

Original Article

An epidemiological study of dietary and exercise habits as correlates of hypertension in persons aged 45 years and above in Agra District.

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Abstract:

Background: Due to changing lifestyle in Indian population prevalence of hypertension is increasing which needs modification in dietary and exercise habit of the general population.

Objective: A study was designed to correlate dietary and exercise habits with hypertension in general population.

Material and methods: Present study is a community based cross sectional study among persons aged more than 45 years in Agra district using PPS multi stage simple random sampling technique with a sample size of 553, which includes 260 persons from urban and 293 persons from rural area.

Results: Out of 544 persons studied, overall prevalence of hypertension was found to be 36.21% which was 41.47% in urban and 31.47% in rural areas. Prevalence decreases significantly in person engaged in heavy physical activity (14.54%). Hypertension is more prevalent in non vegetarian diet (44.26%) as compared to vegetarian (33.88%) and very high in population consuming extra salt (73.77%).

Conclusion: Prevalence of hypertension in this study is 36.21% and increases with lack of exercise and yoga, non vegetarian diet and consumption of extra salt in diet

Keywords:- Hypertension, Diet, Exercise, Salt, physical activity

Introduction :

Presently India is facing not only the epidemic of diabetes, CAD and obesity but also the epidemic of hypertension. Recently conducted CUPS study shows prevalence of hypertension as 22.80% in men and 19.70% in women. Hypertension has become a major cause of morbidity and mortality worldwide and is now ranked third as a cause of disability adjusted life years¹. Lifestyle modification is the best approach to prevent the development of hypertension (European Hypertension Society). In India management of hypertension by pharmacological methods is still a dream with such a high prevalence of hypertension as shown by CUPS study. Out of 8 hypertensive patients in India only 1 is optimally treated by pharmacological method. Study of dietary and exercise habits in relation to hypertensive patients works as a secondary prevention step for the development of future complications associated with hypertension. Hypertension is associated with increased risk of stroke, CAD and chronic renal disease. The World Health Report states that elevated blood pressure alone contributes to about 50% of cardio vascular diseases worldwide². Furthermore the risk of CVD starts even at the upper limit of normal level of blood pressure³.

A greater understanding of the risk factors that account for the increase in hypertension could potentially contribute to its future prevention by addressing its root cause. There is an urgent need to reduce the prevalence of hypertension which can be done by mass education programmes amongst general population regarding the risks of hypertension and the role of lifestyle modifications to control it. So keeping this in view we conducted epidemiological study in this population group in Agra district to know the association of various risk factors with hypertension among this population.

Material and Methods:

The present study is a community based, cross sectional study carried from March 2009 to August 2010 among persons aged 45 years and above from one urban and one rural locality of Agra district using PPS, multistage simple random sampling technique. Taking the reference of 45% prevalence of hypertension in age 45 years & above population according to CURES-52 study⁴ in 2007, a sample size of 213 persons was calculated, however keeping in mind the ratio of 47:53 in urban and rural population including 20% dropout & non respondents, the sample

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size was increased to 260 in urban area and 293 in rural area. Thus a total of 553 persons were included in the study and excluding 2 non respondents from urban area & 7 from rural area, the information from a total of 544 respondents was analyzed.

In first stage, one urban ward (Balkeshwar) & one rural block (Saiyan) was selected randomly from the list of urban wards and rural blocks. In second stage one urban locality (New Adarsh Nagar) from the selected ward and one village (Tehra) from the Saiyan block were selected by random sampling method. In third stage, all the households in selected areas having persons aged 45 years & above, fulfilling the selection criteria were included in the study. The households were visited personally by the surveyor following the left hand rule, and after taking the consent of the participant the information was entered on a predesigned, pretested, semi structured schedule from each of the participants. The survey in the area was terminated on achieving the required sample size. Data thus collected was analyzed using suitable statistical test with the help of Microsoft Excel 2007.

Selection criteria:

1. Inclusion criteria: All male & female aged 45 years & above, who gave consent for participation in the study after explaining the purpose of the study.
2. Exclusion Criteria:
 - a) Persons aged 45 years and above, who did not give their consent for participation in the study.
 - b) Persons who were seriously ill/hospitalized.

