Prevalence of White Coat Hypertension among the Patients Visiting in a Tertiary Care Center, Kathmandu, Nepal

Bhattarai M,[1] Sainju NK,[2] Bhandari B,[3,4] KC V,[1] Karki DB[1]

[1]Department of Cardiology,

[2]Medical Education Department,

Kathmandu Medical College and Teaching Hospital,

Kathmandu, Nepal.

[3]Department of Community Medicine and Public Health,

Tribhuvan University Institute of Medicine, Kathmandu, Nepal.

[4]School of Public Health and Community Medicine,

University of New South Wales, Australia.

Corresponding Author

Mahesh Bhattarai

Department of Cardiology,

Kathmandu Medical College and Teaching Hospital,

Kathmandu, Nepal.

E-mail: drmaheshbha@gmail.com

Citation

Bhattarai M, Sainju NK, Bhandari B, KC V, Karki DB. Prevalence of White Coat Hypertension among the Patients Visiting in a Tertiary Care Center, Kathmandu, Nepal. *Kathmandu Univ Med J.* 2019;66(2):119-22.

ABSTRACT

Background

Hypertension is a major cardiovascular risk factor. White coat hypertension refers to elevated office blood pressure but normal out of office blood pressure. White-coat hypertension has a risk of cardiovascular events more than normotensives.

Objective

To identify the prevalence of white coat hypertension among patients presented in the cardiology department.

Method

The descriptive cross-sectional study was conducted among 165 patients who visited the cardiology outpatient department of Kathmandu Medical College and Teaching Hospital from December 2017 to November 2018. Blood pressure was measured at the hospital, and ambulatory blood pressure device was used to monitor 24hrs pattern. Hypertension is classified as per recent guideline. Data were entered and analysed using Statistical Package for social sciences version 20.

Result

Out of 165 ambulatory blood pressure monitoring conducted patients, 140 participants were enrolled in the study based on inclusion criteria. Among them 55% (77) were male, and 45% (63) were female. Age ranged from 18-78 years with a mean of 43.82 ± 12.31 years. Overall among 140 participants 14.28% had white coat hypertension, however, after excluding twenty-two high normal group, among 118 participants who were hypertensive according to office BP, 16.9% (20) had white coat hypertension, and 33.57% of patients did not have nocturnal dipping of blood pressure.

Conclusion

The white coat hypertension is prevalent among around one-sixth of hypertensive patients visiting tertiary care centre, and one third have non-dipping which needs to be considered in the management of hypertension.

KEY WORDS

Ambulatory blood pressure monitoring, Non-dipping, White coat hypertension

INTRODUCTION

Hypertension is a major cardiovascular risk factor contributing to almost ten million mortality, and around 200 million disability-adjusted life year in 2015.[1] The global age-standardised prevalence of hypertension is 20.1% in women and 24.1% in men.[2] With the current rising trend globally, it is estimated that 1.56 billion people will be hypertensive by 2025.[3]

In Nepal, a recent study in 2018 which analysed Nepal Demographic Health Survey data reported the prevalence of hypertension as 19.9%.[4] Furthermore, studies of Nepal reported around half of the hypertensives were nonadherent to treatment and around two-thirds had uncontrolled blood pressure.[5,6] White coat hypertension (WCHT) is defined as elevated office blood pressure but normal blood pressure when measured by Ambulatory Blood Pressure Monitoring (ABPM).[7] Prevalence of WCHT is reported differently in various studies. The study from the Eastern part of Nepal has reported an overall prevalence of 9%.[8] The difference between higher clinic BP and lower out of clinic BP is referred to as the white coat effect.[9] The white-coat effect can be seen at all grades of hypertension.[10] In comparison to normotensives, patients with white-coat hypertension have more cardiovascular damage. Indeed, they have a higher risk of diabetes and progression to sustained hypertension.[9] There are only limited studies in Nepal which shows the status of white coat hypertension. However, its scenario in our context is yet to be explored. Therefore, this study is conducted with an objective of detecting the prevalence of WCHT by using ABPM among the patients visiting the tertiary care centre in Nepal.

METHODS

This descriptive cross-sectional study was conducted among patients with hypertension and high normal blood pressure who were undertaken for twenty-four hours ABPM to record blood pressure from Cardiology outpatient department of Kathmandu Medical College and Teaching Hospital (KMCTH) during Dec. 2017 to Nov. 2018. A total of 165 patients underwent ABPM during the study period, twenty-five patients excluded based on exclusion criteria, and 140 patients were enrolled in the study purposively based on the inclusion and exclusion criteria of the study.

