

Study of Ambulatory Blood Pressures in Hypertensive medical personnel controlled on Drugs: A cross sectional observational Study

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Abstract- Hypertension is diagnosed on the basis of a persistently high blood pressure ($\geq 140/90$). Traditionally, this requires three separate sphygmomano-meter measurements at one monthly intervals. Ambulatory BP monitoring devices are usually programmed to take readings at set intervals; 15–30 minutes during the day and every 30–60 minutes at night, to obtain numerous measurements while limiting interference with activity or sleep.

The subjects included in the study were monitored by ABPM for a continuous period of 24 hrs and their 24 hours mean blood pressure interpretation was categorized into two different groups viz high normal (115-130/75-80) and normal ($< 115/75$).

Comparing the mean ABPM parameters of two groups, it was found that Day and Night time average SBP & DBP were significantly higher in high normal group.

Index Terms- Ambulatory Blood pressure monitoring, DBP, SBP

I. INTRODUCTION

High blood pressure is said to be present if it is persistently at or above 140/90 mmHg. Hypertension is classified as either primary (essential) hypertension or secondary hypertension; about 90–95% of cases are categorized as "**primary hypertension**" which means high blood pressure with no obvious underlying medical cause.^[1] The remaining 5–10% of cases (**secondary hypertension**) are caused by other conditions that affect the kidneys, arteries, heart or endocrine system. Hypertension is a major risk factor for stroke, myocardial infarction (heart attacks), heart failure, aneurysms of the arteries (e.g. aortic aneurysm), peripheral arterial disease and is a cause of chronic kidney disease.

Hypertension is diagnosed on the basis of a persistently high blood pressure. Traditionally,^[2] this requires three separate sphygmomano-meter measurements at one monthly intervals.

The importance of ABPM in managing hypertension has been acknowledged in hypertension guidelines^[3,4]

ABPM should be considered, To exclude "white coat" hypertension in patients with newly discovered hypertension with no evidence of end-organ damage, In patients with borderline or labile hypertension, To assist blood pressure management in patients whose blood pressure is apparently poorly controlled, despite using appropriate antihypertensive

therapy, In patients with worsening end-organ damage, despite adequate blood pressure control on office blood pressure measurements, To exclude "white coat" hypertension, To assess adequacy of blood pressure control over 24 hours in patients at particularly high risk of cardiovascular events, in whom rigorous control of blood pressure is essential (e.g. diabetes, past stroke), In deciding on treatment for elderly patients with hypertension, In patients with suspected syncope or orthostatic hypotension, In patients with symptoms or evidence of episodic hypertension, In hypertension in pregnancy.

Therefore this study was planned to evaluate medical personnel who have their blood pressure (as measured by sphygmomanometer) controlled on antihypertensive drug by ambulatory blood pressure monitoring.

II. METHODS

This was a type of cross sectional Observational study, conducted at K.G.M.U, Lucknow during June 2013 to May 2014. All known hypertensive patients (medical personnel only) whose blood pressure were under control (as measured by sphygmomanometer) and who have given the consent to participate in the study were included in the study.

The exclusion criteria were: All newly diagnosed hypertensives, All known hypertensive whose blood pressure was not under control after measuring by clinical sphygmomanometer, All patients whose 24 hours mean blood pressure was found to be $> 135/85$ after ABPM analysis, Subjects on other medications known to cause hypertension like : Alcohol, Amphetamines, and Cocaine, Corticosteroids. Cyclosporine, Erythropoietin, Estrogens (including birth control pills), long term intake of cough/cold medications like Ephedrine and Pseudo ephedrine - Tranylcypramine or Tricyclics, Migraine medications like Sumatriptan, Subjects with history of endocrine disorders like Acromegaly, Cushing's syndrome, Thyroid disorders etc, Pregnancy induced hypertension, Subjects having neurological diseases with autonomic dysfunction, Subjects with Obstructive Sleep Apnea- exclusion by clinical criteria, Patients with Metabolic syndrome - excluded by investigations like fasting lipid profile and fasting blood sugar levels.

The subjects included in the study were monitored by ABPM for a continuous period of 24 hrs and their 24 hours mean blood pressure interpretation was categorized into two different groups.

The first group consist of those whose BP were between 115-130/75-80. This was considered high normal group.^[5]

Second group consist of those whose BP were <115/75. This was considered normal group.

