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Original article

Heart Health at the Frontline: A Study on Hypertension and Prehypertension involving Healthcare Staff of a Tertiary Care Hospital

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Abstract

Background: Hypertension, a major public health concern worldwide, affects individuals across various professions, including healthcare workers. This study aims to estimate the prevalence of hypertension and prehypertension among healthcare staff working at a tertiary care hospital and assess the associated risk factors. ***Aims and Objectives:*** To find prevalence of hypertension and prehypertension and its link with various demographic variables among study population. ***Settings and Design:*** A cross-sectional study was conducted at the tertiary care hospital. ***Methodology:*** A cross-sectional study was conducted, including a representative sample of healthcare staff. Data on demographics, lifestyle factors and blood pressure measurements were collected. The prevalence of hypertension and prehypertension was estimated, and significant risk factors were identified. ***Statistical analysis used:*** One-way ANOVA test and Chi square test were used to compare different variables. ***Results:*** Out of total study participants 38.02% were males and 61.98% were females. Among all the continuous variables included, weight, BMI, waist circumference and systolic BP and diastolic BP showed significant association. Among all the non- continuous variables included, monthly family income, place of residence, education, post in current occupation, use of extra salt in diet and habit of doing regular exercise showed significant association. ***Conclusions:*** The study showed age, weight, BMI, waist circumference, place of residence, education, post at workplace, monthly family income, use of extra salt in diet and habit of exercise were strongly associated with blood pressure and were better potential predictors of risk for hypertension and prehypertension than the other indices tested.

Keywords: ***Hypertension, prehypertension, healthcare staff, risk factors, prevalence, tertiary care hospital.***

Introduction

The development of cardiovascular risk factors and cardiovascular disease (CVD) have an established linkage through various studies with occupations [1-4]. Both physiologic and psychological stress at the workplace are possible related factors and also responsible for worsening of cardiovascular risk profiles such as physical inactivity, obesity, dyslipidaemia and hypertension [5-6].

Medical students and health care workers have been documented for high prevalence of cardiovascular risk factors however, the availability of data on cardiovascular risk profiles of medical doctors is limited [7-20]. The lead should be taken by medical doctors who are involved in the management of patients with cardiovascular risk factors and CVDs [21]. It is of utmost importance that they are healthy in order to attend to the health needs of their patients. Patients feel comfortable to believe when counselling on healthy diet and appropriate lifestyle practices is done by a healthy-looking and non-obese doctor [22-25]. Cardiovascular disease (CVD) is the leading cause of morbidity and mortality worldwide and the most important preventable risk factor for it is hypertension (HTN) [26-27].

It is suggested from various evidence that the increasing epidemic of both communicable and non-communicable diseases is faced by middle and low-income countries, which creates extra burden on their healthcare system and economy. The increasing prevalence of non-communicable diseases is mainly due to nutritional and lifestyle changes, sedentary lifestyle and the presence of other risk factors associated with cardiometabolic activities [28].

There are many modifiable lifestyle factors associated with hypertension including less or no physical activity, alcohol consumption, cigarette smoking, overweight and obesity [29-31].

The risk of stroke, heart attack, and other cardiovascular problems, and ultimately mortality can be reduced by effective treatment and control of hypertension [32]. Obesity is a condition in which extensive fat accumulation takes place in the body in such a way that health and wellbeing are affected [33]. Obesity is also a proven risk factor for insulin resistance, diabetes, hypercholesterolaemia and hypertension [34-35].

Low primary care of self, not following recommendations for balanced diet and physical activity, consuming caffeine in high amount and low-quality sleep are some of the reasons responsible for an increase in health problems among physicians [36-37].

The objective of the present study was to find prevalence of hypertension and prehypertension and its link with various demographic variables and some personal habits among study population.

