Prevalence And Determinants of Hypertension Among Adults Attending A Health Care Facility At Srinagar (J&K)

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Abstract

Hypertension is a major cause of morbidity and mortality worldwide. It is one of the most important modifiable risk factors for CHD in western and Asian population.[1,2] It has been found to be associated with an unhealthy lifestyle, including tobacco smoking, lack of physical activity, and alcohol consumption.[3] High- and low- and middle-income countries have shown increasing trends in the prevalence of hypertension.[4,5]

A facility based cross sectional study was conducted in a health care facility of Srinagar, Kashmir (India) which aimed at assessing the prevalence and determinants of hypertension, including age, education, occupation, monthly family income, BMI, family history of hypertension, smoking, physical activity, psychosocial stress.

Materials and *Methods*. 450 people aging 20 years and above (both male and female) attending a health care facility in Srinagar Kashmir (India) were interviewed for sociodemographic data including age, education, occupation, monthly family income, family history of hypertension, psychosocial stress, smoking habits, and physical activity. They were also examined for BP; and height/weight (to estimate (BMI). Frequencies and Pearson's chi-square test [with 5% significance level] were implemented to estimate determinants of hypertension

Results. Our analysis yielded that out of 450 subjects, 280 (62.22%) were normotensive whereas hypertension was prevalent among 170 (37.78%). Hypertension was highly prevalent in 50-64 years (66.15%) and > 64 years (56%) with post graduation or more qualification (66.67%) and subjects with no formal education (44.95%). Housewives and self employed subjects (70% and 69.77% respectively), subjects with monthly family income of Rs 10000-20000 (91.30%) had highest prevalence The prevalence of hypertension in relation to BMI of >30 was 45.03%, The association of hypertension with family history of hypertension was highly significant with prevalence in such subjects as 83.62%, The prevalence of hypertension was very high in current smokers (86.46%) and in subjects with tedious physical activity (76.11%). In this study psychosocial stress has indicated significant association with hypertension though the prevalence was high in subjects whose response was 'no' (69.23%) as compared to those subjects whose response was 'yes' and 'to some extent' where prevalence rate was almost equal (33.60% and 33.77% respectively)

Conclusion: The high prevalence of hypertension in the study population might be attributed to their poor knowledge, poor dietary habits, household smoke inhalation, and inadequate lifestyle habits, stress, poor dietary habits, poor working conditions, and lack of access to health services. Thus there is dire need of life style modifications and health behaviour interventions to be operated at every community, public places, offices, industries schools to curb the problem at infancy.

Keywords: Hypertension, Prevalence, Determinants, Health care facility

Introduction

Hypertension is an important public health challenge in both economically developing and developed countries. It is counted as one of the major non communicable diseases which is

associated with 12.8% of all deaths globally.[6] Hypertension affects about one billion adults globally and is associated with more than 9 million deaths annually. The prevalence of hypertension among adults is estimated to be 31.1% globally and 27.6% in India. Of more than 1.3 billion people with hypertension globally, 82% live in low- and middle-income countries, and India alone is home to an estimated 220 million adults with hypertension.[7,8]

Hypertension exerts a substantial burden on the healthcare system in India. Recent literature suggests hypertension to be a rising health problem, not only in adults but also in adolescents. [9]

Hypertension is a complex and multifaceted disease, with many contributing factors. While diet and nutrition are important influences, the confounding effects of overweight and obesity, metabolic and genetic factors, racial and ethnic predispositions, socio economic status, cultural influences have more influence on the condition and make diagnosis quite challenging.