Results:

Out of 544 persons studied, 258(47%) were from urban area and 286(53%) were from rural area. Maximum participants were in the age group of 45-54 years and the male : female ratio was almost equal. Majority population was of Hindus (90.54%) and almost 50% of the rural population was illiterate whereas majority (39.53%) of urban population was either graduate or above. The overall prevalence of hypertension was found to be 36.21% which was 41.47% in urban and 31.47% in rural area.

The prevalence of hypertension decreased significantly ($p<0.001$) from 52.55% in persons engaged in mild physical activity to 14.54% in persons engaged in heavy physical activity. Very significantly ($p<0.005$) lower prevalence of hypertension (27.17%) was seen in people doing regular exercise as compared to those not doing exercise at all (40.43%).

Significantly ($p<0.05$) lower prevalence of hypertension was seen in those doing exercise for >30 minutes regularly (17.46%) and those practicing yoga (22.35%).

Hypertension is more prevalent among non vegetarians (44.26%) as compared to the vegetarians (33.88%) difference being statistically significant ($p<0.05$). Though lower prevalence of hypertension(33.07%) was seen the those consuming fruits or fruit juice 1-3 times/day as compared to those not consuming fruits at all or occasionally (31.17%) but this difference was not significant statistically ($p>0.05$). Similarly no significant association of hypertension was seen with consumption of milk products.

Significantly higher prevalence of hypertension was seen in those consuming sweets for 1-3 times/week regularly(49.23%) as compared to those not consuming sweets at all or only occasionally (33.57%)(<0.005). Very high(almost double i.e. 62.5%) prevalence of hypertension was seen in those consuming fast foods as compared to those not consuming fast foods(34.87%). This difference was highly significant ($p<0.001$), however no significant difference was seen with the frequency of consumption of fast foods.

The extra salt consumption was defined as those individuals who ate more than two pinches of salt per meal excluding the previously added salt to meal during preparation. Significantly very high prevalence of hypertension (73.77%) was seen in those participants who were consuming extra salt as compared to those not consuming extra salt. Though there was an increased prevalence (76.47%) with the consumption of extra salt in more quantity as compared to those consuming less quantity of extra salt 68.18% but this difference was not significant statistically.

The prevalence of hypertension was very high (54.46%) in those consuming animal fats & hydrogenated oils as main cooking medium, as compared to those using vegetable oils (25.25%) or mixture of both (37.39%) as main cooking medium and this difference was found to be highly significant. Also highly significant higher prevalence of hypertension was seen with the increased amount of oil use as it varied from 51.5% among those consuming > 2 tablespoons/day to 31.25% in those consuming <2 tablespoon/day.

Table - 01

Correlation of hypertension with physical activity, Exercise and Yoga

	Urban (N = 258)			Rural (N = 286)			Total (N = 544)		
Variables	N.	HTn.	%	N.	HTn.	%	N.	HTn.	%
Type of physical work									
Mild	81	44	54.32	56	28	25.0	137	72	52.55
Moderate	165	60	36.36	132	49	37.12	297	109	36.70
Heavy	12	3	25.0	98	13	13.26	110	16	14.54
Chi Square test	$\chi^2=8.62$, df=2, p<0.05			$\chi^2=25.93$, df=2, p<0.001			$\chi^2=38.23$, df=2, p<0.001		
Exercise									
Yes	120	36	25.0	53	11	20.75	173	47	27.17
No	138	71	51.45	233	79	33.90	371	150	40.43
	$\chi^2=12.17$, df=1, p<0.001			$\chi^2=3.46$, df=1, p>0.05			$\chi^2=8.99$, df=1, p<0.005		
Duration/day									
<30 Min.	91	31	34.06	19	5	26.31	110	36	32.73
≥30 Min.	29	5	17.24	34	6	17.64	63	11	17.46
Chi Square test	$\chi^2=2.96$, df=1, p>0.05			$\chi^2=0.56$, df=1, p>0.05			$\chi^2=4.72$, df=1, p<0.05		
Practice of Yoga									
Yes	81	18	22.22	4	1	25.0	85	19	22.35
No	177	89	50.28	282	89	31.56	459	178	38.78
Chi Square test	$\chi^2=18.03$, df=1, p<0.001			$\chi^2=0.08$, df=1, p>0.05			$\chi^2=8.38$, df=1, p<0.005		
Total	258	107	41.47	286	90	31.47	544	197	36.21

