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Original Research Article

Comparison of ambulatory blood pressure monitoring and self-blood pressure monitoring for diagnosing white coat hypertension amongst pregnant women

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ABSTRACT

Background: White coat hypertension (WCH) is a common and well recognized phenomenon. It is also very prevalent amongst pregnant women and is often diagnosed as chronic/ gestational hypertension leading to unnecessary medications during pregnancy. ABPM is the gold standard for diagnosis of WCH. SBPM is an easy effective and reliable method to measure blood pressure but its efficacy needs to be tested and compared with ABPM in cases of WCH. It is important to compare the two methods in assessing WCH so SBPM can be utilized in cases of WCH, if found useful and efficacious.
Methods: All pregnant women who presented to the ANC were screened for hypertension. Those who were diagnosed to be hypertensive in antenatal clinic and these patients were then admitted for ambulatory blood pressure monitoring (ABPM) for 24 hours and SBPM on 6 hourly bases for 5 days.
Results: The ABPM and SBPB readings were noted, tabulated and compared. It was found that the prevalence of 'WCH' in this study using ABPM and SBPM were 47.368% (27/54) and 45.614% (26/54) respectively.
Conclusions: The results in diagnosing WCH using ABPM and SBPM were comparable.

Keywords: Ambulatory blood pressure monitoring, Gestational hypertension, Pregnancy, Self-blood pressure monitoring, White coat hypertension

INTRODUCTION

"White Coat Hypertension" is a well-known entity now days with prevalence as high as 30-35%.[1,2] It is equally or probably more common in pregnancy.[3,4] It is important to identify pregnant women who suffer from this and are wrongly diagnosed as essential hypertension or gestational hypertension.[5,6] These patients are unnecessarily started on anti-hypertensive medications throughout pregnancy. The anti-hypertension medications when used in pregnancy are also associated with considerable side effects. Ambulatory blood pressure monitoring (ABPM) is the gold standard for diagnosing and assessing uncomplicated hypertension and "White Coat Hypertension".[7-9] ABPM is usually not available in all clinics or at home. Home blood pressure monitoring is the self-measurement of blood pressure by patients.[10] Self-monitoring/measurement of BP (SMBP) can be done by the patient at home or it can be done in the ward after teaching patient the proper technique of measuring BP. Self/home blood pressure monitoring (SBPM) is a reliable, cheap and easily reproducible alternative method of ABPM in cases of uncomplicated hypertension.[11,12] Studies have shown that SBPM is superior to blood pressure taken in the clinic in and it is very useful tool in predicting cardiovascular events and mortality.[12,13] SMBP

can also be used as an effective way to rule out or exclude WCH, if done in a proper manner. This method is more educative, less expansive, may not require patient admission to ward as it can be done at home and more appropriate for the places where patient loads are high and admitting too many patients to ward is not feasible.[13,14] The patient efficiency in measuring BP and reliability are the two important factors in implementing this technique. The aneroid sphygmomanometers are widely available now days and are very effective and easy to use; so, it is better to compare ABPM with SBPM as a tool for diagnosis which coat hypertension. There is limited data available where the efficacy of ABPM and SBPM are compared in diagnosing white coat hypertension. It is essential to compare ABPM and SMBP in ruling out or excluding white coat hypertension in pregnant women.

Objective of this study was to do a comparative study to check the efficacy of Ambulatory BP monitoring versus self BP monitoring (SBPM) using an aneroid sphygmomanometer in excluding "white coat hypertension" in pregnant women who were admitted after they were found to have raised BP during their visits to the antenatal clinic (ANC).

METHODS

This study was a prospective and comparative observational study. This study was done over a period of 1 year 1 month (August 2018 - September 2019) in a Peripheral Hospital with a posted gynecologist and with facilities of ante-natal clinic, family ward and operation theater.

Inclusion criteria

- All pregnant women with raised BP in ANC after their consent.

Exclusion criteria

- Those women who didn't gave consent for the study
- Women with age < 18 years and > 35 years
- Patient already having any other systemic or psychiatric illness
- Patient on any chronic medications (other than the routine medications prescribed in pregnancy) for any other illness.