Materials and Methods

A cross sectional study was conducted during May 2022 to September 2022 at one of the tertiary care hospitals in central Gujarat. According to National Family Health Survey (NFHS-5) conducted during 2019-21 prevalence of hypertension among adult women and men was 21.3% and 24% respectively. Taking this into consideration with precision level of 5% and considering non-response rate around 10% the final sample size calculated was 321, which was rounded off to 330.

Simple random sampling technique was used to select the healthcare personnel for the study. Pre-designed, pre-tested, semi-structured proforma was used as a study tool. Informed consent was taken prior to obtaining information regarding the study. Data collection was divided in to interview schedule, blood pressure measurement and anthropometric measurements like blood pressure, height, weight, waist circumference of study participants. Healthcare personnel who did not give the consent were excluded from the study. The ethical approval was obtained from the institutional ethical committee before conducting the study.

The definition of Hypertension (HTN) in this study was taken as systolic blood pressure (SBP) ≥140 mm Hg and/or diastolic blood pressure (DBP) ≥90 mm Hg. Pre-hypertension (PHTN) was defined as a SBP between 120 and 139 mm Hg and/or a DBP between 80 and 89 mm Hg. No hypertension (NHTN) was defined as SBP <120 mm Hg and DBP < 80 mm Hg. Use of extra salt was defined as use of additional salt in any amount to cooked or uncooked food. Smoking was defined as use of tobacco for smoking in any amount, duration and frequency. Alcohol consumption was defined as consumption of alcohol in any amount, duration and frequency. Daily physical activity was defined as any kind of physical activity in excess to daily routine activities for at least half an hour.

Collected data were compiled and processed using Microsoft Office Excel 2016. Descriptive and analytical statistical methods were used for the preparation of results. In descriptive methods overall percentage were calculated for variables used in the study i.e. age, gender, place of residence, religion, marital status, type of family, education etc. Also individuals having normal blood pressure, pre-hypertension and hypertension were mentioned in comparison to various study variables. In analytical methods one-way ANOVA test was used to compare continuous variables with normal distribution among inter-group comparisons. Categorical variables were compared by the Chi square test. A P value < 0.05 was considered statistically significant. Data are presented in tabulated format.

Results and Discussion

Results

Out of total study participants 127 (38.02%) were males and 207 (61.98%) were females. Age wise distribution of all participants shows that majority of them belong to the age group 25-35 years i.e. 140 (41.92%) followed by 88 (26.35%), 77 (23.05%) and 29 (8.68%) belonging to the age groups 35-45 years, 45-55 years and 18-25 years respectively. (**Table 1**)

The mean (± s.d.) age of study participants was 36.15 (± 8.83) years. The mean (± s.d.) weight of study participants was found to be 65.66 (± 10.06) kg. The mean (± s.d.) BMI and waist circumference were 23.74 (± 2.77) kg/m^2 and 83.71 (± 8.81) cm respectively. Whereas mean (± s.d.) SBP and DBP were found to be 124.6 (± 8.34) mm of Hg and 81.82 (± 5.83) mm of Hg respectively.

Table 2 shows association of various continuous variables with persons having normal blood pressure, pre-hypertension and hypertension. The mean (± s.d.) age of study participants having PHTN was 39.17 (± 8.45) years and of those having HTN and NHTN were 32.39 (± 8.84) years and 31.14 (± 6.56) years respectively. The mean (± s.d.) weight of study participants having HTN was 70.75 (± 11.7) kg and of those having NHTN and PHTN were 66.13 (± 10.67) kg and 64.53 (± 9.18) kg respectively. The mean (± s.d.) height of study participants having HTN was 167.75 (± 10.22) cm and of those having NHTN and PHTN were 166.48 (± 7.82) cm and 165.58 (± 8.16) cm respectively. The mean (± s.d.) BMI of study participants having HTN was 25.05 (± 2.9) kg/m^2 and of those having NHTN and PHTN were 23.81 (± 3.25) kg/m^2 and 23.48 (± 2.42) kg/m^2 respectively. The mean (± s.d.) waist circumference of study participants having HTN was 86.47 (± 9.87) cm and of those having NHTN and PHTN were 84.72 (± 9.65) cm and 82.75 (± 8.05) cm respectively. The mean (± s.d.) systolic BP of study participants having HTN was 137.28 (± 8.11) mm Hg and of those having PHTN and NHTN were 127.23 (± 3.55) mm Hg and 114.19 (± 2.98) mm Hg respectively. The mean (± s.d.) diastolic BP of study participants having HTN was 88.44 (± 4.23) mm Hg and of those having PHTN and NHTN were 84.08 (± 3.3) mm Hg and 74.48 (± 2.82) mm Hg respectively.