Table - 02

Correlation of hypertension with type of diet and vegetables & fruits intake

	Urban (N = 258)			Rural (N = 286)			Total (N = 544)		
Variables	N.	HTn.	%	N.	HTn.	%	N.	HTn.	%
Type of Diet									
Veg.	196	80	40.81	226	63	27.86	422	143	33.88
Non-Veg.	62	27	43.54	60	27	45.0	122	54	44.26
Chi Square test	$\chi^2=0.14$, df=1, p>0.05			$\chi^2=6.45$, df=1, p<0.05			$\chi^2=4.41$, df=1, p<0.05		
Fruit & Fruit Juice use									
No/ Occasionally	151	70	46.35	266	85	31.95	417	155	37.17
1-3 time/day	107	37	34.58	20	5	25.0	127	42	33.07
Chi Square test	$\chi^2=3.58$, df=1, p>0.05			$\chi^2=0.42$, df=1, p>0.05			$\chi^2=2.17$, df=1, p>0.05		

Table - 03

Correlation of hypertension with consumption of milk, sweets & fast foods

	Urban (N = 254)			Rural (N = 286)			Total (N = 544)		
Variables	N.	HTn.	%	N.	HTn.	%	N.	HTn.	%
Milk & milk products									
No	16	7	43.75	41	15	26.58	57	22	38.59
Yes	242	82	33.88	245	75	30.61	487	157	32.24
Quantity/ day									
< 250 ml	201	68	33.83	112	36	32.14	313	104	33.23
> 250 ml	41	14	34.14	133	39	29.32	174	53	30.46
Chi Square test	$\chi^2=3.20$, df=1, p>0.05			$\chi^2=0.58$, df=1, p>0.05			$\chi^2=0.93$, df=1, p>0.05		
Sweets									
No/ Occasionally	167	60	35.93	247	79	31.98	414	139	33.57
1-3 time/week	91	47	51.64	39	17	43.58	130	64	49.23
Chi Square test	$\chi^2=6.00$, df=1, p<0.05			$\chi^2=2.03$, df=1, p>0.05			$\chi^2=10.37$, df=1, p<0.05		
Fast foods									
No	211	83	39.33	285	90	31.57	496	173	34.87
Yes	47	30	63.82	1	0	0	48	30	62.5
Frequency/week									
<2 time/week	41	25	60.97	1	0	0	42	25	60.97
≥ 2time/week	6	5	83.33	0	0	0	6	5	83.33
Chi Square test	$\chi^2=9.53$, df=1, p>0.005			$\chi^2=0.46$, df=1, p>0.05			$\chi^2=14.27$, df=1, p<0.001		
	χ^2 (frequency)=1.13 d=1, p>0.05						$\chi^2=9.53$, df=1, p>0.005 df=1, p>0.05		

Table - 04
Correlation of hypertension with consumption of extra salt, type of oils & fats

	Urban (N = 258)			Rural (N = 286)			Total (N = 544)		
Variables	N.	HTn.	%	N.	HTn.	%	N.	HTn.	%
Consume extra salt									
No	236	90	38.13	247	62	25.1	483	152	31.47
Yes	22	17	77.27	39	28	71.79	61	45	73.77
Chi Square test	$\chi^2=12.70$, df=1, p<0.001			$\chi^2=34.05$, df=1, p<0.001			$\chi^2=41.95$, df=1, p<0.001		
Odds ratio:	OR=5.51			OR=7.59			OR=6.12		
Quantity of extra Salt/day									
< 5 gm	17	11	64.70	27	19	70.37	44	30	68.18
> 5 gm	5	4	80.0	12	9	75.0	17	13	76.47
Chi Square test	$\chi^2=0.42$, df=1, p>0.05			$\chi^2=0.09$, df=1, p>0.05			$\chi^2=0.41$, df=1, p>0.05		
Main cooking medium									
(a)Vegetable oils	92	24	26.09	110	27	24.54	202	51	25.25
(b)Animals fats & hydrogenated oil	56	32	57.14	56	29	51.79	112	61	54.46
(c)a+b	110	51	46.36	120	34	28.33	230	86	37.39
Chi Square test	$\chi^2=23.63$, df=2, p<0.001			$\chi^2=39$, df=2, p<0.001			$\chi^2=26.74$, df=2, p<0.001		
Quantity/day									
<2 tablespoon	216	87	40.28	200	43	21.5	416	130	31.25
> tablespoon	42	19	45.28	86	47	54.65	128	66	51.56
Chi Square test	$\chi^2=0.36$, df=1, p>0.05			$\chi^2=30.65$, df=1, p<0.001			$\chi^2=17.52$, df=1, p<0.001		