All pregnant women who attended our ante-natal clinic underwent BP measurement as part of general medical examination using a well calibrated aneroid sphygmomanometer. Those patients who were found to have blood pressure values more than 140/90 mmHg were made to rest for 15 min and BP was measured again as per the blood pressure protocol. Finally, out of 700 women, 57 were found to have raised blood pressure (> 140/90 mmHg) in antenatal clinic. These patients were then admitted to the family ward for further monitoring and management. Out of these 57 pregnant ladies, 30 were primi-gravida and 27 were multi-gravida. All these patients after admission were trained and were taught how to do record/ measure Self Blood Pressure using an aneroid sphygmomanometer. This training was conducted for two day by the on-duty nursing officer in the ward. Once the nursing officer was convinced that the patients can precisely measure their BP, after that the patients were asked to record their BP 4 times a day at 6 hourly intervals for 5 days as a part of SBPM and simultaneously they were also put on ABPM for 24 hrs. ABP is measured using the Holter's machine which measure blood pressure every 20 minutes irrespective of the patient's activity. All routine and specific investigations like complete haemogram, urine tests (for proteinuria), liver and renal function test were done for all patients to assess and rule out the complications of complication of gestational hypertension and pre-eclampsia. All patients were also screened for fetal growth restriction with ultrasonography (USG). After blood ambulatory blood pressure monitoring for 24 hours and SBPM for 3 days the results of ambulatory blood pressure monitoring were obtained and tabulated in an Excel sheet. The data obtained by using ABPM and SBPM were compared and final results were drawn. A study protocol was made before the commencement of the study delineating the various steps of the study (Figure 1).

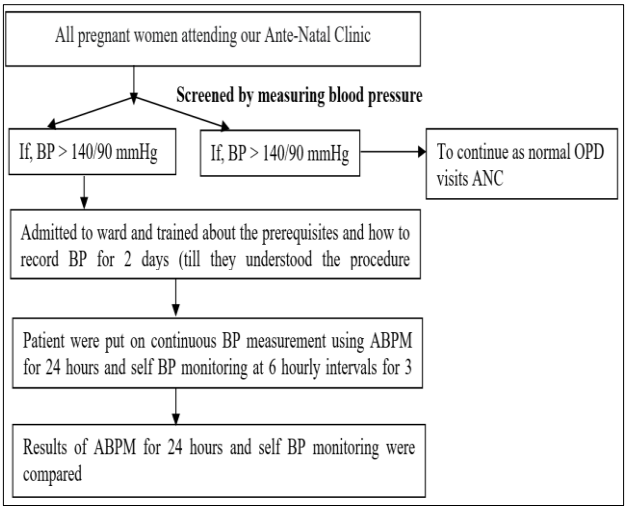

Figure 1: Study protocol.

Statistical analysis

Assuming the prevalence of WCH to be around 30-50% with 95% confidence interval (CI), alpha (a) error of 5% and with beta (b) error of 20%. The estimated minimum sample size for the study using the standard formulas was found out to be 48. However, the maximum number of patients who were available during the study duration was included in the study. The data obtained will be filled in MS excel sheets and statistical analysis was done using SPSS Software.

RESULTS

Total 57 pregnant women out of 700, who visited to the ante-natal clinic (ANC), were found to have elevated blood pressure. The age groups of these women were as shown in Figure 2.

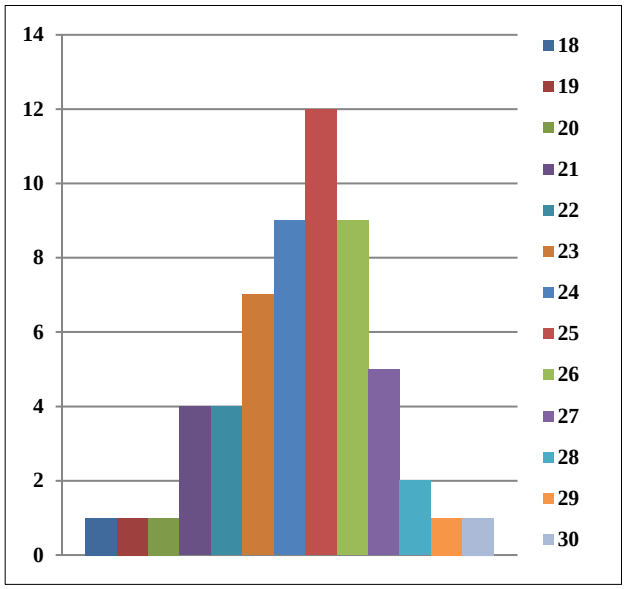

Figure 2: Number of women in various age GP in the study.