Blood pressure was measured with auscultatory sphygmomanometer after five minutes of rest in sitting position with back and arm supported. Standard size cuff was used at the level of heart, recorded in both arm and higher value taken, three readings taken two minutes apart and BP recorded an average of last two readings in accordance with standard guidelines.[7] Twenty-four hours Ambulatory Blood Pressure measure was measured using a validated device by oscillometer technique. ABP cuff was wrapped around the patient's arm which was connected to a recorder worn by a patient using a belt around the waist. Patients were instructed to stop moving, not to exert, not to talk and to keep arm still at the level of the heart as cuff will inflate and deflate to record blood pressure. The monitor was programmed to record BP at 30 minutes and 60 minutes intervals during day and night respectively. The night time was set in accordance with the sleep on and sleep off pattern of the patient commonly between 10 pm to 6 am Measurements on recorder was downloaded in a computer and analysed and blood pressure was categorized into 24-hour, daytime and nighttime mean. Participants were included in the analyses if they had at least 70% of expected readings and twenty measurements during the day and at least seven readings during the night, following ESH recommendations.[11] ABP monitoring was done for 24 hours among the patients who had hypertension or high normal blood pressure. Patients above 18 years of age, who were not consuming medicines for any non-communicable diseases including hypertension and who gave consent were included in the study. Patients with atrial fibrillation or under antihypertensive or other medications for non-communicable diseases were excluded from the study. Systolic blood pressure of 130-139 mmHg and/or diastolic blood pressure of 85-89 mmHg is considered as high normal blood pressure.

Classification of hypertension was done as per 2018 ESC/ESH (European Society of Cardiology/ European Society of Hypertension) guideline for the management of arterial hypertension.[7] Based on this criteria hypertension is defined as office BP ≥140 and/or 90 mmHg; in ABPM daytime (or awake) mean BP ≥135 and/or 85 mmHg; night-time (or asleep) mean BP ≥120 and/or 70 mmHg; and 24 hours mean BP ≥130 and/or 80 mmHg. WCHT is defined as office BP ≥140/ 90 mmHg and ambulatory BP normal. Masked Hypertension (MHT) is defined as office BP normal but ABPM blood pressure in hypertension range. Sustained hypertension (SHT) is defined as office BP ≥140/90 mmHg, and ambulatory BP is also showing hypertension, and normotensive (NT) as having both readings in the normal range. Ethical approval was taken from the Institutional Review Committee of Kathmandu Medical College. Informed consent was taken from each of the participants. Data were entered and analysed using the Statistical Package for Social Sciences 20 version. Both descriptive and inferential statistics were used for the analysis and tabular presentation is done.

RESULTS

Overall 165 patients underwent ABPM during the study period, and after excluding twenty-five patients already on antihypertensive treatment, 140 participants were enrolled in the study. Out of 140 participants, 55% (77) were male, and 45% (63) were female. Age ranged from 18 to 78 years with a mean of 43.82 years and standard deviation of 12.31 years. Most of the participants (58.6%) were between the age of 36 to 55yrs. Overall among 140 participants 14.28% had white coat hypertension, however, after excluding twenty- two high normal blood pressure group, among 118 participants who were hypertensive according to office BP, 16.9% (20) had white coat hypertension, and 83.1% (98) had sustained hypertension. Among 22 (15.7%) participants with high normal BP, 12 were masked hypertension, and ten were normotensive by ABPM. Most of the patients with white coat hypertension were of middle age group (36 to 55 years) with a mean age of 38.2 and a standard deviation of 10.11. Most of the participants with white coat hypertension were in grade 1 hypertension. Table 1 shows the age and sex distribution as per their blood pressure status.

Table 1. Age and sex distribution; blood pressure pattern among total participants (N=140)

Age	NT	WCHT	MHT	SHT	Total	P value
18-35	8.82% (3)	23.53% (8)	2.94% (1)	64.71% (22)	100% (34)	0.110
36-55	3.66% (3)	13.42% (11)	10.97% (9)	71.95% (59)	100% (82)	
>55	16.67% (4)	4.17% (1)	8.33% (2)	70.83% (17)	100% (24)	
Total	**7.14% (10)**	**14.28% (20)**	**8.57% (12)**	**70% (98)**	**100% (140)**	
Sex						
Male	6.49% (5)	10.39% (8)	10.39% (8)	72.73% (56)	55% (77)	0.430
Female	7.94% (5)	19.05% (12)	6.35% (4)	66.67% (42)	45% (63)	
Total	**7.14% (10)**	**14.28% (20)**	**8.57% (12)**	**70% (98)**	**100% (140)**	

Among all the participants, 66.43% were dippers, and 33.57% were non-dippers. Among dippers 51.42% are dippers (SBP nocturnal dipping 10-20%), and 15 % were extreme dippers (SBP nocturnal dipping >20%) illustrated in table 2.

