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Study of Cardiovascular Risk Factors and Ambulatory Blood Pressure Monitoring-Based Hypertension Evaluation of Postgraduate Medical Students

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ABSTRACT:

Introduction: Occurrence of cardiovascular disease (CVD) risk factors in young postgraduate medical students is a matter of significant concern. Hypertension (HTN) is important risk factor for CVD and death. Ambulatory 24-hour BP monitoring (ABPM) is recommended standard of evaluation of HTN.

Aim &Objectives: Screen for cardiovascular (CV) risk factors and ABPM-based hypertension in young postgraduate medical students of our college.

Methods And Materials: In this cross-sectional study, medical students, between 20-40 years, doing postgraduate course in our institute were chosen for screening of cardiovascular risk factors and evaluation of Systolic and Diastolic Blood Pressure (SBP & DBP) with ABPM. Subjects with past history of HTN were excluded.

Results: There were 41 young PG doctors (18 females and 23 males) with mean 27.6(23-32) years. Occurrence of CV risk factors was high, namely: family history of HTN/CAD 67%, smoking 29%, alcohol consumption 51%, sedentariness 53% and elevated BMI 63%.Mean 24-hour SBP and/or DBP was elevated in 13 (31%)(p-0.056), all males, of whom BP remained high at night in 7. On gender-based analysis, males had higher occurrence of smoking/alcohol and elevated BMI, while females were more sedentary.

Conclusion: Postgraduate medical students have significant cardiovascular risk factors and early hypertension without awareness.

Key Words

Postgraduate medical students, Ambulatory blood pressure monitoring, Cardiovascular risk factors, Nocturnal dipping

1. INTRODUCTION

Cardiovascular (CV) risk factors, both modifiable and non-modifiable, are increasingly becoming common in young people. Hypertension (HTN) is well known risk factor for CV disease, disability and death. Among young Kerala adults, (defined as ages 20–39), about 7% of women and 21% of men are diagnosed with hypertension (Geevaret et al., 2022). Prevalence may be expected to be higher in more stressful profession, such as that of postgraduate medical student. Ambulatory 24-hour BP monitoring (ABPM) is recommended standard of evaluation of hypertension, being a useful way to detect white coat hypertension, masked hypertension, and sustained hypertension.
Also, lack of awareness regarding occurrence of hypertension is common in young adults, including medical students. Hence, it is imperative to have studies assessing important risk factor of hypertension in this at-risk population. This study was undertaken asthere have been no studies of ABPM to study pattern of blood pressure (BP) and prevalence of elevated BP in this young, vulnerable population.

2. MATERIAL &METHODS:

In this observational, cross-sectional study, 24- hour ambulatory BP monitoring was used to evaluate HTN in postgraduate medical students of 3 admission year batches in our institute.
Study participants were explained about the purpose of the study and assured privacy and confidentiality of the information provided by them. Their baseline demographics, height, weight, body mass index are documented and they completed a questionnaire detailing information about their consumption of tobacco/alcohol, exercise habits (exercise duration per week less than 3 hours or more), and relevant past medical history was taken. A baseline12-lead ECG and detailed echocardiography was done and all of them underwent 24-hour ambulatory BP monitoring.

Body mass index (BMI) was calculated as weight in kilograms divided by the square of standing height in meters. Patients were categorized as underweight (<18.5 kg/m2), normal (18.5–22.9 kg/m2), overweight (23.0 –24.9 kg/m2) and obese (≥25 kg/m2) based on the revised consensus guidelines for India (Snehalatha et al.,2003).

ABPM (GE Ambulatory Blood Pressure recorder TONOPART V1) is about size of a portable radio and was worn attached to a belt or strap worn on their waist. A BP cuff that is attached to the device is worn around their upper arm, which inflates at set regular intervals throughout the day and night and thus yields many readings over a continuous period. Readings for this study were taken every 30 minutes during the day and every hour at night and heart rate was measured at the same time and these were averaged over the 24-hour period. After 24 hours, device and BP cuff are returned and returned to hospital. A computer analysed the readings and generated results of changes in BP and heart rate, the BP distribution pattern and other statistics.

The ambulatory blood pressure monitoring (ABPM) classification of BP values:
Values above daytime SBP/DBP of 135/85 mm Hg, a night-time SBP/DBP of 125/80 mm Hg, and a 24-hour SBP/DBP of 135/85 mm Hg were considered abnormal.
Inclusion criteria:
1. Postgraduate medical student of our institute.
2. Willing to give informed consent.
3. Age between 18-39 years.

Exclusion Criteria:
1. Previous history of having high blood pressure
2. Students with renal or renovascular disease, polycystic kidney, pheochromocytoma, Cushing syndrome, acromegaly, hypothyroidism, and hyperparathyroidism
3. History of intake of drugs, such as steroids, oral contraceptive pills, known to be associated with secondary hypertension.

STATISTICAL ANALYSIS: Data were analysed using Statistical Package for the social sciences (SPSS) version 24. Descriptive statistics included calculation of percentages, mean, and standard deviation. Categorical data were compared using the Chi-square and Fischer's exact. All values were considered statistically significant for $p < 0.05$.