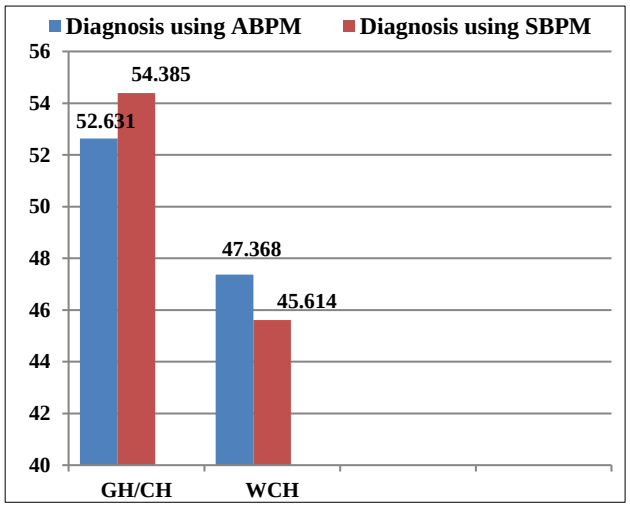

Figure 3: Comparison of results (%) in diagnosing gestational hypertension (GH)/chronic hypertension (CH) and white coat hypertension (WCH) obtained using ABPM and SBPM.

These women were admitted to family ward for further training on measuring self-monitoring of blood pressure and for ambulatory blood pressure monitoring (ABPM). 52.631% (30/57) patients were diagnosed to have hypertension after ABPM as their average blood pressure was remaining more than 140/90 mmHg during the 24 hours of ambulatory blood pressure monitoring on period and 47.368% (27/57) patients were diagnosed as 'white coat hypertension' less than 140/90 mmHg over 24 hours. 54.385% (31/57) patients were diagnosed gestational/chronic hypertension by manual /self-monitoring of blood pressure of blood pressure in the ward and 45.614% (26/57) patients were diagnosed "White coat hypertension". The comparison of results in diagnosing gestational hypertension (GH)/chronic hypertension (CH) and WCH obtained using ABPM and SBPM are is shown in Figure 3. Out of the patients who were diagnosed of having hypertension, two patients were detected to have mean blood pressure continuously > 160/110 mmHg by ABPM and their BP readings by manual/SMBP were > 150/100 mmHg. The systolic and diastolic BP tracings of a normo-tensive and a hypertensive pregnant woman obtained by ABPM (using Holter's BP monitoring) are shown in Figure 4 and 5.

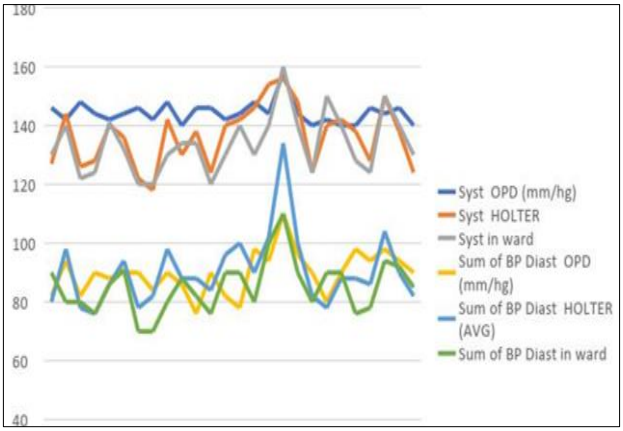

Figure 4: The systolic and diastolic BP tracings of a normo-tensive taken using Holter's BP monitoring.

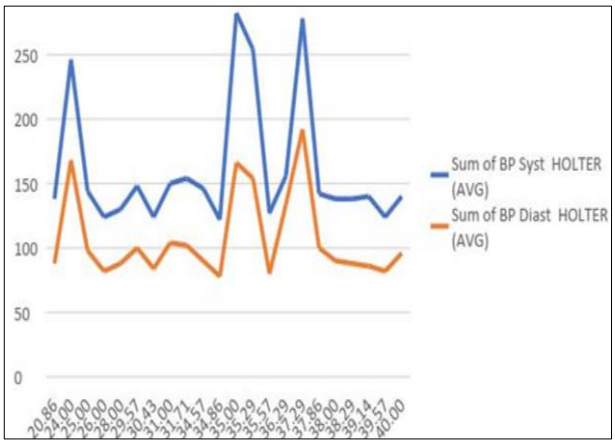

Figure 5: A hypertensive pregnant woman taken using Holter's BP monitoring taken using Holter's BP monitoring.