Type of the instrument used for clinical blood pressure recording- Portable mercury sphygmomanometer with calibration interval of 12 months and check interval of 6 months.

Investigations:

Urinary protein creatinine ratio

Fundus Examination

ECG

Chest X-ray

AMBULATORY BLOOD PRESSURE MONITORING (METHODS AND CRITERIA):

CONTEC 06 C Fully automated ABPM was used to measure blood pressure in 24-hour cycles. These 24-hour measurements are stored in the device and are later interpreted by the physician. These monitors use the oscillometric technique.

The monitors are typically programmed to take readings every 15 to 30 minutes throughout the day and night. At the end of the recording period, the readings are downloaded into a computer. Standard protocols are used to evaluate the accuracy of the monitors, and approved devices are usually accurate to within 5 mm Hg of readings taken with a mercury sphygmomanometer.

Analysis of variables between 2 groups:

Depending on the ABPM readings, study population was categorized into two groups.

Those with 24 hours average BP>115-130/75-80 and Those with 24 hours average BP<115/75.

These two groups were analyzed for day and night time SBP & DBP.

Statistical analysis

Continuous data were summarized as Mean \pm SD while discrete (categorical) in no. and %. Continuous groups were compared by independent Student's t test while categorical groups were compared by chi-square (χ^2) test. A two-sided ($\alpha=2$) p value less than 0.05 ($p<0.05$) was considered statistically significant. All analysis was performed on SPSS (PSAW, windows version 18.0) software

III. OBSERVATIONS AND RESULTS

A total of 50 medical personnel (medical and paramedical) age between 18-65 yrs of either sex were recruited and evaluated. Of total, 32 had "Normal" and 18 had "High normal" blood pressure with prevalence being 64.0% and 36.0%, respectively (Fig. 1).

Prevalence of high normal BP

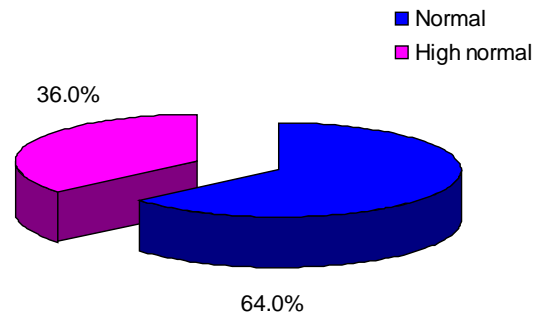


Fig. 1. Prevalence of high normal BP among medical personnel

The ambulatory blood pressure monitoring (ABPM) findings viz. day time avg. BP, night time avg. BP, 24 hrs avg. BP, day time BP load, night time BP load and circadian rhythm of BP at night of two groups at admission are summarized in Table 1 and also shown graphically in Fig. 2 to Fig. 7, respectively. Comparing the mean ABPM parameters of two groups, t test revealed significantly different and higher day time SBP (117.20 ± 10.56 vs. 127.67 ± 5.08 , $t=3.94$; $p<0.001$) and DBP (68.30 ± 6.61 vs. 81.97 ± 3.71 , $t=8.06$; $p<0.001$) in high normal group as compared to Normal group. Further, the day time SBP and DBP in high normal group was 8.2% and 16.7% higher respectively as compared to Normal group.

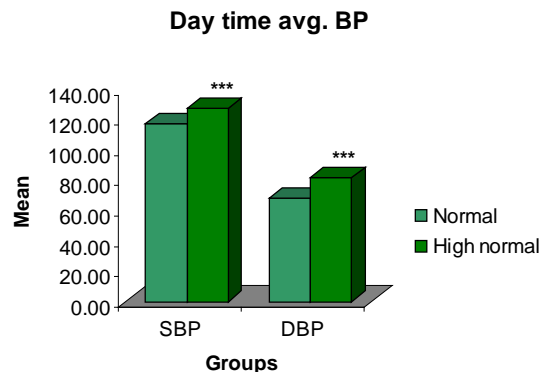
Similarly, the night time SBP (107.37 ± 10.45 vs. 115.64 ± 4.72 , $t=3.17$; $p=0.003$) and DBP (62.03 ± 6.94 vs. 72.95 ± 4.00 , $t=6.11$; $p<0.001$) in high normal group was significantly higher and 7.2% and 15.0% respectively as compared to Normal group.

