a genetic factor.

Long-term high blood pressure, is a leading cause of stroke, coronary artery disease, heart failure, atrial fibrillation, peripheral arterial disease, visual loss, chronic kidney disease, and death in the world.

Primary (essential) hypertension and secondary hypertension are two types of high blood pressure. Primary hypertension is characterised as high blood pressure caused by nonspecific lifestyle and genetic variables in 90–95 percent of cases.

Excess salt in the diet, excessive body weight, smoking, and alcohol consumption are all risk factors. Secondary high blood pressure, defined as high blood pressure caused by an identifiable cause such as chronic renal disease, constriction of the kidney arteries, an endocrine problem, or the use of birth control pills, accounts for the remaining 5–10% of cases. The systolic and diastolic pressures, which are the maximum and minimum pressures, respectively, are used to classify blood pressure.

For most adults, normal resting blood pressure ranges from systolic mercury column mm (mmHg) 100-130 mm and diastolic blood pressure 60-80 mmHg. Most adults have hypertension if their resting blood pressure is consistently above 130/80 or 140/90 mmHg. Different numbers apply to children. A 24-hour ambulatory blood pressure monitoring looks more accurate than an office based blood pressure monitoring.

### TYPES OF HYPERTENSION

Category pressure	Systolic pressure mm Hg	Diastolic pressure mm Hg
Normal	90–119	60-79
Pre-hypertension	120–139	80–89
Stage 1	140–159	90–99
Stage 2	≥160	≥100
Isolated systolic Hypertension	≥140	<90

### Factor Effecting Blood Pressure

- 1) Blood volume
- 2) Force of contraction of the heart.
- 3) Heart rate and BP are inversely proportional.
- 4) Viscosity of blood.
- 5) Nature of the blood.
- 6) Elasticity of blood vessel

### CAUSES

1. Essential Hypertension
2. Renal
  - a) Acute nephritis
  - b) Interstitial nephritis and pyelonephritis
  - c) Polycystic kidneys
  - d) Renal artery stenosis
3. Vascular: Arteriosclerosis
4. Endocrine: Cushing's syndrome, thyrotoxicosis, myxedema
5. Neurological: Elevated intracranial tension, lead encephalopathy.
6. Miscellaneous: Polycythemia, gout.

### SYMPTOMS

1. Head ache which is throbbing and usually frontal occurs usually in morning hours.
2. Dizziness
3. Epistaxis

Symptoms due to affection of organs

1. CVS:
  - a) Dyspnea on exertion.
  - b) Anginal chest pain (IHD)
  - c) Palpitation

2. Kidneys: Hematuria, nocturia.

3. CNS:

a) Transient ischemic attacks with focal neurological deficit.

b) Hypertensive encephalopathy (head ache, vomiting, convulsion, unconsciousness, focal neurological deficit).

c) Dizziness, tinnitus and syncope.

4. Retina: Blurred vision or sudden blindness.

Symptoms due to underlying diseases

1. Edema and puffy face.

2. Weight gain

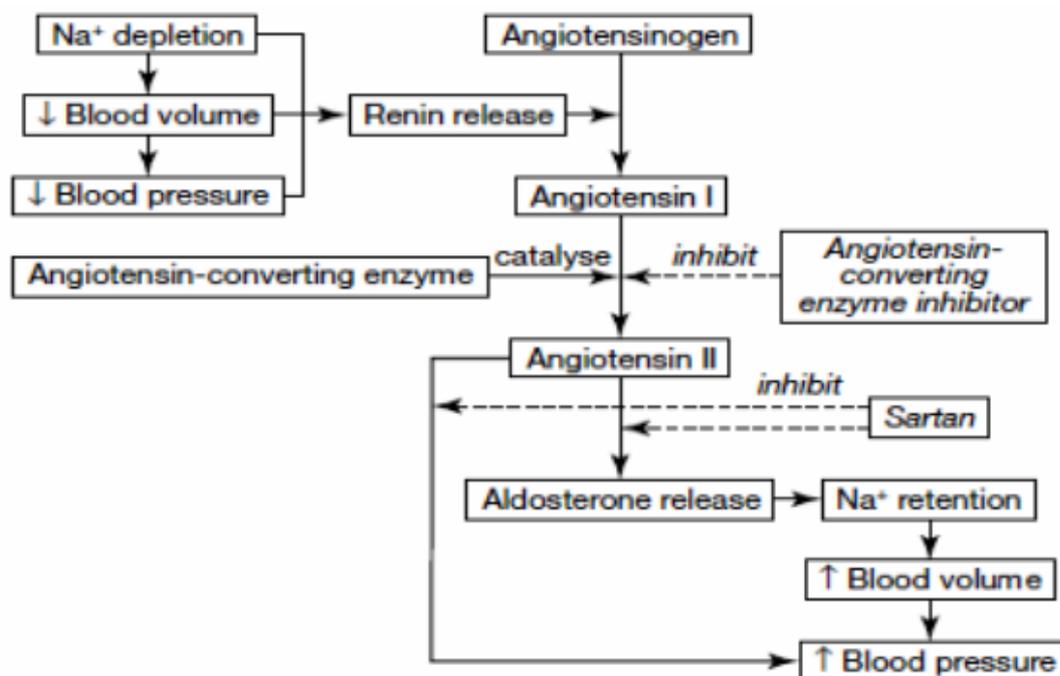
3. Weight loss, tremors, palpitation and sweating.