Among all the variables included, weight, BMI and waist circumference showed significant association, whereas age, systolic BP and diastolic BP were highly significant.

Table 3 shows association of various variables other than continuous variables with study participants having normal blood pressure, pre-hypertension and hypertension. More prevalence of PHTN (42.52%) and HTN (25.2%) is seen among males compared to females. Participants residing in urban area showed more prevalence both in PHTN (46%) and HTN (30.67%) followed by participants residing in semi-urban (43.68% and 24.14%) and rural (29.9% and 11.34%) areas. Those participants who are living in nuclear family showed more prevalence of PHTN (42.77%), whereas participants living in joint family showed more prevalence of HTN (28.15%). Participants having educational qualification of post graduate showed higher prevalence of HTN (45%) and HTN (25.83%) followed by those having educational qualification of graduate (44.38% and 23.75%) and higher secondary or less (20.37% and 16.67%). On considering post in current occupation, doctors showed higher prevalence of PHTN (46.9%) and HTN (25.66%) followed by nursing staff (45.26% and 24.09%) and other supportive staff (25% and 19.05%). Monthly family income showed inversely proportional relation with PHTN and HTN, where participants having higher monthly family income showed higher prevalence of both PHTN as well as HTN. Among all the variables included, monthly family income showed significant association, whereas place of residence, education and post in current occupation were highly significant.

Table 4 shows association of some personal habits of study participants with their blood pressure levels. Participants who are having vegetarian dietary habits showed more prevalence of PHTN (42.16%), whereas participants having mixed dietary habits showed more prevalence of HTN (24.83%). Use of extra salt in diet showed higher prevalence of both PHTN (44.32%) and HTN (27.84%). Participants having addiction of smoking and alcohol consumption showed higher prevalence of HTN (25.22% and 26.57% respectively), but prevalence of PHTN was almost similar in both smokers and alcoholics (40.87% and 42.66% respectively) as well as non-smokers and non-alcoholics (40.64% and 39.27% respectively). More prevalence of PHTN (47.46%) and HTN (25.99%) is seen among participants not having habit of regular exercise compared to those having habit of doing exercise regularly. Among all the variables included, use of extra salt in diet and habit of doing regular exercise were highly significant.

Table 1: Age and sex wise distribution of study participants

Age Group	Male		Female		Total	
	No.	%	No.	%	No.	%
18-25 years	9	31.03%	20	68.97%	29	100.00%
25-35 years	47	33.57%	93	66.43%	140	100.00%
35-45 years	36	40.91%	52	59.09%	88	100.00%
45-55 years	35	45.45%	42	54.55%	77	100.00%
Total	127	38.02%	207	61.98%	334	100.00%

Table 2: Association between various continuous variables and No hypertension, Pre-hypertension and Hypertension

	NHTN	PHTN	HTN	*f*-ratio	p value
Age (years)	31.14 ± 6.56	39.17 ± 8.45	32.39 ± 8.84	37.04321	< 0.00001
Weight (kg)	66.13 ± 10.67	64.53 ± 9.18	70.75 ± 11.7	6.17079	0.002338
Height (cm)	166.48 ± 7.82	165.58 ± 8.16	167.75 ± 10.22	1.21269	0.298714
BMI (kg/m^2)	23.81 ± 3.25	23.48 ± 2.42	25.05 ± 2.9	4.2564	0.014957
Waist Circumference (cm)	84.72 ± 9.65	82.75 ± 8.05	86.47 ± 9.87	3.65783	0.026836
Systolic BP (mm Hg)	114.19 ± 2.98	127.23 ± 3.55	137.28 ± 8.11	508.84028	< 0.00001
Diastolic BP (mm Hg)	74.48 ± 2.82	84.08 ± 3.3	88.44 ± 4.23	357.91641	< 0.00001