Table 1: ABPM parameters (Mean ± SD) of two groups

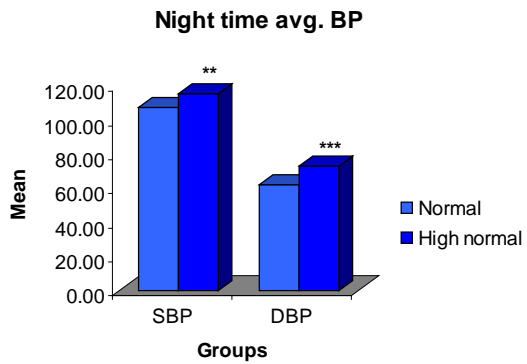
APBM	Normal (n=32)	High Normal (n=18)	% Change	t value	P Value
Day time avg. BP: SBP (mmHg) DBP (mmHg)	117.20 ± 10.56 68.30 ± 6.61	127.67 ± 5.08 81.97 ± 3.71	8.2% 16.7%	3.94 8.06	<0.001 <0.001
Night time avg. BP: SBP (mmHg) DBP (mmHg)	107.37 ± 10.45 62.03 ± 6.94	115.64 ± 4.72 72.95 ± 4.00	7.2% 15.0%	3.17 6.11	0.003 <0.001
24 hrs avg. BP: SBP (mmHg) DBP (mmHg)	116.23 ± 9.47 67.82 ± 4.77	125.79 ± 3.88 80.08 ± 3.50	7.6% 15.3%	4.08 9.54	<0.001 <0.001
Day time BP load: SBP (%) DBP (%)	12.83 ± 17.84 6.32 ± 7.41	24.45 ± 24.15 21.08 ± 12.09	47.5% 70.0%	1.94 5.37	0.058 <0.001
Night time BP load: SBP (%) DBP (%)	25.46 ± 23.58 8.69 ± 12.94	58.01 ± 29.02 40.40 ± 28.80	56.1% 78.5%	4.31 5.37	<0.001 <0.001
Circadian rhythm of BP at night: SBP (%) DBP (%)	9.23 ± 8.45 10.29 ± 9.00	6.28 ± 5.45 7.92 ± 6.91	32.0% 23.1%	1.33 0.97	0.189 0.337

Moreover, the 24 hrs avg. SBP (116.23 ± 9.47 vs. 125.79 ± 3.88, t=4.08; p<0.001) and DBP (67.82 ± 4.77 vs. 80.08 ± 3.50, t=9.54; p<0.001) in high normal group was significantly higher and 7.6% and 15.3% respectively as compared to Normal group. In contrast, the day time mean SBP load (12.83 ± 17.84 vs. 24.45 ± 24.15, t=1.94; p=0.058) was found similar between the two groups though it was 47.5% higher in high normal group as compared to Normal group. However, day time mean DBP load (6.32 ± 7.41 vs. 21.08 ± 12.09, t=5.37; p<0.001) was significantly higher and 70.0% in high normal group as compared to Normal group.

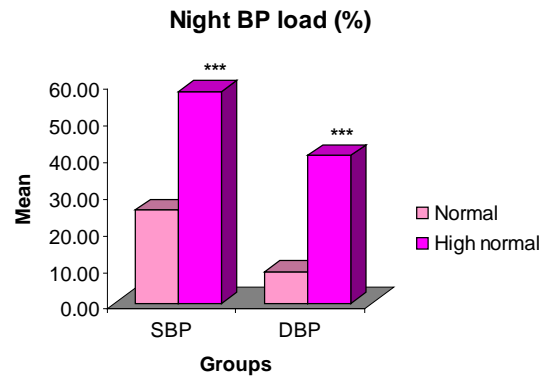
The night time mean BP load of both SBP (25.46 ± 23.58 vs. 58.01 ± 29.02, t=4.31; p<0.001) and DBP (8.69 ± 12.94 vs. 40.40 ± 28.80, t=5.37; p<0.001) was significantly higher and 56.1% and 78.5% respectively in high normal group as compared to Normal group.



