
White Coat Hypertension: An Overview

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Abstract: *White coat hypertension (WCH) is also known as isolated clinic or isolated office hypertension. It is defined as the patients with high clinic blood pressure at repeated visits. WCH is a vital concept to understand because it has been linked to the development of sustained hypertension (SH), target organ damage, and the possibility of cardiovascular events. This condition exists in women, older, adults, non-smokers, recently diagnosed patients with hypertension with a finite number of convectional blood pressure measurements in the office setting who have mild hypertension. It refers to the fight or flight response to the healthcare professional with elevated heart rate. Psychological factors that are responsible for causing white coat hypertension are stress and anxiety. Anxiety causes during a visit to doctors' room after seeing all the instruments like white coat, syringes with needle etc. So, Uncontrolled High blood pressure can lead to complications including dementia, deep vein thrombosis, heart attack or stroke, pulmonary embolism, narrowing of blood vessels, trouble with memory etc. Mainly, two widely accepted procedures or strategies are known measure the blood pressure associated with white coat syndrome, 1) High blood pressure monitoring (HBPM) 2) Ambulatory blood pressure monitoring (ABPM). HBPM is most convenient method as the patients can efficiently access their measurements of blood pressure. However, in ABPM, some patients are reluctant to accomplish or fulfill the examination. It is due to bugging those further causes risk of imprecise measurements throughout the activity of patients that will lead to a flawed reproducibility.*

Keywords: ROS, Pulmonary Embolism, Hypertension.

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1. Introduction

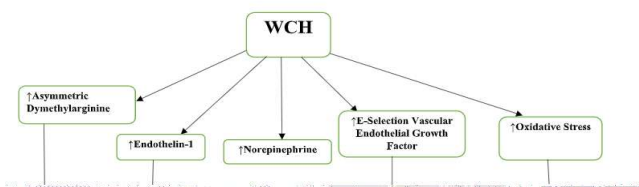
White coat hypertension (WCH) refers to an isolated office or isolated clinic hypertension and is used to define the patients with elevated clinic blood pressure at repeated hospital or clinic visits. In comparison with the normal blood pressure outside the doctor's office is detected either on ambulatory blood pressure monitoring or home blood pressure monitoring (HBPM). It has been observed that the overall pervasiveness of WCH is 10-15% in general population and its about 30% observed in patients associated with clinic/hospital blood pressure measurements [1]. WCH is an important phenomenon to understand, because it has been connected to the development of sustained hypertension (SH), target organ damage, and the risk of cardiovascular issues. WCH is a crucial phenomenon to comprehend because it has been linked to the development of sustained hypertension (SH), target organ damage, and the possibility of cardiovascular problems. It is now featured both in national and international hypertension guidelines. In the recent report, it has been observed that WCH can elevate approximately threefold when we

compare it with those patients having normal blood pressure [2-6]. WCH condition exists preferably in paediatrics, geriatrics, women, non-smokers, lately detected hypertension patients with a finite number of conventional BP readings in the clinic/hospital setting having moderate hypertension [7]. It has been noted that WCH develops cardiovascular events but not more than that of established hypertensives (EHs) [8]. The underlying mechanism(s) and long-term implications of WCH on cardiovascular health in children are yet unknown, according to a recent review[9]. WCH associated increased heart rate induced due to stress by responded of physicians or nurses at the hospital / clinic. In some studies, it has been observed that WCH indicated the mean of BP measurements within the interval of hypertension. It is also when ambulatory blood pressure values fall in between normal limits [10]. It has been taken into consideration that the failure of diagnosing WCH with standard measurements can result in-appropriate prescription and it can led to overexposure of patients to antihypertensive medications [11]. Above mentioned overview is highlighting on

the pathogenesis, causes, complications, diagnosis of WCH. Moreover, this review also focuses on non-pharmacological and pharmacological approaches for WCH. This paper will may be act as a roadmap for physicians to explore the future research on the WCH and its associated disorders.

2. Pathophysiology of WCHS

Sympathetic nervous system and endocrine system both are involved in arising of WCH. It is noted that various changes like vasoconstriction of skin, vasodilation of skeletal muscle, high blood pressure, elevated arterial blood pressure occurs during doctor’s clinic visit and these changes



undergone for several minutes after end of Hospital/Clinic visit.

Fig. 1: The Cellular and Molecular Pathway of WCH
Endocrine system related changes undergone for hours instead of minutes through Hospital/Clinic visit. It is observed that nurse’s

visit with carefully/polite handling induces a significant reduction of responses as compared to doctor’s visit [6]. It is noticed that increased level of ADMA and decreased level of eNOS leads to endothelium dysfunction. The elevated level of Endothelin-1 and nor epinephrine leads to vasoconstriction of skin. Moreover, increased level of E-selection VEGF leads to inflammation angiogenesis It is also noted that the increased level of oxidative stress resulting in vascular endothelium dysfunction [12].