The trend of global prevalence for hypertension has been dramatically increasing for the past two decades. Globally, at least 1 billion people have hypertension, and a projected figure of 1.5 billion is expected to be hypertensive by 2025.[10]

Hypertension is a serious medical condition and can increase the risk of cardiovascular, cerebrovascular, renal and other morbidities. It exerts a substantial public health burden on cardiovascular health status and healthcare systems in India. It is directly responsible for 57% of all stroke deaths and 24% of all coronary heart disease (CHD) deaths in India . The WHO rates hypertension as one of the most important causes of premature death worldwide. In an analysis of worldwide data for the global burden of hypertension, 20.6% of Indian men and 20.9% of Indian women were suffering from hypertension in 2005. The rates for hypertension in percentage are projected to go up to 22.9 and 23.6 for Indian men and women, respectively by 2025. Recent studies from India have shown the prevalence of hypertension to be 25% in urban and 10% in rural population in India.[11]

Studies from India and Bangladesh have shown an increasing trend in the prevalence of hypertension.[12] Community surveys have documented that in a period of three to six decades, prevalence of hypertension has increased by about 30 times among urban dwellers and by about 10 times among the rural inhabitants. However differential rates are due to different cut off marks in determining the level of hypertension and also differing age groups constituting the study population. Dramatic changes in life style have lead to physical inactivity due to technological advances. Rising affluence has modified the dietary pattern characterized by increased consumption of diets rich in fat, sugar and calories.[13] There is a paucity of data on the prevalence of hypertension and its determinants in India and this study was done to determine the same amongst an urban community area in Srinagar.

Materials and Methods

This was a facility based cross sectional study conducted at outpatient department of a Tertiary Care Hospital, SKIMS, Srinagar, J&K (India) from July 2022 to March 2023. The study involved 450 participants who were accompanying patients attending OPD services. Inclusion criteria for study participants was age group of 20 years and above, both male and female whose patients were ambulatory and not critical and those who gave approval and acceptance for participation through informed consent. The participants were free to leave if not willing to continue. A pre validated proforma was used to collect the data on sociodemographic data including age, education, occupation, monthly family income, family history of hypertension, smoking habit, physical activity. They were also examined for BP; and height/weight (to estimate (BMI). BP was measured using a mercury column sphygmanometer tied on the left arm in the seated position. Weight and height was measured using standard weighing machine and calibrated fixed height measuring scale after pretesting its validation.

Blood pressure (BP) was classified using JNC 7 algorithm.[14] *Normotension* was defined as BP values <120/80 mm Hg in individuals who were not taking antihypertensive medication. Hypertension was defined as systolic BP $\geq$140 mm Hg and/or diastolic BP $\geq$90 mm Hg and/or

current use of antihypertensive medication. Hypertensive participants were classified as per their systolic and diastolic blood pressure measurements e.g *High BP* (BP121-129/81-84 mmHg); *pre hypertension* (BP130-139/85-89 mmHg); and *stage I hypertension* (BP140-159/90-99 mmHg). *Stage II hypertension* (BP>160/100 mmHg) was not counted as none of the participants had BP of more than 160/100mmHg.

Body mass index (BMI) was calculated as weight in kg divided by square of height in meters (kg/m$^{2)}$ and classified according to Asia-Pacific criteria: normal weight (18.5 to <22.9 kg/m^2), overweight (23.0 to 24.9 kg/m^2) and obese (>25 kg/m^2).[15] Their height and weight was recorded to estimate BMI using formula wt. in kg/ ht. in m^2. According to BMI, participants were categorized normal weight (BMI: 18.5 - 24.9), overweight (BMI: 25 – 29.9), and obese (BMI >30)

Age groups were categorized as 20-34 years, 35-49 years, 50-64 years and more than 64 years.

Groups were asked about their *education* and were categorized as having no formal education; primary to secondary; higher secondary to graduate; and post graduate and above.

Groups were asked about their *occupation* and were categorized as students, unemployed, house-wives, self employed, government employed.

Groups were asked about their *monthly family income* and were categorized as having income of RS 10000-20000; RS 21000-30000; RS 31000-40000; RS 41000-50000; >Rs50000.

Family history of hypertension was asked and categorized as 'yes' or 'no' if both or any one of the parent, was hypertensive or not respectively.