3. RESULTS

The study included 41 young PG doctors (18 females and 23 males) with mean 27.6 (23-32) years. The 24-hour mean systolic blood pressure (SBP) was 122.5 (104-168) mmHg and mean diastolic blood pressure (DBP) was 79.2 (64-104) mmHg. Mean HR was 82.3(68-105) beats per minute.

In the total study population, the occurrence of cardiovascular risk factors was high, namely: family history (F/H) of HTN/CAD in 67%, smoking in 29.3%, alcohol consumption in 51.2%, sedentariness in 53% and elevated BMI in 63.4%. (Figure 1).

A total of 13 men (31%) were detected to have HTN, of whom 7 (17%) had elevation in both systolic & diastolic BP, whereas rest of the six (15%) had elevated DBP alone. Of the 7 subjects with abnormal systole-diastolic BP, only 3 were nocturnal dippers in both, two were only isolated diastolic dippers, while rest were complete non-dippers. All except one of the6subjects with isolated high day-time DBP were good dippers at night and had normal sleep-time BP.

On gender-based analysis (Figure 2), males were found to have higher occurrence of smoking/alcohol and elevated BMI, while females were more sedentary. Both genders had similar (17%) occurrence of family history of HTN/CAD. Elevations in BP were found only in males.

4. DISCUSSION

Hypertension, while being more prevalent in older populations, is not uncommon in young adults. Being a silent killer, it remains undiagnosed n most cases, until complications like coronary artery disease, stroke, and renal failure develop. Epidemiological data from India reported that approximately 12.7% hypertensive population with associated vascular disease occurred below 40 years of age (Sidhu et al., 2017).Hence it needs special attention for awareness, initiation of early treatment along with compliance of the patient.

Medical doctors -in-training, such as postgraduate students, have hectic schedules, run emergencies, on-call days, night duties, periodic performance assessments, deadlines for various presentations etc., all of which is taxing and gruelling. Staying in hostels often implies being away from families apart from suboptimal diet &psychological issues of loneliness.They have challenges due to lack of adequate sleep, academic and work pressures, unhealthy food habits and lack of adequate time for physical exercise. If already they have

higher family history of cardiovascular risk factors, then it is expected to aggravate their own risk of developing the same.

In a review by Hill et al. (2018), various factors contribute to increased stress in medical students, including difficulties with time management and studying, medical school peer relations, conflicts in relationships and work–life balance, excessive workload, health concerns, and financial stressors as well as medical school administrative failures, concerns about lack of assistance with career planning, and assessment-related performance pressure.

In our study based on ABPM assessment, only males had hypertension, supporting the hormonal protection theory in young females. While 13 men, constituting nearly one-third of the study population, were detected to have HTN, six of them had only isolated diastolic HTN (DHTN).Of concern was the finding that normalization of their BP during sleep did not occur in all. Subjects with isolated DHTN fared better with significant nocturnal dip in all except one subject. Contrary to this, only 3 of the 7 with systolic+diastolic HTN,were dippers, while2 were only isolated diastolic dippers, and the rest were complete non-dippers. Such persistence of HTN, even during sleep time, in this young population, who are unaware of it, with known detrimental effects on vital target organs is indeed, of significant concern. It underscores the importance of awareness, detection and holistic health measures and the lack of these in young doctors, who advise patients but do not seem to apply to themselves.

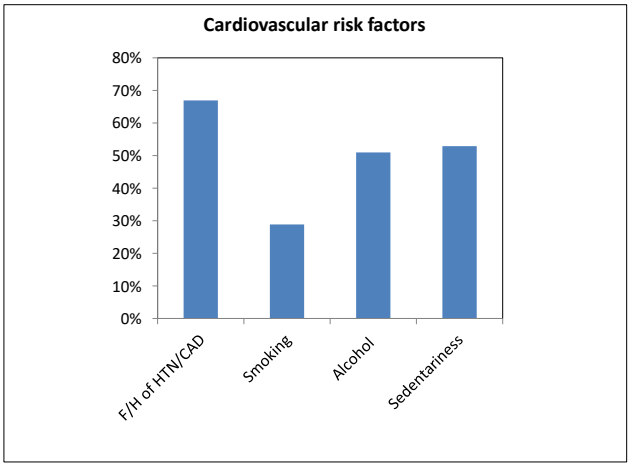
Occurrence of such high percentage of HTN in our study population seems to be contributed to by high prevalence of known coronary risk factors in them, the disease being polygenic. Both men and women had high proportion of both non-modifiable and modifiable risk factors, including family history of HTN/CAD in 67%, sedentariness in 53%, elevated BMI in 63%, smoking in 29% and alcohol consumption in 51%.On gender-based analysis, males were found to have higher occurrence of smoking/alcohol and elevated BMI, while females had higher family history of HTN/CAD and sedentariness. Considering such high occurrence of cardiovascular risk factors, it appears to be only a matter of time before women lose their hormonal protection to catch up with men.