Table 2. Nocturnal Dipping pattern among total participants (N=140)

	NT	WCHT	MHT	SHT	Total	P value
Non -dipper	40.00% (4)	10% (2)	58.33% (7)	34.69% (34)	33.57% (47)	
Dipper	60.00% (6)	55% (11)	41.67% (5)	51.02% (50)	51.42% (72)	0.022
Extreme dipper	0.00% (0)	35% (7)	0.00% (0)	14.29% (14)	15% (21)	
Total	**7.14% (10)**	**14.28% (20)**	**8.57% (12)**	**70% (98)**	**100% (140)**	

DISCUSSION

Ambulatory Blood pressure measurement was initially used to assess circadian variation of blood pressure and influence of therapy on twenty-four hours profile.[12] Now, ABPM and home BP monitoring are recommended to evaluate for WCHT. In the present study, ABPM was used to analyse the prevalence of WCHT which was identified as 14.28% among overall 140 participants, however, after excluding twenty-two high normal group, among 118 participants who were hypertensive according to office BP, 16.9% (20) had white coat hypertension. Blood pressure behaviour of most of them was of grade one hypertension at office blood pressure monitoring. Different studies in various clinical settings have demonstrated wide range of prevalence of WCHT. Similar to our study, the prevalence of WCHT was reported as 14.03% among Chinese diabetic patients with hypertension.[13] The review conducted among studies including untreated hypertensive patients had detected the prevalence of white coat hypertension as 15%.[14] Likewise, the study conducted in the Eastern region of Nepal reported an overall prevalence of 9%.[8] However, on analysis of stage one hypertensives only, the prevalence was reported as 17% which is similar to our findings. In contrary to our results, Swiss study had detected a much lower prevalence of WCHT as 2.6% of participants.[15] However, it was a population-based study.

On the contrary to our study, study conducted in Brazil reported a prevalence of WCHT as 38% among participants doing ABPM for suspected whitecoat hypertension participants.[16] Furthermore, study on an elderly population with untreated isolated systolic hypertension on office measurement, 52% had white-coat hypertension on ABPM. WCHT is considered as an intermediate between persistent hypertension and normotensive state and needs regular monitoring and use of nonpharmacological measures.[17] It has been found to have around two- fold raised cardiovascular risk in comparison to normotensive individuals.[18] The group of patients with WCHT showed a higher incidence of metabolic risk factors such as waist circumference, serum fasting glucose and metabolic syndrome. However, our study did not look for the cardiovascular risk factor which was out of the scope of our study. In the present study, only the patients without treatment were included, and non-dipping (nocturnal Systolic BP decline ≤ 10%) was present in 33.5% of the participants. On the other hand, non- dipping pattern was observed in 47% of participants in the study from the Eastern part of Nepal.[8] Similarly, in the Spanish study, ABPM registry among the untreated patients 44.5% were considered as non-dippers (nocturnal Systolic BP decline ≤ 10%) whereas non-dipping was found in 57% of the treated hypertensive group.[19] It is concerning that non-dipping worsens the prognosis of hypertensives and is related to advanced cardiovascular disease.

In the present study, 83.1% of individuals with hypertension in office measurement had SHT in ABPM. Hypertension mediated organ damage is less prevalent in WCHT than in SHT.[10] Indeed, in comparison to true normotensive individuals, patients with WCHT have increased adrenergic activity and metabolic risk factors leading to more substantial risk of diabetes and progression to sustained hypertension and left ventricular hypertrophy.[9] Besides, although out-of-office BP values are normal in white-coat hypertension, they tend to be higher compared to true normotensives, which may explain the more significant risk of cardiovascular events in white-coat hypertension.[10] The diagnosis of white coat hypertension should be confirmed by ABPM and should include an extensive assessment of risk factors and hypertension mediated organ damage.

CONCLUSION

This study identified around one-sixth of the hypertensive by office blood pressure are found to have white coat hypertension in twenty-four hours ambulatory blood pressure monitoring, and most of them are of grade one hypertension. Around one-third of the patients are non-dipper in nocturnal blood pressure profile. As cardiovascular risk in white coat hypertension is more than normotensives. They should be closely monitored and managed on time.