Smoking was assessed by asking if they have ever smoked cigarette or used hukka, or chewed tobacco; if they still have the habit or totally quit. Responses were grouped into never, occasional, quitters (ex smokers), and current smokers.

Physical Activity was categorized[16] as sedentary (having low physical movement and activity e.g, having workers to carry their household work, having more table work like clerks, office workers, computer associates etc), moderate (doing average movement and physical activity e.g carrying household work and/or office work, going on stairs, making hospital rounds etc) and tedious (doing vigorous movements and high physical activity like athlete, labourer etc)

Psychosocial stress was categorized as 'no', 'yes' and 'to some extent' according to the response given by participants to the item, "do you easily get anxious over some events in your personal or family life"

Data is presented in figures (graphs) and tables.

Results:

Total 450 subjects were included in the study. It is depicted in *figure 1* that out of 450 subjects, 280 (62.22%) were normotensive whereas hypertension was prevalent among 170 (37.78%). With regard to prevalence of various categories of hypertension, it is indicated that high blood pressure (BP of121-129/81-84mmHg) was prevalent in 58(12.89%) subjects; pre hypertension (BPof130-139/85-89 mmHg); among 49(10.89%) subjects; and stage I hypertension (BPof 140-159/90-99 mmHg) among 63(14%) subjects (*figure 2*).
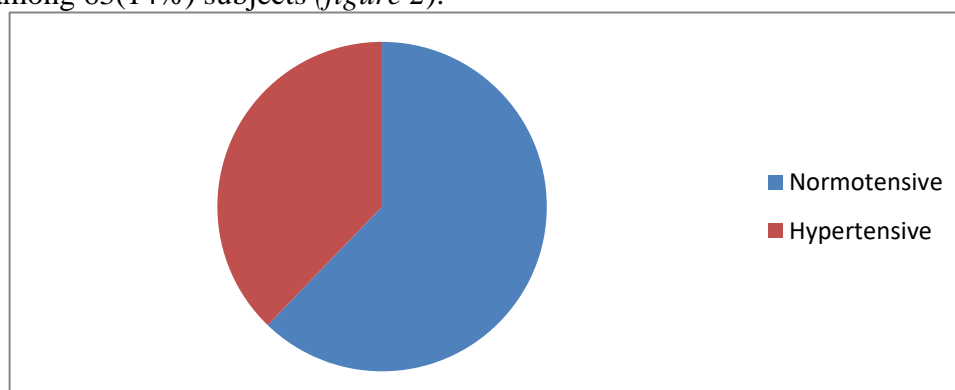
Figure 1: Pie graph showing frequency of normotensive and hypertensive subjects
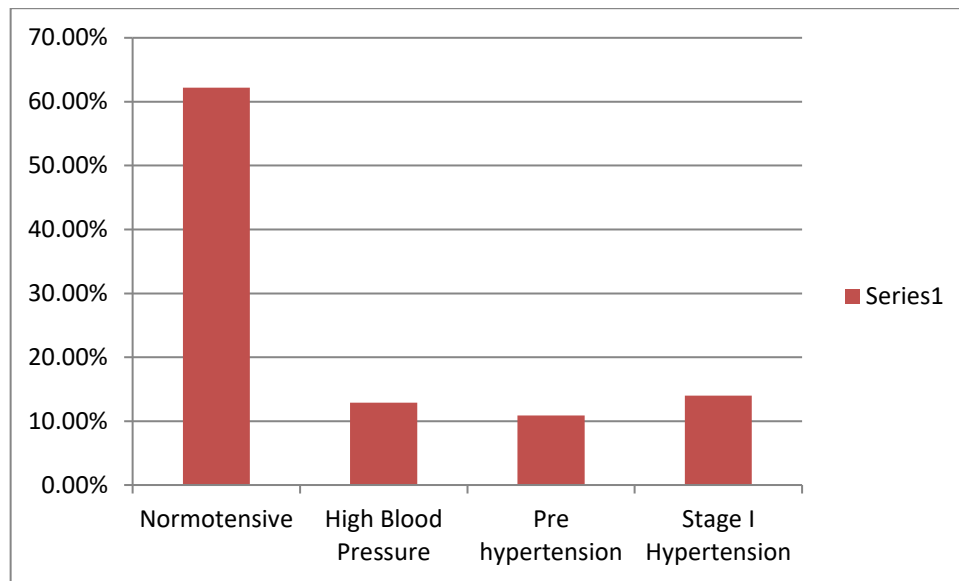
Figure 2: Bar diagram depicting prevalence of various categories of blood pressure among subjects