Table 3: Association between various non-continuous variables and No hypertension, Pre-hypertension and Hypertension

Variables	NHTN	PHTN	HTN	Total	Chi square	df	p value
	No. (%)	No. (%)	No. (%)	No. (%)			
Gender							
Male	41 (32.28%)	54 (42.52%)	32 (25.20%)	127 (100%)	1.219	2	0.54362261
Female	79 (38.16%)	82 (39.61%)	46 (22.22%)	207 (100%)			
Place of Residence							
Rural	57 (58.76%)	29 (29.90%)	11 (11.34%)	97 (100%)	34.497	4	0.00000059
Semi-Urban	28 (32.18%)	38 (43.68%)	21 (24.14%)	87 (100%)			
Urban	35 (23.33%)	69 (46.00%)	46 (30.67%)	150 (100%)			
Type of Family							
Joint	44 (32.59%)	53 (39.26%)	38 (28.15%)	135 (100%)	3.675	4	0.45177247
Nuclear	65 (37.57%)	74 (42.77%)	34 (19.65%)	173 (100%)			
Three Generations	11 (42.31%)	9 (34.62%)	6 (23.08%)	26 (100%)			
Education							
Higher Secondary or less	34 (62.96%)	11 (20.37%)	9 (16.67%)	54 (100%)	21.161	4	0.00029422
Graduate	51 (31.88%)	71 (44.38%)	38 (23.75%)	160 (100%)			
Post Graduate	35 (29.17%)	54 (45.00%)	31 (25.83%)	120 (100%)			
Post in current Occupation							
Doctors	31 (27.43%)	53 (46.90%)	29 (25.66%)	113 (100%)	20.511	4	0.00039578
Nursing staff	42 (30.66%)	62 (45.26%)	33 (24.09%)	137 (100%)			
Other supportive staff	47 (55.95%)	21 (25.00%)	16 (19.05%)	84 (100%)			
Monthly Family Income (Rupees)							
<50000	36 (53.73%)	17 (25.37%)	14 (20.90%)	67 (100%)	21.296	10	0.01912152
50000-100000	29 (44.62%)	22 (33.85%)	14 (21.54%)	65 (100%)			
100000-200000	21 (33.33%)	27 (42.86%)	15 (23.81%)	63 (100%)			
200000-300000	15 (27.78%)	26 (48.15%)	13 (24.07%)	54 (100%)			
300000-400000	11 (22.92%)	25 (52.08%)	12 (25.00%)	48 (100%)			
>400000	8 (21.62%)	19 (51.35%)	10 (27.03%)	37 (100%)			

Table 4: Association between Personal habits and No hypertension, Pre-hypertension and Hypertension

Variables	NHTN	PHTN	HTN	Total	Chi square	df	p value
	No. (%)	No. (%)	No. (%)	No. (%)			
Dietary Habits							
Vegetarian	66 (35.68%)	78 (42.16%)	41 (22.16%)	185 (100%)	0.472	2	0.78978067
Mixed	54 (36.24%)	58 (38.93%)	37 (24.83%)	149 (100%)			
Use of extra salt							
Yes	49 (27.84%)	78 (44.32%)	49 (27.84%)	176 (100%)	9.878	2	0.00716176
No	71 (42.77%)	66 (39.76%)	29 (17.47%)	166 (100%)			
Addiction of smoking							
Yes	39 (33.91%)	47 (40.87%)	29 (25.22%)	115 (100%)	0.46	2	0.7945336
No	81 (36.99%)	89 (40.64%)	49 (22.37%)	219 (100%)			
Consumption of Alcohol							
Yes	44 (30.77%)	61 (42.66%)	38 (26.57%)	143 (100%)	3.194	2	0.20250312
No	76 (39.79%)	75 (39.27%)	40 (20.94%)	191 (100%)			
Habit of Exercise							
Yes	73 (46.50%)	52 (33.12%)	32 (20.38%)	157 (100%)	14.53	2	0.0006996
No	47 (26.55%)	84 (47.46%)	46 (25.99%)	177 (100%)			