In a study of 222 medical students studying at Government Medical College, Karnataka, 58 students (26.1%) were pre-hypertensive, none having HTN (Namita et al., 2017). No one had a current smoking habit of any type, unlike the prevalence of one-third seen in our study. In another study, that was carried out among 200 medical students in Odisha, whose BP was measured in sitting posture using a standard sphygmomanometer on two different settings and the average was taken for analysis, found pre-hypertension and hypertension percentage was 67% among study subjects. This appears to be higher than the 32% found in our study, but could be due to combination of pre-HTN as well as HTN. The authors advice healthcare providers to recognize the increased CVD risk of pre-hypertension in medical students and to identify and treat the modifiable risk factors in these persons (Patnaik et al., 2015).

In another study from tertiary care hospital in north-east India, 100 resident doctors, had their blood pressure measured on two occasions, one on an emergency day and another on a non-emergency day. The prevalence of hypertension and pre-hypertension among the doctors was found in 36% and 13% respectively, on an emergency day. This huge number of HTN was reduced to 19% when BP was taken on a non- emergency day. Authors emphasize that stress like emergency duties may be an important factor of higher prevalence of HTN in doctors (Shira et al., 2020).

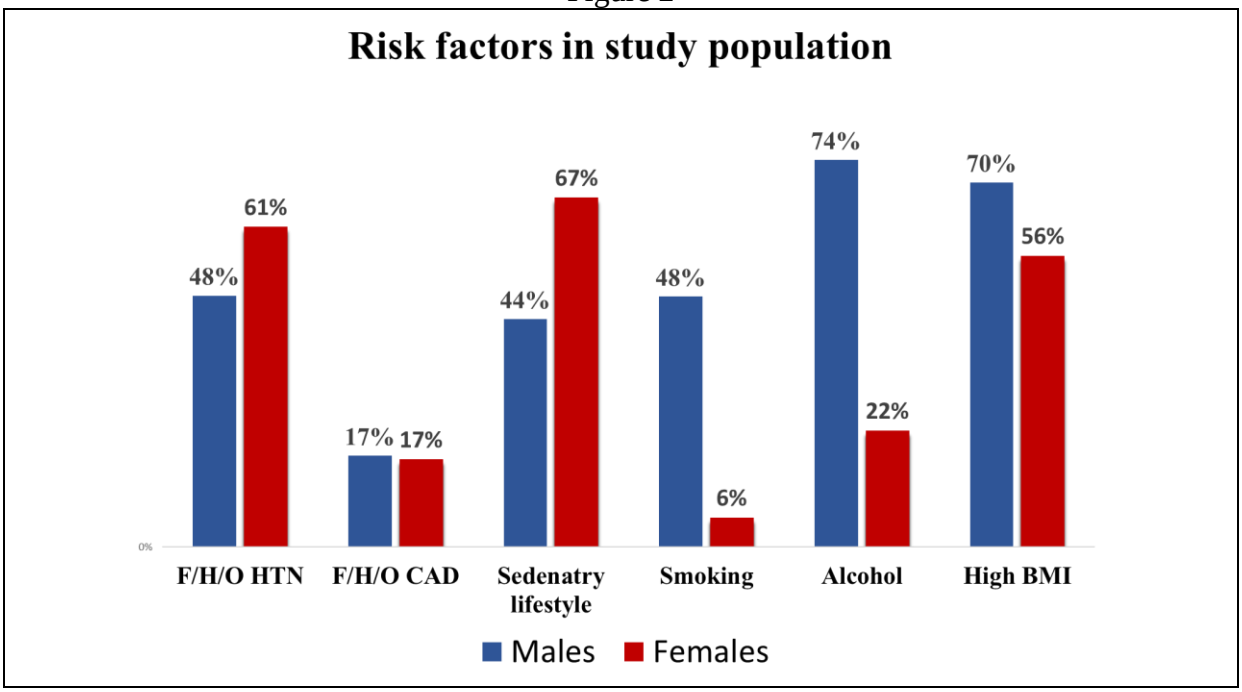
Figures

Figure 1.



Cardiovascular Risk Factors in Postgraduate Medical Students(%)

Figure 2



Gender-based Comparison of Cardiovascular Risk Factors (%)

Legends for Figures

Figure 1: Cardiovascular Risk Factors in Postgraduate Medical Students (%)

Figure 2: Gender-based Comparison of Cardiovascular Risk Factors (%)

5. CONCLUSION

To the best of our knowledge this is the only study done among the vulnerable population of postgraduate medical students using 24 hour- ambulatory BP monitoring to evaluate their blood pressures and assess cardiovascular risk factors. One third (13/41) had hypertension (all males) and more concerningly, in 5 of them, BP remained elevated at night too. They already had higher occurrence of conventional cardiovascular risk factors and lacked

awareness of their own blood pressure status. Both non-modifiable and modifiable risk factors were high; Two-thirds had elevated BMI and family history of HTN/CAD, one-half were sedentary and similar number were alcohol consumers and one third were smokers. Compared to their male counterparts, young female postgraduate doctors were more sedentary, while having similarly high risk of family history of CAD/HTN. This shows the importance of awareness, prevention and adoption of healthy lifestyle to reverse the modifiable risks in this cohort of young postgraduate doctors.

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