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Efficiency of Office Blood Pressure Measurement in Comparison with 24 Hour Ambulatory Blood Pressure Monitoring in the Diagnosis of Hypertension

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Abstract: ***Background:*** *Hypertension continues to be one of the most common diagnosis in primary care practice and the most important risk factor in cardiovascular disease. As the Blood pressure (BP) fluctuates frequently, we should obtain an accurate BP to avoid misdiagnosis and over or under treatment.* ***Aim and objectives:*** *To study the validity of office blood pressure measurement by comparing it with ambulatory blood pressure monitoring in hypertension patients attending outpatient department in a tertiary care hospital.* ***Materials and Methods:*** *It is an Observational study carried out in 30 patients over the age of 25 years. Office BP was measured using a calibrated mercury sphygmomanometer and ABPM using Contec ABPM 50. Descriptive statistics such as Mean, SD were calculated and the difference between groups was calculated by Paired T-test.* ***Results:*** *Mean SBP were 151.6± 9.23 and 130.4± 16.6 in OBPM and ABPM respectively. Mean DBP were 93.7± 5.99 and 77.6± 10.27 in OBPM and ABPM respectively. There is a significant difference between the methods by Paired T-test (p = 0.0001). The prevalence of white coat hypertension was 33.3%.* ***Conclusion:*** *Measurement of arterial blood pressure in a clinic alone is not sufficient for optimal detection and management of hypertension. We have to consider what is happening to our patients throughout the day and in between office visits. It is difficult to make clinical decisions based only on what happens when the patients are in the office.*

Keywords: Ambulatory blood pressure monitoring, Blood Pressure, Hypertension, Office Blood Pressure measurement

1. Introduction

Blood pressure (BP) is an important clinical finding of general health and often it is used as an initial diagnostic tool. BP screening becomes of paramount importance in patients at risk for developing hypertension. High BP is currently the greatest threat to the global burden of disease.[1],[2] Hypertension continues to be the most common diagnosis in adult primary care practice and the most important risk factor in cardiovascular disease.[3] While it is easy to obtain a BP reading, it can be really difficult to estimate the correct BP level.[4] The long-time standard approach of taking manual readings using a stethoscope and sphygmomanometer, referred here as office BP measurement (OBPM). An additional modalities is now available to physicians wishing to obtain the best representation of a patient's BP are automated office BP measurement (AOBP), home BP monitoring (HBPM), and ambulatory BP monitoring (ABPM).

Clinical decision-making in the diagnosis and management of hypertension is typically based on BP measurements obtained during a clinical visit. Inaccurate diagnosis of hypertension based on BP measurement in the office setting is a major concern. Multiple studies demonstrate that office staff most often measure BP using incorrect technique.[5] Most technical errors falsely elevate BP, measurement by office staff averages 10/7 mmHg higher than BP measured according to current guidelines.[5] Systematic and narrative reviews conclude that about 30% of patients with elevated BP measured in an office have isolated office ("white-coat") hypertension but normal BP out of the office.[6] Considering 24-hour ABPM as the reference standard for an accurate diagnosis of hypertension and prediction of future cardiovascular events, a large proportion of people with elevated in-office BP may be normotensive with out-of-office BP monitoring which is ranging from 5% to 65% among 24 studies reviewed by Piper et al.[6] A false-positive diagnosis of hypertension exposes patients and the health care system to the unnecessary costs of antihypertensive medications and office visits, to the side effects of these medications and to the possible adverse psychological effects from being labeled as "hypertensive."

As a result, to avoid misdiagnosis and overtreatment, new US and international guidelines propose that OBPM should be used only as a screening test for hypertension.[7-11] These guidelines, including a 2015 grade A recommendation from the US Preventive Services Task Force (USPSTF) propose that confirmation of a diagnosis of hypertension should be achieved with out-of office BP monitoring for most patients, preferably using 24-hour ABPM.[7-11] If ABPM is not available, or not tolerated, standardized HBPM may be a substitute.[7-11] Use of ABPM or HBPM to improve management of hypertension is now recommended by several national and international guidelines.[12-17] Based on OBPM alone there may be potential for a false positive diagnosis of hypertension, with risk of unneeded treatment is a significant problem. Implementation of either ABPM or HBPM after initial screening is effective for reducing the false positive rate.[18]

2. Aim & Objectives

To study the validity of office blood pressure measurement by comparing it with ambulatory blood pressure monitoring in hypertension patients attending outpatient department in a tertiary care hospital.

3. Material & Methodology

Study design: An Observational study.

Study setting: Out Patient Department of Medicine**,** KIMS&RC.

Study duration: Three months

Sample size: 30 Patient.

Sampling technique: Purposive sampling

Inclusion criteria: Patients over the age of 25 years newly diagnosed stage I and stage II hypertension and previously diagnosed with hypertension (three clinic readings of systolic BP ≥ 140 mmHg or diastolic BP ≥90 mmHg) being treated

Exclusion criteria: Atrial fibrillation, arm perimeter of more than 42 cm, dementia and <80% valid ABPM measurements, or < 14 valid SBP and DBP measurements during the day and < 7 SBP and DBP measurements during the night.[9]

Study instruments: structured questionnaire administered with variables like demographic profile, anthropometric measures, office BP are measured using a calibrated mercury sphygmomanometer ABPM using Contec ABPM 50 etc.