Discussion

About two-thirds of this working population which seems apparently healthy, have raised blood pressure levels either in the form of prehypertension or hypertension. From this we can say that it is a big public health problem. According to National Family Health Survey (NFHS) - 5 [38], 21.3% women and 24% men were suffering from hypertension. The results of the present study are almost similar to the NFHS-5. Present study showed that 22.22% women and 25.2% men are suffering from hypertension. Men also had higher prevalence of PHTN compared with women (42.52% vs 39.61%). The results are also similar to those found by Yang Shen et al (2017) [39].

Balazs Sonkodi et al (2011) in their study found similar results of increasing trend of mean and standard deviation of both systolic as well as diastolic blood pressure in persons having normal blood pressure, pre-hypertension and hypertension respectively [40]. Similar to present study, their study also found that increased BMI was associated with prehypertension. Yang Shen et al (2017) in their study found similar results that overweight or obese individuals and frequent drinkers significantly increased from normal blood pressure to pre-hypertension and then to hypertension [39]. Ononamadu CJ et al (2017) found similar results in their study of having strong predictive potential of BMI and waist circumference for prehypertension as well as hypertension in both males and females [41]. Paquissi FC et al (2016) in their study found similar results that age and overweight were associated with hypertension [42].

Nowadays it is accepted widely that any increase in blood pressure levels represents increased risk of CVD, also the association of hypertension with premature CVD morbidity and mortality has been proven [9-11]. Recent evidence suggests that individuals having PHTN would be at a significant higher risk of developing to HTN and also of CVD in the future, compared to those with NHTN [40].

As the sample population taken in this study was healthcare workers working in a tertiary care hospital, we are aware that the results of this cross-sectional study may not necessarily reflect the health status of the general population. A multilevel intervention like BP awareness by simple health educational messages for public, repeated at frequent intervals should be considered for effective CVD prevention. In addition to this, worksites should also provide a favourable setting for diagnosis and treatment of prehypertension and hypertension [43].

Conclusions

The present study showed a high prevalence of PHTN in a working population aged 25-45 years and a high prevalence of HTN in a working population aged 35-55 years, which may result into high incidence of CVD events in future.

The study showed age, weight, BMI, waist circumference, place of residence, education, post at workplace, monthly family income, use of extra salt in diet and habit of exercise were strongly associated with blood pressure compared to other indices tested. And therefore, they are better potential predictors of risk for hypertension and prehypertension.

To fight with this situation, routine BP screening should be done at workplace using appropriate screening methods to mitigate the community health emergencies that may arise from undiagnosed hypertension. Training sessions aiming at modification of risk factors and rational use of antihypertensive medicine should be arranged in which interventions should be done to help healthcare staff to adopt healthier lifestyles.

List of abbreviations

BP - Blood pressure
CVD - Cardiovascular disease
HTN - Hypertension
PHTN - Pre-hypertension
NHTN - No hypertension
NFHS - National Family Health Survey
SBP - Systolic blood pressure
DBP - Diastolic blood pressure
BMI - Body Mass Index

Data Availability

Data will be available on request from Dr. Malay Savalia, malay30582@gmail.com

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

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Authors' contributions

MS contributed in conceptualization and defining of intellectual content of the study. PP contributed in designing the study. AS, AJ, SA, AD and AB did all the investigations. MS, PP, AJ and AD contributor in writing the manuscript. All authors read and approved the final manuscript.

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