The findings related to prevalence of hypertension in association with socio- demographic data like age, education, occupation, monthly family income, BMI, family history of hypertension, smoking habit, physical activity, psychosocial stress, is noted and presented in tables 1-3.

Table 1 Association of socio-demographic variables with various categories of blood pressure N=450

Socio demographic variables	Normo-tensive <120/80 mmHg N=280	High Blood Pressure 121-129/81-84mmHg n=58	Pre hypertension 130-139/85-89 mmHg n=49	Stage I hypertension 140-159 /90-99 mmHg n=63	Total 450	Prevalence of hypertension	Chi squre Df	P value
1.Age in years -20-34 years -35-49 years -50-64 years .->64 years	97 72 81 30	8 10 19 21	0 24 11 14	0 0 39 24	105 106 135 104	(7.62%) (32.07%) (66.15%) (56%)	124.5 21 df: 9	0*
2.Education -No formal -Primary to SS -HSS to graduate ->Postgraduate	109 127 36 8	24 15 9 10	29 11 5 4	36 17 8 2	198 170 58 24	(44.95%) (25.29%) (37.93%) (66.67%)	38.70 9 df:9	0.0 00 *

3. Occupation							
-Student	36	5	13	20	74	(51.35%)	182.02	0.0*
-Unemployed	194	10	16	8	228	(14.91%)	df:12	
-Housewives	12	21	4	3	40	(70%)		
-Self employed	13	15	7	8	43	(69.77%)		
- Govt employed	25	7	9	24	65	(61.54%)		

Table 2 Association of socio-demographic variables with various categories of blood pressure N=450

Socio demographic variables	Normo-tensive <120/80 mmHg N=280	High Blood Pressure 121-129/81-84mmHg n=58	Pre hypertension 130-139/85-89 mmHg n=49	Stage I hypertension 140-159/90-99mmHg n=63	Total 450	Prevalence of hypertension	Chi squre Df	P value
4. Monthly family income								
-Rs10000-20000	2	8	7	6	23	91.30%	104.007	0*
-Rs 21000-30000	153	13	9	15	190	19.47%	df: 12	
-Rs 31000-40000	69	26	17	8	120	42.5%		
-Rs 41000-50000	44	11	10	30	95	53.68%		
-> Rs 50000	12	0	6	4	22	45.45%		
5. BMI								
-< 25 (Normal Wt)	103	27	16	14	160	35.63%	20.56	0.0*
-25-29.9 (Over Wt)	105	12	11	31	159	33.96%	df:6	
->30 (Obese)	72	19	22	18	131	45.03%		
6. Family H/O hypertension								
-No	261	38	18	17	334	21.86%	164.55	0*
-Yes	19	20	31	46	116	83.62%	df:3	

Table 3 Association of sociodemographic variables with various categories of blood pressure N=450