DISCUSSION

There are increased risk factors for hypertensive disorders in pregnancy like advanced maternal age, multiple births, diabetes, chronic hypertension, obesity, previous history of preeclampsia, maternal and fetal genetic factors etc

and these make hypertension the most common medical disorder in pregnancy.[14-16] This prevalence is further increased by the uncertainty added due to the presence of white coat hypertension (WCH), which is very common during pregnancy. A recent task force concerning BP measurement and cardiovascular outcomes recommended that 'pregnancy is a special indication for ambulatory blood pressure monitoring so white coat hypertension can be effectively ruled out and unnecessarily antihypertensive medications and unnecessary caesarean section can be avoided in pregnancy.[17] The white coat hypertension is due to reflex activation of the sympathetic nervous system. ABPM is the gold standard for the diagnosis of WCH and uncomplicated hypertension. Studies have suggested that SBPM is a better method for measurement of BP values as compared to the OPD or office blood pressure measurement.[18]

ABPM and SBPM both can give us an almost accurate estimate of BP. Both these methods of BP measurement i.e ABPM and SBPM have strong prognostic significance and theses are effective predictors of the cardio-vascular outcomes related to hypertension. Many studies have been done on ABPM and large amount of data had been generated on it, but not much data is available on SBPM. ABPM and SBPM are complementary tools in evaluation and management of hypertension.[19,20] ABPM gives us frequent, programmed, and automated BP measurements at regular short intervals over a period of 24 hour irrespective of the patient activity and state. With ABPM the BP changes over short periods can be analyzed. SBPM gives us the repeated measurements of BP over long periods of time as compared to ABPM but it can be tailored as per the convenience and for the shorter durations also.[20,21] However, repeated performance of ABPM needs special consideration because it is relatively expensive and inconvenient to apply. A preferential and more apt role of SBPM could lies in long term management of hypertension while ABPM is a useful tool for the initial assessment of hypertension, and for the evaluation of relatively high-risk patients.

In WCH and the ABPM and SBPM values are close and co-relatable.[21] It is even better that in patient with suspected WCH the BP is recorded during the day time at home when the patient is much relaxed i.e. by SBPM but the ABPM gives an advantage of providing regular reading at short interval making it a more specific tool for WCH. To measure WCH the SBPM may equal or probably higher sensitivity but lower specificity as compared to ABPM.[21] There are not many differences in the measured BP values by AMBP and SBPM. The similar results were shown in a study conducted by Dan Hold et al comparing ABPM and SBPM for WCH.[21,22] There are many studies going on to assess the role of SBPM or HBPM in prognostication and predication of the cardio-vascular mortality due to hypertension whereas ABPM has be proven to be an important toll in predicting the future cardiovascular outcomes due to hypertension.[22,23] Currently, there is no doubt in considering ABPM as the gold standard or the reference tool for uncomplicated hypertension or WCH but there is still immense scope to study the SBPM as an effective tool in hypertension. SBPM cannot replace ABPM, but it can be a reliable and cheap alternative to ABPM in many aspects related to hypertension. Most of the studies done to compare the ABPM and SBPM have concluded that the finding of ABPM and SBPM are co-relatable and the ABPM values are reproducible on SBPM without much differences and they have also and they have also given consensus on SBPM being not a replacement but a complementary or alternative tool for diagnosis and evaluation of hypertension and related complications.[24.25]

Limitations of the study were the sample size of the study has been small, owing to the fact that the study was done at a peripheral hospital. Further larger trials need to be conducted to reinforce these facts.

CONCLUSION

Detecting gestational hypertension accurately is very important for good antenatal care. 'White coat hypertension' is also a very well-known entity in this clientele as patients are extremely anxious about their well-being. 48.15% patients in the study who were initially diagnosed as gestational hypertension were later found to have 'white coat hypertension' by ABPM. Hence, we recommend all patients found to be having raised BP recording in OPD should be further evaluated using ABPM which can used in ward or at their home and then interpret the results. It would avoid unnecessary admission and medication to the patients.

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Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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