REFERENCES

1. Forouzanfar MH, Liu P, Roth GA, et al. Global burden of hypertension and systolic blood pressure of at least 110 to 115 mmHg, 1990-2015. *JAMA*. 2017;317(2):165-82.
2. Worldwide trends in blood pressure from 1975 to 2015: a pooled analysis of 1479 population-based measurement studies with 19.1 million participants. *Lancet.* 2017;389(10064):37-55.
3. Kearney PM, Whelton M, Reynolds K, Muntner P, Whelton PK, He J. Global burden of hypertension: analysis of worldwide data. *Lancet* (London, England). 2005;365(9455):217-23.
4. Hasan M, Sutradhar I, Akter T, Das Gupta R, Joshi H, Haider MR, et al. Prevalence and determinants of hypertension among adult population in Nepal: Data from Nepal Demographic and Health Survey 2016. *PLoS One.* 2018;13(5):e0198028.
5. Bhandari B, Bhattarai M, Bhandari M, Ghimire A, Pokharel P, Morisky D. Adherence to antihypertensive medications: population based follow up in Eastern Nepal. *Journal of Nepal Health Research Council.* 2015;13(29):38-42.
6. Simkhada R. Study on blood pressure control status and predictors of uncontrolled blood pressure among hypertensive patients under medication. *Nepal Medical College Journal: NMCJ.* 2012;14(1):56-9.
7. Williams B, Mancia G, Spiering W, Agabiti Rosei E, Azizi M, Burnier M, et al. 2018 ESC/ESH Guidelines for the management of arterial hypertension. *European heart journal.* 2018;39(33):3021-104.
8. Paudel N, Karki P, Shrestha NR, Sharma SK. White coat hypertension, relationship of stages of hypertension with end organ damage and diurnal variation of blood pressure in newly diagnosed hypertensive patients. *Journal of Advances in Internal Medicine.* 2012;1(2):56-60.
9. Mancia G, Bombelli M, Cuspidi C, Facchetti R, Grassi G. Cardiovascular Risk Associated With White-Coat Hypertension: Pro Side of the Argument. *Hypertension* (Dallas, Tex : 1979). 2017;70(4):668-75.
10. Briasoulis A, Androulakis E, Palla M, Papageorgiou N, Tousoulis D. White-coat hypertension and cardiovascular events: a meta-analysis. *Journal of hypertension.* 2016;34(4):593-9.
11. O'Brien E, Parati G, Stergiou G, Asmar R, Beilin L, Bilo G, et al. European Society of Hypertension position paper on ambulatory blood pressure monitoring. *Journal of hypertension.* 2013;31(9):1731-68.
12. Kain HK, Hinman AT, Sokolow M. Arterial blood pressure measurements with a portable recorder in hypertensive patients. I. Variability and correlation with "casual" pressures. *Circulation.* 1964;30:882-92.
13. Zhou J, Liu C, Shan P, Zhou Y, Xu E, Ji Y. Characteristics of white coat hypertension in Chinese Han patients with type 2 diabetes mellitus. *Clinical and Experimental Hypertension.* 2014;36(5):321-5.
14. Martin CA, McGrath BP. White-coat hypertension. *Clinical and experimental pharmacology & physiology.* 2014;41(1):22-9.
15. Alwan H, Pruijm M, Ponte B, Ackermann D, Guessous I, Ehret G, et al. Epidemiology of masked and white-coat hypertension: the family-based SKIPOGH study. *PLoS One.* 2014;9(3):e92522.
16. Pereira Silva R, Ribeiro P Sousa N. Who is the Patient with Suspected White Coat Hypertension? *Journal of Clinical & Experimental Cardiology.* 2016;07(03).
17. Kollias A, Ntineri A, Stergiou GS. Is white-coat hypertension a harbinger of increased risk? *Hypertension research: official journal of the Japanese Society of Hypertension.* 2014;37(9):791-5.
18. Mancia G, Bombelli M, Brambilla G, Facchetti R, Sega R, Toso E, et al. Long-term prognostic value of white coat hypertension: an insight from diagnostic use of both ambulatory and home blood pressure measurements. *Hypertension.* (Dallas, Tex: 1979). 2013;62(1):168-74.
19. de la Sierra A, Gorostidi M, Banegas JR, Segura J, de la Cruz JJ, Ruilope LM. Nocturnal Hypertension or Nondipping: Which Is Better Associated With the Cardiovascular Risk Profile? *American Journal of Hypertension*. 2014;27(5):680-7.