3. Causes of WCH

WCH causes elevated blood pressure for a temporary period. Some people experienced high BP because of another factors like stressor, work, an emergency etc. Psychological factors like stress and anxiety causing WCH. Those patients’ dependent on anti-hypertensive drugs, faces high probability of pseudo resistant hypertension by increasing anxiety caused by effect of WCH. Anxiety causes during a Hospital/Clinic visit after seeing all the instruments like white coat, syringes with needle etc. WCH may causes an elevated risk of heart attack, stroke, heart failure and remaining cardiovascular conditions[6]. The two most common causes of white coat syndrome are extreme anxiety and fear [13].

4. Complications of WCH

4.1 Impact of WCH in Endothelial Myocardium Dysfunction

The damage of angiogenesis and endothelial are noted in individuals with WCH. WCH patients show a variety of symptoms, the elevated level of Von Willebrand Factor (VWF) and soluble E-selectin are reported in WCH. Moreover, Nitric oxide, Endothelium-1 and Vascular growth factor (VEGF) are noted in WCH patients [14].

4.2 WCH Associated with Diabetes

Hypertensive and micro-albuminuria are associated with in type-1 diabetic patients. In WCH type -2 diabetes patients suffering from comorbidity is elevated risk for diabetic nephropathy and retinopathy [15]. If we compare WCH with non-diabetic WCH than former has more precise target organ damage even in the patients with relatively less blood pressure. It signifies that management of blood pressure is vital and it is even in the context appertained to temporary increase in blood pressure [16].

4.3 WCH Associated with Cardiovascular Diseases

Without antihypertensive treatment WCH is related with extended risk of CVD and over all fatality in individuals. In this statement it is

noted that the most comprehensive meta-analysis examining the risk of target and related organ damage associated with WCH. A study has been done in a large population it showed that there are more chances of heart failure in WCH patients [17].

4.4 WCH Associated with Pregnancy

Recent literature review shows that women with WCH has risks of developing preeclampsia, delivering SGA (Small for gestational age) newborn, and preterm birth, compared with normotensive women and WCH is also linked with worse perinatal and maternal outcomes than normotension [18].

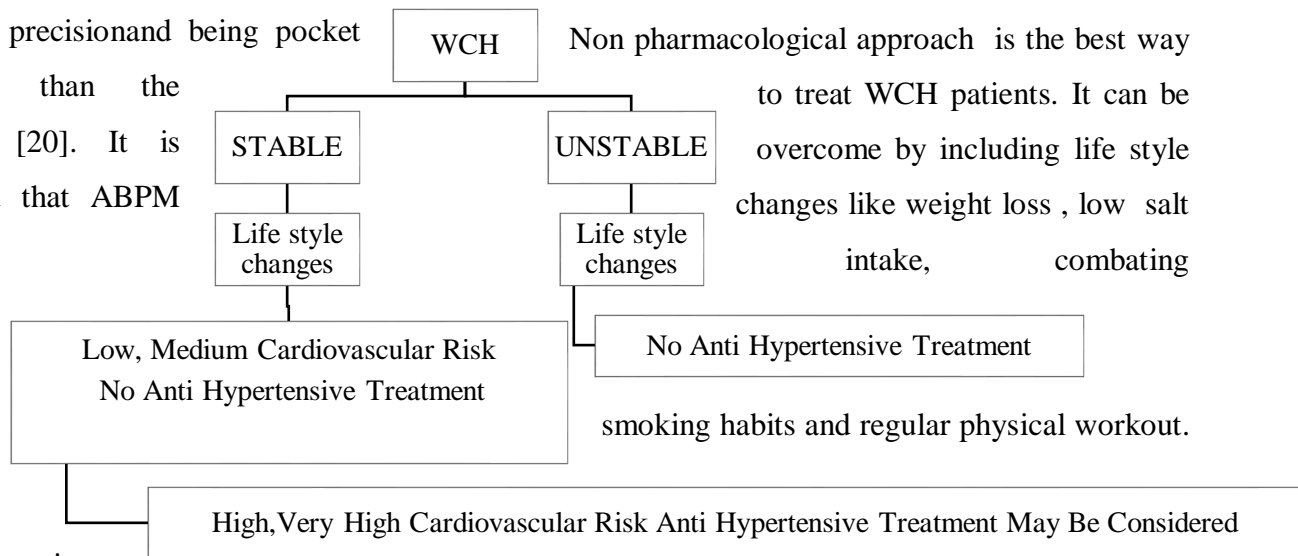
1. Diagnosis of WCH

There should not be comparison between WCH and high blood pressure. Patients with WCH may show two characteristics with elevated to normal blood pressure: (1) succession over a shorter time period to constant hypertension, particularly in adolescents and older individuals, (2) risk of cardiovascular disease[19]. Recently, two well-accepted approaches are used to measure BP related to white coat syndrome, they are 1) High Blood Pressure Monitoring (HBPM) and 2) Ambulatory Blood Pressure Monitoring (ABPM). In HBPM method, the individuals can easily access their BP measurement. It demands a prior training, mostly given by the physician / nurse. It is done by