4. Hyperthyroidism

5. Weakness, hyper-aldosteronism.

6. Joint pain, bronchospasm and peripheral vascular disease.

### Renin- Angiotensin- Aldosterone mechanism or system



### PSEUDO-HYPERTENSION

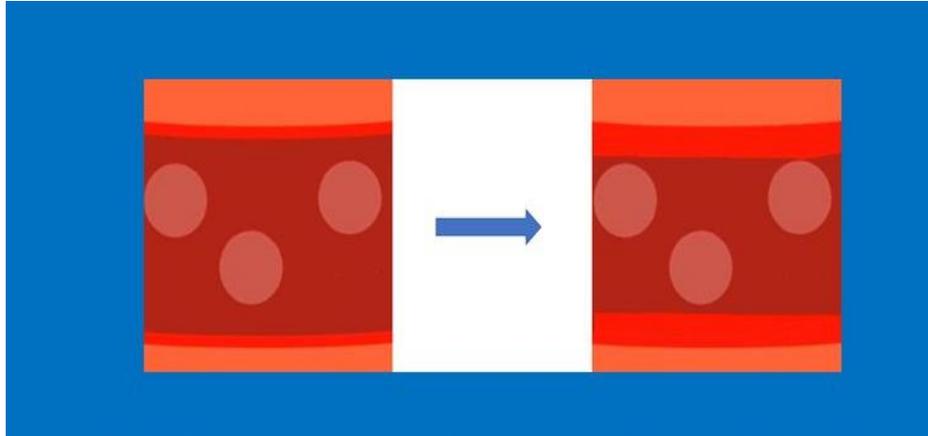
Pseudohypertension (PHT) is primarily used to specify the conditions under which brachial artery pressure is assessed, with an invasively assessed interruption of the next arterial pressure of 10 mmHg or greater. In 1892 William Osler probably interpreted the condition to represent PHT. However, in 1974, the term pseudohypertension first appeared in the therapeutic literature. Based on previous studies conducted to correlate indirect and direct calculations, PHT dominance should range from completely unique (1.7%) to fairly average (> 65%). Based on fascinating scientific evidence, PHT is an important hypertensive disease in the elderly.

Antihypertensive drugs suitable for true hypertension note that orthostatic hypotension, dizziness, and even major cardiovascular events can cause antagonism in patients with PHT.

As people grow older, high blood pressure has become one of the biggest challenges for older people, accounting for about 49% of people over the age of 60. Changes in these conditions mean that thousands of cases are at risk of developing this condition. Prevalence of PHT is assessed not only because of the different definition and option bias of the study in the study cohort of victims who previously had suspected associated PHT, but also because of the lack of convenient, non-invasive, simple and correct means. Is difficult.

Confirmation of this state. Invasive subsequent determination of arterial pressure by arterial puncture remains the standard diagnostic procedure for PHT. By the age of the study, there was an extreme brachial artery wall. This is known to be a major achievable cause of PHT. Therefore, prisoners with comorbidities who treat arteriosclerosis, chronic kidney disease, diabetes mellitus, hypertension, and hyperlipidemia are more likely to form PHT because these conditions affect the elasticity of blood vessels. Become.

In these patients, the prevalence of PHT can be identified in both hypertensive and normotensive patients and the sources of risk associated with the development of PHT can be determined. In addition, both brachial and ankle pulse wave velocity (baPWV) and pulse pressure (PP) are important criteria for assessing arteriosclerosis.



- Thickening of vessel wall causing Osler's sign leading to Pseudohypertension.

## Etiology

Pseudohypertension is caused by medial sclerosis and/or decreased arterial disintegration due to calcification. Both systolic and diastolic chamber pressures are affected.

