

A Study on Application of Ambulatory Blood Pressure Monitoring in Known Hypertensive Patients

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ABSTRACT

Aim: To assess the blood pressure trend in 24 hours ambulatory period in the treatment of hypertensive patients and to correlate blood pressure variations with symptoms and for adjustment of antihypertensive drugs.

Materials and methods: This was a single-centre, observational study that included hypertensive patients who visited the out-patient department of tertiary care hospital in India. The study was carried out from August, 2018 to July, 2020. All the patients were assessed through ambulatory blood pressure monitoring machine for 24 hours. Any variations in the blood pressure were noted and evaluated to vary the doses of antihypertensive drugs accordingly.

Results: Total 100 patients were included in the study. Blood pressure recording was done and analysed. 67% patients were males. 38% patients had diabetes. 62 patients had blood pressure recordings within normal limits, 17 patients showed blood pressure <110/70 in more than 80% recordings. In 21 patients the blood pressure recordings were >150/100 most of the times.

Conclusion: Ambulatory blood pressure monitoring can be applied in routine clinical practice to titrate the doses of antihypertensive drugs.

Keywords: Ambulatory blood pressure monitoring; Drugs; Hypertension

INTRODUCTION

Blood pressure in the humans is subject to change due to myriad reasons throughout the day. The changes in blood pressure pattern through a particular time period can be assessed using ambulatory blood pressure monitoring⁽¹⁾. Ambulatory blood pressure monitoring is usually applied for diagnosing hypertension, detecting white coat hypertension, masked hypertension and nocturnal hypertension as well as for assessing the response to therapy in patients with hypertension^(2,3).

The chief benefits of 24-hour ambulatory blood pressure monitoring are: there are multiple measures of blood pressure within 24 hours (during daily activities and during sleep); it assesses blood pressure during circadian rhythm; it evaluates blood pressure means, overload and variability; it helps in identification of "alarming reaction"; it assists in placebo effect reduction; it assesses the antihypertensive drugs effect in 24 hours; and identifies possibility of risk stratification⁽⁴⁾.

In India, the utilization of ambulatory blood pressure monitoring is very limited. Often it is used in myocardial infarction patients or other critical care patients within hospitals. However, its use for maintaining antihypertensive therapy in

known hypertensive patients is not well established. In this study we have utilized 24 hours ambulatory blood pressure monitoring for assessing the blood pressure trend in 24 hours ambulatory period in the treatment of hypertensive patients and to correlate blood pressure variations with symptoms and for adjustment of antihypertensive drugs.

METHODS

This was a single-centre, observational study that included hypertensive patients who visited the out-patient department of tertiary care hospital in India. The study was carried out from August, 2018 to July, 2020. Inclusion criteria were patients of age from 18 to 80 years who were known hypertensives and on medical treatment for hypertension. Exclusion criteria were: co-existence of acute myocardial infarction or any life threatening condition; denial of informed consent by patient.

All the patients were assessed through ambulatory blood pressure monitoring machine for 24 hours. Any variations in the blood pressure were noted and evaluated to vary the doses of antihypertensive drugs accordingly. The study was carried out as per the declaration of Helsinki and all the included patients have provided informed consent.

The ambulatory blood pressure monitoring was performed with a Spacelabs 90207 system. Systolic and diastolic blood pressure measurements were performed each 30 minutes during 6:30 am to 10:30 pm and during rest of the time at night, estimations were done hourly with a proper arm cuff. A mean of 24 hours of recording was obtained with a mean of 40 measurements per ABPM participant. Nocturnal dipping was also analyzed by automated calculation of difference in asleep systolic and diastolic pressure and awake systolic and diastolic pressure.

The continuous data were presented as mean and standard deviation. The categorical data were presented as

frequencies and percentages. All data were analysed using the Statistical Package for Social Sciences (SPSS; Chicago, IL, USA) program, version 15.