utilization of a validated and precise BP measurement device. This procedure is accepted overall by the patients/ volunteers, besides proving precision and being pocket friendly than the ABPM [20]. It is believed that ABPM is prime method for diagnosis of variations in BP measurement such as oscillometer procedure is capable to observe the BP of patients for 24 hours' time period, and offers more precise measurements of BP [21]. This process creates some annoyance, unwillingness, inaccurate readings and imperfect reproducibility for patients [22]. ABPM studies reveal that, in individual patients neither hospital visit BP measurements can reliably replace ABPM because of 95% limits of agreement. Nonetheless in spite of that a standardized study of methods can reduce the bias that is inherent to hospital visit BP recording [23].

2. Treatment Approaches of WCH

6.1 Non Pharmacological Treatment



Non pharmacological approach is the best way to treat WCH patients. It can be overcome by including life style changes like weight loss, low salt intake, combating smoking habits and regular physical workout.

Along with these life style changes proper look out at clinical and laboratory measurement should be done like ABPM and BP measurement at home,

as there are high chances of having effects like diabetes, cardiovascular disease and metabolic syndrome to WCH patients [24]. WCH can be reduced by proper patient care in hospital and clinics. The paramedical staff should ensure proper counseling and gentle care of patient by advising him/her to relax, calm down and to follow normal deep breathing techniques to remove the unwanted stress or worries. A proper room with positive environment including soothing colored walls and some motivational

pictures may be allotted to a patient to abolish the WCH effects resulting in batterment of patient [25].

Fig. 2.: Non Pharmacological/ Pharmacological Treatment Approach of WCH

WCH diagnosed patients who have optimum blood pressure in normal conditions need not to have any treatment with medications. They can consult with their physician as there are high chances of having hypertension in future. Medications can lead to hypotension thus are avoided in WCH and mostly non pharmacological treatments are given [26].

6.2 Pharmacological Treatment

In the past decades, hypertensive drugs were not recommended for the treatment of WCH.

This is for the reason that the defensive mechanism of antihypertensive drugs was not understood. So, some studies were carried out on middle-aged, elderly and very elderly hypertensive patients it shows the commendatory results of BP lowering drugs like atenolol or lacidipine treatment regimens. WCH patients have high cardiovascular dysfunction risk due to any of the factor like Kidney dysfunction, diabetes, plaque so pharmacological treatment may be

recommended along with non-pharmacological approaches for netter therapeutic effects. Also, according to ELSA study (European Lacidipine Study on Atherosclerosis) Lacidipine reduces the BP in WCH patients [22, 25, 27]. Patients with WCH, who have experienced very low stroke rate showed less significant benefits from medical therapy. ACE inhibitors asceptopril, beta blockers like Metoprolol and diuretics may be used to treat vascular endothelial dysfunction in WCH patients [28].

3. Conclusion

WCH is a condition with cardiovascular complications in case of individuals with existing hypertension that have high probability to develop cardiovascular disease. WCH elevates blood pressure for a temporary period of time. WCH should not be bewildered with elevated to normal blood pressure. It has been noted that overall pervasiveness of WCH in the common population is 10-15% and it has significantly increased to 30% in

individuals with elevated clinical blood pressure measurements. The failure of WCH with standard readings has resulted in inappropriate prescription and overuse of anti-hypertensive medication for patients already suffering from hypertension. Clinicians should become familiar with ambulatory blood pressure monitoring and consider using it judiciously in a number of clinical situations to provide additional guidance in the treatment of individuals suffering from hypertension. It has been noted that WCH increases the levels of endothelin-1, nor epinephrine, oxidative stress whereas decreases the level of endothelial nitric oxide

synthesis. Treatment approaches of WCH include pharmacological treatment and non-pharmacological treatment. Non pharmacological treatment includes changes in life style changes as weight loss, low salt intake and regular physical workout whereby pharmacological treatment involves the consultation with the physician and use of anti-hypertensive medications. Cardiovascular complications along with diabetes were noted in WCH. This paper summarizes the overview of pathogenesis, causes, complication diagnosis of WCH.

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