Socio demographic variables	Normo-tensive <120/80 mmHg N=280	High Blood Pressure 121-129/81-84mmHg n=58	Pre hypertension 130-139/85-89 mmHg n=49	Stage I hypertension 140-159/90-99mmHg n=63	Total 450	Prevalence of hypertension	Chi squre Df	p value
7. Smoking -Never -Occasional -Quitters/ex smoker -current	198 49 20 13	8 9 15 26	4 9 8 28	7 11 16 29	217 78 59 96	8.76% 37.18% 66.10% 86.46%	199.552 df: 9	0.0*
8.Physical activity -Sedentary -Moderate -Tedious	45 208 27	16 14 28	20 12 17	3 19 41	84 253 113	46.43% 17.79% 76.11%	147.087 df:6	0.0*
9. Any psychosocial stress -No -Yes -To some extent	16 164 100	13 22 23	2 29 18	21 32 10	52 247 151	69.23% 33.60% 33.77%	53.548 df:6	0.0*

The determinants studied were found prevalent and have shown significant association with hypertension. With regard to age, hypertension was highly prevalent in 50-64 years (66.15%) and > 64 years (56%) and least prevalent in the age group of 20-34 years (7.62%) ; p=0, <0.05. In relation to educational status, hypertension was highly prevalent in subjects with post graduation or more qualification (66.67%) and subjects with no formal education (44.95%) whereas prevalence was less among subjects with primary or secondary education and this shows significant association (p=0.00). Occupation of subjects also was significantly associated with hypertension, housewives and self employed subjects had highest prevalence (70% and 69.77% respectively) whereas unemployed subjects have shown low prevalence of 14.91% (p=0) (Table 1)

Association with monthly family income of the subjects has indicated highly significant association with highest prevalence in subjects whose monthly family income was Rs 10000-20000 and it has low prevalence in subjects with monthly family income of Rs 21000-30000 (p=0). BMI of subjects has indicated again significant association. The prevalence of hypertension in relation to BMI of >30 was 45.03%; BMI of < 25 was 35.63% and BMI of 25-29.9 was 33.96%. (p=0.002). The association of hypertension with family history of hypertension was highly significant with prevalence in such subjects as 83.62% (p=0) [Table 2].

The study depicts significant association of smoking with hypertension. The prevalence of hypertension was very high in current smokers (86.46%) followed by ex-smokers/quitters (66.10%) and it was least in subjects who never smoked (8.76%) [p=0]. With regard to physical activity, the present study again rejects the null hypothesis by showing significant association with hypertension. Hypertension was very prevalent in subjects with tedious physical activity (76.11%) as compared to subjects with sedentary and moderate physical activity where prevalence rate was 46.43% and

17.79% respectively. In this study, psychosocial stress has indicated significant association with hypertension though the prevalence was high in subjects whose response was 'no' (69.23%) as compared to those subjects whose response was 'yes' and 'to some extent' where prevalence rate was almost equal (33.60% and 33.77% respectively; p=0) [Table 3],

Discussion

The present study was to find out the prevalence and determinants of hypertension among 450 adults. In this study, it is found that out of 450 subjects, hypertension was prevalent among 170 (37.78%) subjects. Peltzer and Pengpid[17] did a study in Indonesia and reported the prevalence of hypertension among study participants as 33.4 % (95 % CI: 32.7-34.0) thus agree with our findings. Tapela etal[18] aimed to determine the prevalence and correlates of hypertension, awareness, treatment, and control among adults in Botswana, a middle-income African country and found a high burden of hypertension, with an estimated prevalence of 30% (95% CI: 28%–32%) in the general adult population, 58% (53–64%) among those aged 50–69 years. Agarwal, Bhalwar , Basannar[19] while studying prevalence and determinants of Hypertension in a Rural Community reported that18.5% men and women were suffering from systolic hypertension ($\geq$ 140 mg Hg) and 15 % from diastolic hypertension ($\geq$ 90 mg Hg). Prevalence of risk factors for hypertension was significantly more among subjects suffering from systolic and diastolic hypertension than normotensive subjects.