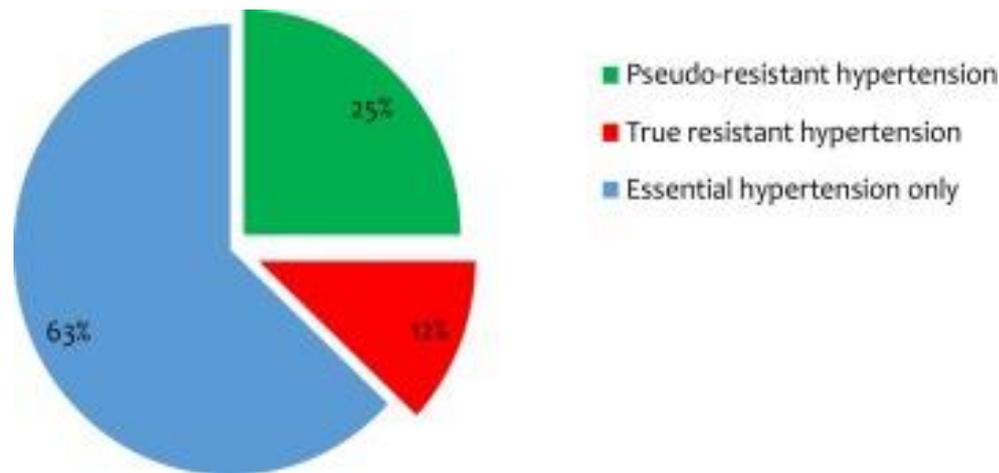
The most common cause of pseudohypertension is age-related thickening of the arterial wall. This condition is actually quite common in the elderly. Thickening makes it difficult to compress the arteries. It causes arterial stiffness and the cuff gauge reads blood pressure higher than the actual blood pressure.

The main factors are:

- Inappropriate blood pressure measurement.
- White coat effect.
- Inappropriate doses related to antihypertensive drugs
- Inappropriate combinations
- Inadequate patient compliance
  - Drug side effects
  - Drug costs
  - Complex medication schedule
  - Physician-patient relationship
  - Psychiatric problems

## Epidemiology

Hypertension is becoming more common, especially in low- and middle-income nations (LMICs). According to estimates, 31.1 percent of adults (1.39 billion) in the globe had hypertension in 2010. Adult hypertension was more common in LMICs (1.04 billion persons) than in high-income nations (349 million people). Some of the regional variety in hypertension prevalence may be explained by variations in the levels of risk factors for hypertension, such as high salt intake, low potassium intake, obesity, alcohol consumption, physical inactivity, and a poor diet.



### Diagnosis

Pseudohypertension is diagnosed based on actual blood pressure fluctuations and readings from a cuff or finger blood monitor. Diagnosis of pseudohypertension is finding the target pressure to be treated. If the patient's cuff pressure and intra-arterial pressure are different, especially if:

- High cuff pressure readings, but no evidence of organ damage.
- If the patient presents with symptoms of hypotension (such as dizziness or confusion) after starting treatment for hypertension.

### Management

#### **Dietary changes;**

Many studies have found a link between sodium chloride consumption and blood pressure. The effects of sodium chloride are especially important in middle-aged to late-stage individuals with a family history of hypertension. By reducing the consumption of sodium chloride, you can lower your blood pressure slightly. The American Heart Association recommends that sodium chloride intake not exceed 6 g per day. This can lower blood pressure by 28mmHg. The DASH diet, which consists of fruits, vegetables and low-fat dairy products, has been shown to reduce blood pressure by 814 mm Hg.

Potassium, calcium and magnesium in the diet are inversely proportional to blood pressure. When these nutrients are consumed in smaller amounts, the effect of salt on blood pressure is enhanced.

#### **Weight loss and exercise;**

Up to 60% of people with high blood pressure are overweight by 20% or more. The distribution of afferent fat is associated with insulin resistance and hypertension. Even a small (5%) weight loss can lead to lower blood pressure and improved insulin sensitivity. Losing weight can reduce blood pressure by 520 mmHg for every 10 kg of weight lost in patients who weigh more than 10% of their ideal body weight.

Regular aerobic exercise may promote weight loss, lower blood pressure, and reduce the overall risk of cardiovascular disease. With moderately intense physical activity, blood pressure can be lowered by 49 mmHg.

- Pseudohypertension occurs when cuff blood pressure (BP) measurement overestimates intra-arterial pressure. It can be seen in elderly people with thickening, calcified arteries, as the cuff has a harder time compressing such arteries, requiring a much higher cuff pressure to occlude a thickened brachial artery. It's also possible that the diastolic BP is exaggerated.
- Consider pseudohypertension when no organ damage occurs despite abnormally high blood pressure readings, when patients acquire hypotensive symptoms while on medication, and when radiologic examination reveals calcification of the brachial artery. In this situation, direct intra-arterial pressure measurement may be required.