RESULTS

Total 100 known hypertensive patients were studied with ambulatory 24 hours blood pressure monitoring. Average age was 52±9 years. Total males were 67%. 38% of patients had diabetes mellitus, 22% were current smokers and 12% were alcoholics. About one-third patients had ischemic heart disease and 2% patients had previous cerebrovascular accident. Baseline demographics of patients have been outlined in **Table 1**.

Upon analysis after 24 hour monitoring, 62 patients had blood pressure recordings within normal limits so drug doses were recommended to be kept unchanged, 17 patients showed blood pressure <110/70 in more than 80% recordings in whom the doses of antihypertensive drugs could be reduced (**Table 2**). In 21 patients the blood pressure recordings were >150/100 most of the times, in whom the drug doses were suggested to be titrated accordingly upon further investigation. There was no nocturnal dip who required increasing the dose of antihypertensive in any of the patients.

Table 1: Baseline demographics of patients

Characteristics	100 patients
Age	52 ± 9 years
Gender Distribution	
Male	67%
Female	33%
Risk Factors	
Diabetes Mellitus	38%
Smoking	22%
Alcohol	12%
Obesity	28%
IHD	31%
Previous CVA	2%

Table 2: Variations noted in blood pressure upon assessing through ambulatory blood pressure monitoring

Blood Pressure	100 patients
Normal	62
< 110/70 mm Hg	17
>150/100 mm Hg	21

DISCUSSION

The apt use of ambulatory blood pressure monitoring has been a matter of concern. Cost of ambulatory blood pressure monitoring machine is higher than the office blood pressure measurements or not and the prognosis made by ambulatory blood pressure monitoring machine is resultant of lower mortality and morbidity rates or not have been the major issues ⁽⁴⁾. Some studies have reported that the evaluation of hypertensive patients under proper management by use of ambulatory blood pressure monitoring was observed to be more efficient than the office blood pressure measurements ⁽⁵⁾. A study by Schrader, et al, observed that of total 851 patients who underwent ambulatory blood pressure monitoring (412 patients) assessment for antihypertensive therapy had lower incidences of mortality and morbidity rates than those monitored under office measurements (439 patients). There were 20 primary events in ambulatory blood pressure monitoring group and 35 primary events have occurred in office measurements group ($p = 0.037$) ⁽⁶⁾. In another study, Clement et al. observed that in patients with ambulatory systolic blood pressure higher than 135 mmHg a strong correlation was found with the prognosis of such patients treated with antihypertensive therapy, irrespective of office blood pressure ⁽⁷⁾.

In present study, upon analysis of 100 patients after 24 hour monitoring, 62 patients had blood pressure recordings within normal limits so drug doses were recommended to be kept unchanged, 17 patients showed blood pressure <110/70 in more than 80% recordings in whom the doses of antihypertensive drugs could be reduced. In 21 patients the blood pressure recordings were >150/100 most of the times, in whom the drug doses were suggested to be titrated accordingly upon further investigation. Similar to our study, in a previous study, 12% of patients had reached normal target blood pressure with office blood pressure monitoring while

more than one third of patients achieved target blood pressure with ambulatory blood pressure monitoring. Moreover, 38% of patients needed to get their antihypertensive medications changed with the help of ambulatory blood pressure monitoring, 32% had to be started with new medications ^(8,9).

In a study that compared ambulatory blood pressure monitoring in patients having different classes of antihypertensive drugs, concluded that differences were present among antihypertensive drug classes and also in different compounds in each class. That finding would be of help to clinicians in choosing among drug classes and compounds if blood pressure reduction would be the main objective of treatment ⁽¹⁰⁾. In a recent study based on Indian patients that aimed at finding the differences between office blood pressure measurement and ambulatory blood pressure measurement in a large multi-centre Indian all comers' population, concluded that application of ambulatory blood pressure monitoring in routine hypertension management can be beneficial in decreasing burden and associated costs for Indian healthcare ⁽¹¹⁾.