All the determinants had shown significant association with hypertension in this study. As far as *age* is concerned in this study, it was highly prevalent in 50-64 years and > 64 years. Verghese etal[20] reported from India that the prevalence of hypertension nationally was 28.1% (95% CI, 27.9%-28.3%) and was higher among participants at older ages ($\geq$65 years, 54.3% [95% CI, 53.8%-54.8%]; 18-39 years, 14.9% [95% CI, 14.8%-15.1%]). Similar reports are given in other studies.[18]

Education has shown significant association with hypertension and prevalence was high in subjects with qualification of post graduate or more and subjects with no formal education. Similar findings are reported by Vimesh, Chander,Mehta, Singh[21] from a study conducted by them in Punjab. They reported significant association of education with hypertension where illiterate had highest prevalence of 57.05%. Other studies too favour these finding.[20,22-24]

Occupation of subjects in this study depicted significant association with hypertension, housewives and self employed subjects had highest prevalence. Verghese etal[20] reported that the prevalence of hypertension was higher among participants with a higher level of schooling (postsecondary, 39.4% [95% CI, 38.6%-40.3%]; none, 36.3% [95% CI, 35.6%-37.0%]). Our study findings are in consensus with other study findings.[21,23,24]

Association with *monthly family income* of the subjects has indicated highly significant association with hypertension with highest prevalence in subjects with monthly family income of Rs 10000-20000 and has low prevalence in subjects with monthly family income of Rs 21000-30000. Vimesh, Chander, Mehta, Singh[21] in their study at Punjab found that subjects with per capita monthly income > 10,000 rupees showed 74.41% prevalence of hypertension and 37.93% among subjects with less than 10,000 rupees. But it was found in other studies that higher the monthly income, less is the prevalence of hypertension.[20] Todkar, Gujarthi, Tapare[25] agree with our study findings

BMI of subjects has indicated again significant association. The prevalence of hypertension in relation to BMI of >30 was 45.03% which was higher as compared to BMI of less than 30; Regarding weight variables, being underweight was protective and being overweight or obese increased the odds of having hypertension as found by Peltzer and Pengpid [17]. The association between overweight/obesity and hypertension has been confirmed in a number of studies.[26-31] BMI was observed as risk factor for hypertension as increased BMI has resulted in hypertension in the study conducted at Punjab.[21] Some studies suggest that about two-thirds of the prevalence of hypertension may be attributed to obesity.[32]

The association of hypertension with *family history of hypertension* was highly significant with prevalence in such subjects. Vimesh, Chander, Mehta, Singh[21] in their study found that family

history is strongly associated with hypertension. Lifton[33] and Perusse, Rice, Bouchard, Vogle, Rao[34] studied the genetic and familial environmental effects on blood pressure by using extensive information on environmental correlates and indicated genes as important predictors of hypertension.

The study depicts significant association of *smoking* with hypertension. The prevalence of hypertension was very high in current smokers and it was least in subjects who never smoked. Smoking was strongly related with hypertension.[21] Benowitz[35] observed that sodium absorption was higher among persons who smoked cigarettes and chewed tobacco as compared to non-tobacco use and has got role in association to hypertension. Peltzer and Pengpid [17] reported about their study results that older age, no or elementary education and being overweight or obese were positively associated with hypertension. Both among men and among women being underweight was negatively associated with hypertension. In addition, among men having quit tobacco use were positively associated with hypertension, while current tobacco use was negatively associated with hypertension. Moreover, among women lower subjective economic status was associated with hypertension. Prevalence of smoking and tobacco use was 16%, and physical inactivity (work and leisure) as 18.5%. Body Mass Index (BMI) was ≥ 25 in 18 % and ≥ 30 in 3.2% men and women.[19]

Tapeli etal[18] reported that the individuals who were older, less educated, current smokers, obese were more likely to be hypertensive, based on univariable regression analysis. In fully adjusted multivariable logistic regression analysis, older age (OR 1.04, 95% CI: 1.03–1.06), obesity (OR 2.96, 2.16–4.04), and overweight (OR 1.56, 1.20–2.04) were independent predictors of hypertension. Current smokers tended to be hypertensive; however, this association did not reach statistical significance (OR 1.40, 0.98–1.99).