Discussion:

Overall prevalence of hypertension in present study was 36.21% which was 41.47% in urban and 31.47 in rural areas. Hypertension was found to be increasing with the increase in age. Study by Singh S.K. et al (2009)⁵ reported that the prevalence of hypertension was 32.8% in the urban

population and 14.5% in the rural population. Low prevalence of hypertension in this study is probably due to the fact that the lower age groups (20 years and above) were included in the study as compared to current study (45 year and above). Study by Chandwani H et al⁶ from Jamnagar (2007) documented the prevalence of hypertension

as 37.7% in 40 years and above aged population in the sampled group. Similarly the study by Hazarika N.C et al (2004)⁷ reported overall prevalence of hypertension in men as 33.2% and in women as 33.4%. This higher prevalence of hypertension is more as compared to recently conducted CUPS study which shows prevalence of hypertension as 22.8% in men and 19.7% in women. Probably this increased prevalence of hypertension in north Indian population is due to poor dietary and exercise habits as compared to south Indian population which was the main target of CUPS study. Prevalence of hypertension significantly decreased in persons engaged in heavy physical activity (14.54% in our study) and the prevalence increased with decrease in physical activity i.e. 36.70% in moderate physically active person and 52.55% in mild physically active persons. Similarly, Shiv Ram Krishna H. R. et al (2009)⁸ documented that the prevalence of hypertension in sedentary subjects was 39.39%. Among mild physical activity subjects it was 55.10% and among moderately active subjects it was 20.69% while among vigorously active subjects it was 4.92%. Increase in aerobic physical activity such as brisk walking and swimming has shown to lower BP. This reduction is independent of weight loss. It is recommended that a person should exercise for at least 30 minutes in a day and at least for 5 days a week. Most important dietary habits which are a risk factor for hypertension in our study is extra salt consumption. Very high prevalence of hypertension is noted in this group (73.77%). Study by Todkar S. S. et al (2006)⁹ reported the high prevalence of hypertension in extra salt consumer (28.99% vs. 6.02%). Study by Chandwani H. et al⁶ (2007) from Jamnagar reported that hypertension was 42.34% in those using extra salt. Similarly a study by Mandal P. K. et al (2010)¹⁰ from Kolkata reported that hypertension was 56% in those using extra salt. Avoidance of habit of use of extra salt on dining table and avoiding use of food high in sodium content like pickle, papad and chutney and processed and junked foods are some of the useful measures to reduce the sodium content in diet in Indian circumstances. In our study prevalence of hypertension is very high (54.46%) in the population groups which are consuming hydrogenated fat and animal fat as main cooking medium. Similarly higher prevalence of hypertension is also noted in those groups which have lesser intake of fruits in their diet and who consume sweets and fast food and are non vegetarian. Similar study by Chandwani H et al⁶ (2007) from Jamnagar reported that higher prevalence was found among those with a non vegetarian diet and high saturated fat intake. Ideally these patients are advised to adopt a DASH

diet plan (dietary approach to stop hypertension). Indian equivalent of DASH consists of diet rich in fruits, grains (chapatti), dairy products such as milk and curd, vegetables. It can cause approximately 8-14mm Hg reduction in systolic BP.

Conclusion:

The overall prevalence of hypertension in the study subjects was 36.21%. The prevalence of hypertension increased with sedentary life style, lack of exercise & yoga, non vegetarian diet, consumption of sweets, fast foods, extra salt and fat oils of animal origin in large quantities.

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