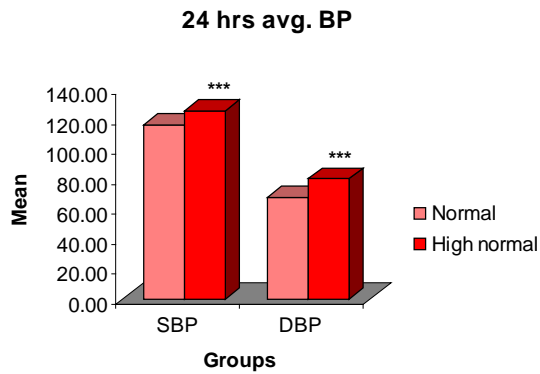
*** p<0.001- as compared to Normal
Fig. 2. Day time avg. BP of two groups.



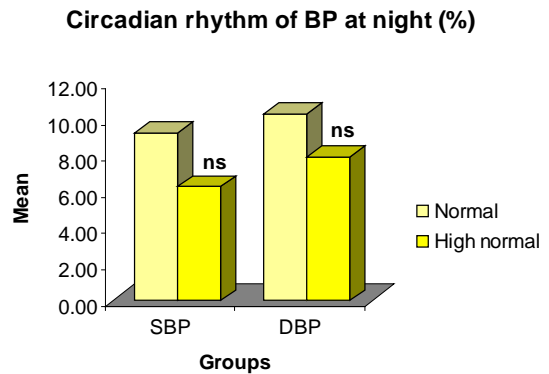
***p<0.001- as compared to Normal
Fig. 3. Night time avg. BP of two groups.



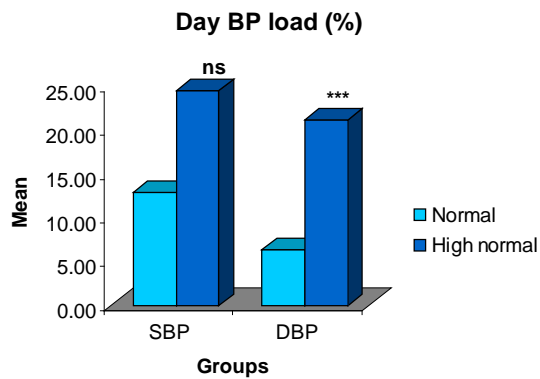
***p<0.001- as compared to Normal
Fig. 6. Night BP load of two groups



***p<0.001- as compared to Normal
Fig. 4. 24 hrs avg. BP of two groups.



^{ns}p>0.05- as compared to Normal
Fig. 7. Circadian rhythm of BP at night of two groups.



^{ns}p>0.05 or ***p<0.001- as compared to Normal
Fig. 5. Day BP load of two groups.

IV. DISCUSSION

In this study, 50 medical subjects who were known hypertensive and controlled on drugs (as measured by sphygmomanometer) were subjected to ambulatory blood pressure monitoring.

A study by **Chavanu K, Merkel J, Quan AM**^[6], showed that Ambulatory blood pressure monitoring is an effective method for the accurate diagnosis and management of hypertension and may positively affect clinical outcomes of patients with other risk factors for cardiovascular events as was seen in our study which fully evaluated the hypertensive subjects in order of 24 hours average, day time and night time SBP and DBP and the circadian variation in the blood pressure. **Echeverria RF, Carbajal HA, Salazar MR, RiouDET B, Rechifort V and Quaini M**^[7], showed that the prevalence of high normal blood pressure was 6.62%, but our study was done in general population and using clinical blood pressure instruments while our study was done on medical personnel and using ambulatory blood pressure monitoring which showed prevalence of 36%. So more studies has to be done in this field among the medical personal using Ambulatory blood pressure monitor.

Data regarding blood pressure control (as measured by ABPM) is very less in our country more so in medical personnels. We planned this study to answer our question regarding control of blood pressure (as measured by ABPM) on various drugs and their combination.

V. CONCLUSION

Prevalence of high normal blood pressure (as measured by ABPM) among the hypertensive medical personal controlled on drug was found to be 36%.

Prevalence of normal blood pressure (as measured by ABPM) among the hypertensive medical personal controlled on drug is found to be 64%.

24 hours average SBP and DBP as well as day time average and night time average SBP and DBP was found to be significantly higher in high normal subjects than the normal subjects.

Day time mean SBP load and DBP load was found to be higher in high normal group than normal group.

Night time mean SBP load and DBP load was found to be higher in high normal group than normal group.

The circadian rhythm of both SBP and DBP at night did not differed between the two groups.

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