With regard to *physical activity*, the present study again shows significant association with hypertension. Hypertension was very prevalent in subjects with tedious physical activity as compared to subjects with sedentary and moderate physical activity. Prevalence rates of obesity, as one important risk factor for hypertension, are higher among young adults[36-38] and obesity is found to be directly related to physical activity. As found in a number of previous studies[27,28,39-41] moderate physical activity is negatively associated with hypertension which completely agree with our study results.

In this study *psychosocial stress* has indicated significant association with hypertension though the prevalence was high in subjects whose response was 'no'as compared to those subjects whose response was 'yes' and 'to some extent' In terms of psychosocial stress and support, as found by Peltzer and Pengpid [17] quit tobacco use and depressive symptoms (stress) were positively associated with hypertension. This study findings are in agreement with previous studies[42-44] that have shown psychosocial stress in the form of depression, as positively related to hypertension.

Conclusion: A higher prevalence of hypertension was observed in study population. The high prevalence of hypertension in the older age group with low or no education, low monthly income in this study may be related to having a higher number of risk factors such as stress, poor dietary habits, poor working conditions, and lack of access to health services.[45] Housewives and unskilled workers have shown high prevalence of hypertension in this study which might be attributed to their poor knowledge, poor dietary habits, household smoke inhalation, and inadequate lifestyle habits.

Overweight or obesity may be associated with hypertension which could be mediated through unhealthy diet and inadequate physical activity.[46] Subjects who had tedious type of physical activity are correlated with hypertension in this study which could be due to their unawareness about their blood pressure measurements which might have been already towards higher trend.It is possible that the impact of current tobacco use on hypertension in this study could be due to having the smoking habit from quite a long period of time.

Several risk factors, including sociodemographic variables (older age, lower education, being housewives or unskilled worker, and lower income), body weight status (overweight or obese), health behaviour (physical inactivity), genetic history of hypertension and psychosocial stress, have

been identified, which can help in guiding intervention programmes. Interventions programmes are urgently needed that can enhance knowledge of hypertension, its risk factors and associated dangers, and increase the access of adults towards high blood pressure treatment

Since most of these risk factors are modifiable thus health behaviour interventions need to be operated at every community, public places, offices, industries schools etc so that early preventive measures can curb the problem at infancy stage as such programmes are known to be effective in reducing high blood pressure levels.

Limitations

All the information assessed in this study, apart from weight, height and blood pressure measurements, was based on self-reporting. It is possible that certain behaviours were over- or underreported. Our reading was based on blood pressure measurements at a single point.[47] due to over crowding in out patient facility. The ICMR guidelines for diagnosis of hypertension require a minimum of 2 sets of readings on 2 different occasions.[48] However, single blood pressure measurements have been used in surveillance studies globally, and this approach offers consistency and comparability across studies. Since study was conducted on subjects attending health care facility from various regions and districts so they would have varied by their demographic profile, dietary habits, living standards, health-seeking behaviors, and availability of health care facilities. Prior and recent data shows that there are between-district differences in health-seeking behaviors across India.[49]

Another limitation was that salt intake and type of food consumed, gender and place of residence, type of family which are determinants of hypertension, were not assessed in this study. Further, it was a cross-sectional study and causal relationships between risk factors and the development of hypertension could not be established.

Implications

The present results could lay an important foundation for future studies on population-based strategies, such as policy-mandated reductions in the salt content of packaged foods, food labeling, low sodium or salt substitutes, reducing particulate exposure, and improved built environments. Door to door surveys are required where blood pressure measurements can be conducted as per ICMR guidelines and information can be collected at their discretion which could bring change in their health behavior thus can enhance positive health outputs.

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