### **Blood pressure measurements**

The accurate calculation of blood pressure (BP) is essential for the analysis and management of hypertension. In the background, many oscillometric devices have happened approved that admit precise BP calculation while reducing human faults guide the auscultatory approach.

Fully automatic oscillometric instruments worthy taking different readings even without a spectator being present can determine a more accurate calculation of BP than auscultation. Studies have proved solid dissimilarities in BP when calculated outside versus in the setting.



Ambulatory BP monitoring is treated the citation standard for out-of-office BP assessment, along home BP scanning being an alternative when ambulatory BP scanning is not possible or tolerated. All the cases experienced coronary artery angiography by the trans-radial artery approach, and blood pressure was calculated in the lying down position at the time cardiac catheterizations.

### **Conclusion**

Pseudohypertension is a condition of excessive blood pressure much like hypertension, which has most common reason as the stiffness and blockage in arteries. The treatment is equal because the treatment of high blood pressure, which include way of life modifications, nutritional conduct, and blood pressure medications. But, the analysis of Pseudo hypertension is depending on the knowledge and experience of the medical practitioner. Consequently it is advised to visit your health practitioner or an expert cardiologist frequently to reveal the blood pressure. This especially holds real for senior citizens, and caretakers have to preserve this in mind.

## References

1. M. H. Beers and R. Berkow, Eds., *The Merck Manual of Geriatrics*, Merck Research Laboratories, Whitehouse Station, NJ, USA, 2000.
2. J. D. Spence, "Pseudohypertension," *Hypertension*, vol. 59, no. 5, p. e49, 2012.
3. J. Belmin, J.-M. Visintin, R. Salvatore, C. Sebban, and R. Moulia, "Osler's maneuver: absence of usefulness for the detection of pseudohypertension in an elderly population," *The American Journal of Medicine*, vol. 98, no. 1, pp. 42–49, 1995.
4. F. H. Messerli, H. O. Ventura, and C. Amodeo, "Osler's maneuver and pseudohypertension," *The New England Journal of Medicine*, vol. 312, no. 24, pp. 1548–1551, 1985.
5. L. S. Peterson, A. M. Nelson, and W. D. Su, "Classification of morphea (localized scleroderma)," *Mayo Clinic Proceedings*, vol. 70, no. 11, pp. 1068–1076, 1995.
6. J. V. Nguyen, V. P. Werth, and N. Fett, Morphea, <http://emedicine.medscape.com/article/1065782-overview>.
7. N. Fett and V. P. Werth, "Update on morphea: Part I. Epidemiology, clinical presentation, and pathogenesis," *Journal of the American Academy of Dermatology*, vol. 64, no. 2, pp. 217–228, 2011.
8. Oxford Centre for Evidence-based Medicine, "Levels of Evidence," March 2009.
9. E. A. Fox and S. Sharan, "A comparison of two methods for soft boolean operator interpretation in information retrieval".
10. Messerli FH, Ventura HO, Amodeo C. Osler's maneuver and pseudohypertension. *N Engl J Med*. 1985;312:1548–1551.
11. Nichols WW, O'Rourke MF. *McDonalds Blood Flow in Arteries. Theoretical, Experimental and Clinical Principles*. 5th ed. Hodder Arnold, London, UK: Oxford University Press; 2005.
12. Benetos A, Safar M, Rudnicki A, Smulyan H, Richard JL, Ducimetiere P, Guize L. Pulse pressure: a predictor of long-term cardiovascular mortality in a French male population. *Hypertension*. 1997;30:1410–1415.
13. Rivera SL, Martin J, Landry J. Acute and chronic hypertension: what clinicians need to know for diagnosis and management. *Crit Care Nurs Clin North Am*. 2019 Mar. 31 (1):97-108.
14. Benjamin EJ, Blaha MJ, Chiuve SE, et al, for the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. Heart disease and stroke statistics-2017 update: a report from the American Heart Association. *Circulation*. 2017 Mar 7. 135 (10):e146-e603.
15. Chobanian AV, Bakris GL, Black HR, et al. Seventh report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. *Hypertension*. 2003 Dec. 42(6):1206-52.
16. Katakam R, Brukamp K, Townsend RR. What is the proper workup of a patient with hypertension?. *Cleve Clin J Med*. 2008 Sep. 75(9):663-72.
17. Institute for Clinical Systems Improvement (ICSI). *Hypertension diagnosis and treatment*. Bloomington, Minn: Institute for Clinical Systems Improvement (ICSI); 2010.
18. Whelton PK, Appel LJ, Sacco RL, et al. Sodium, blood pressure, and cardiovascular disease: further evidence supporting the American Heart Association sodium reduction recommendations. *Circulation*. 2012 Dec 11. 126 (24):2880-9.