Furthermore, a Spanish database determined that use of ambulatory blood pressure monitoring to assess blood pressure in the community presented with much better blood pressure control than with casual methods of blood pressure measurement ⁽¹²⁾. Literature states that the use of ambulatory blood pressure monitoring safeguards that when the right people have been treated with antihypertensive drugs, there is an overall reduction in the proportion of patients been incorrectly treated for hypertension. Therefore ambulatory blood pressure monitoring can be beneficial in terms of saving money, and the extra costs that are levied for providing the technique will outweighed by cost savings from better-targeted treatment ⁽²⁾. In a dilemma of frequency in repeating the ambulatory monitoring measurement, studies have stated that it would seem reasonable to

repeat ABPM within few weeks to check whether adequate reduction in blood pressure has been achieved. Moreover, concomitant use of home blood pressure measurement may also be compliment and reduce the need to repeat ambulatory blood pressure monitoring ⁽¹³⁾.

CONCLUSION

In light of these results, it can be concluded that ambulatory blood pressure monitoring can be applied in routine clinical practice to titrate the doses of antihypertensive drugs in known hypertensive patients.

REFERENCES

1. Nathani S. Ambulatory blood pressure monitoring in patients with ST-elevation myocardial infarction: one year follow-up study. *International Journal of Research in Medical Sciences*. 2019;7(11):4054.
2. O'Brien E, White WB, Parati G, Dolan E. Ambulatory blood pressure monitoring in the 21st century. *The Journal of Clinical Hypertension*. 2018;20(7):1108-11.
3. Kinsara AJ. Ambulatory blood pressure monitoring in daily practice. *Indian Heart Journal*. 2017;69(6):788-9.
4. Nobre F, Mion Junior D. Ambulatory blood pressure monitoring: five decades of more light and less shadows. *Arquivos brasileiros de cardiologia*. 2016;106(6):528-37.
5. Ortega KC, da Silva GV, Mion Jr Dc. Nocturnal blood pressure fall changes in correlation with urinary sodium excretion. *Hypertension*. 2008;52(2):e10-e.
6. Schrader J, Lüders S, Züchner C, Herbold M, Schrandt G. Practice vs ambulatory blood pressure measurement under treatment with ramipril (PLUR Study): a randomised, prospective long-term study to evaluate the benefits of ABPM in patients on antihypertensive treatment. *Journal of human hypertension*. 2000;14(7):435-40.
7. Clement D, De Buyzere M, De Bacquer D, de Leeuw P, Duprez D, Fagard R. Office versus ambulatory pressure study investigators. prognostic value of ambulatory blood-pressure recordings in patients with treated hypertension. 2003;348.
8. O'Brien E, Dolan E. Ambulatory blood pressure monitoring for the effective management of antihypertensive drug treatment. *Clinical therapeutics*. 2016; 38(10): 2142-51.
9. Uallachain GN, Murphy G, Avalos G. The RAMBLER Study: The Role of Ambulatory Blood Pressure measurement in routine clinical practice: A cross-sectional study. *Irish medical journal*. 2006;99(9):276-8.
10. de la Sierra A, Gorostidi M, Banegas JR, Segura J, Vinyoles E, de la Cruz JJ, et al. Ambulatory blood pressures in hypertensive patients treated with one antihypertensive agent: differences among drug classes and among drugs belonging to the same class. *The Journal of Clinical Hypertension*. 2015; 17(11):857-65.
11. Kaul U, Arambam P, Rao S, Kapoor S, Swahney J, Sharma K, et al. Usefulness of ambulatory blood pressure measurement for hypertension management in India: the India ABPM study. *Journal of human hypertension*. 2020;34(6):457-67.
12. Banegas JR, de la Cruz JJ, Graciani A, López-García E, Gijón-Conde T, Ruilope LM, et al. Impact of ambulatory blood pressure monitoring on reclassification of hypertension prevalence and control in older people in Spain. *The Journal of Clinical Hypertension*. 2015;17(6):453-61.
13. Parati G, Stergiou GS, Asmar R, Bilo G, De Leeuw P, Imai Y, et al. European Society of Hypertension guidelines for blood pressure monitoring at home: a summary report of the Second International Consensus Conference on Home Blood Pressure Monitoring. *Journal of hypertension*. 2008; 26(8):1505-26.

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