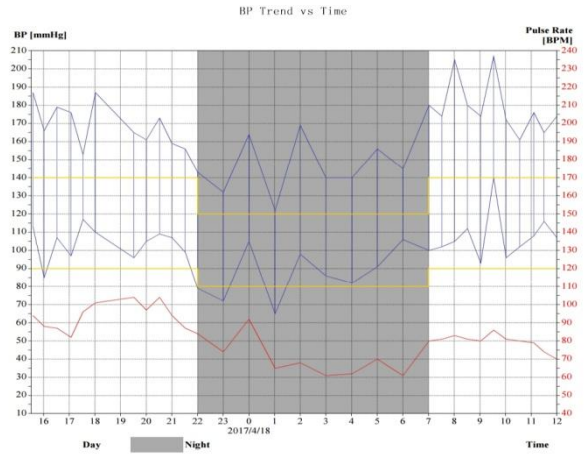


Figure 1: BP trend graph obtained in Hypertensive patient by ABPM monitor

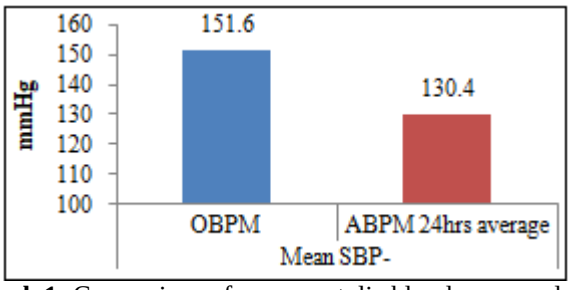
Data collection: Interview method and clinical examination

Data analysis: The software used was SPSS. Descriptive statistics such as Mean, SD were calculated and the difference between groups was calculated by Paired T test @ 5% level of significance.

Ethical issues: Institutional ethical committee approval obtained. The patients was enrolled after got written informed consent in their language

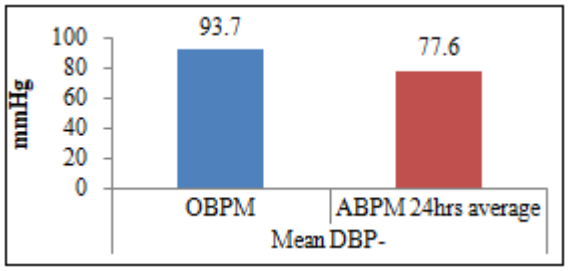
4. Result

In this study 17 males and 13 females were participated. The mean age of study participants in years is 47.4 and their mean BMI is 29.04. Graph 1 compares the mean systolic blood pressure level in OBPM and ABPM method. Mean SBP were 151.6± 9.23 and 130.4± 16.6 in OBPM and ABPM respectively. There is significant difference between the methods by Paired t test (**p = 0.0001**).



Graph 1: Comparison of mean systolic blood pressure level in OBPM and ABPM method

Graph 2 compares the mean diastolic blood pressure level in OBPM and ABPM method. Mean DBP were 93.7± 5.99 and 77.6± 10.27 in OBPM and ABPM respectively. There is significant difference between the methods by Paired t test (**p = 0.0001**).



Graph 2: Comparison of mean diastolic blood pressure level in OBPM and ABPM method

5. Discussion

Measurement of arterial blood pressure in a clinic alone has significant limitations for optimal detection and management of hypertension.[20] ABPM is a valuable procedure that gives us about the circadian pattern of BP and has drawn attention to such issues as the prognostic importance of nighttime BP. Its reproducibility and least bias have made it a critical part of studying the efficacy of antihypertensive therapies. Despite the conclusive evidence that aggressive BP lowering is beneficial to a major population of patients with hypertension, it is important to note that the majority of clinical trials demonstrating this relied exclusively on office BP measurements by physicians.

In this study mean SBP and DPM of 130.4± 16.6 and 77.6± 10.27 measured by ABPM, was significantly less than 151.6± 9.23 and 77.6± 10.27 measured by OBPM. Out of 30

participants 6 were non dippers and 1 were reverse dipper. Prevalence of white coat hypertension was 33.3%. In Verdecchia, Paolo, et al[21] study, Prevalence of white coat hypertension was 19.2%.. In Etyang, Anthony Oet al,[22] Screening BP ≥140/90 mm Hg was present in 359 of 986 participants, translating to a crude population prevalence of 23.1%. On ABPM, 186 of 415 participants were confirmed to be hypertensive, with crude prevalence of 15.6%. Age-standardized prevalence of masked and white coat hypertension was 7.6% and 3.8%, respectively.

It should be noted that the recently completed SPRINT trial utilized automated office BP measurement and found similar results.[23] There are now many clinical research data supporting the added value that home BP monitoring and ABPM provide to the busy practitioner, especially when there is concern that office BP measurements may be giving spurious results, as in cases of white-coat hypertension. Several prospective studies have documented that the average level of ABPM predicts risk of morbid events better than clinic blood pressure.[24, 25] In addition to mean absolute levels of ABPM, certain ABP patterns may predict blood pressure-related complications. The patterns of greatest interest are WCH and non-dipping blood pressure.

6. Conclusion

We need to shift our focus to the patient outside of the clinic. If we fail to consider what is happening to our patients in between office visits, then we are missing 99% of the time. We are making clinical decisions based only on what happens during the 1% of the time when patients are in the office. In order to provide proper patient care, we need to shift our focus to that 99%. The most important implication of ABPM is that the considerable proportion of people not labelled as hypertensive, the burden of this diagnosis could be lifted. There would be significant cost savings for the government health plans and for patient treatment. Patients with white-coat hypertension will require frequent follow-up visits at least annually according to the USPSTF. Non-adherence of BP measurement guidelines would be expected to result in over diagnosis and overtreatment of hypertension, as well as overuse of multiple-drug therapies. In future these additional BP monitoring modalities may routinely assist clinicians more effectively in diagnosing and managing hypertension, thereby improving outcomes.

7. Limitations

Small number of samples is the limitation of this study. Future studies should include larger number of patients and may be conducted in multiple centres.

8. Conflicts of Interest

Nil

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