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Relationship Of Hypertension And Daily Consumption Of Salt And Edible Oil In Kashmiri Population

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ABSTRACT

A community based cross-sectional descriptive study was carried out to assess the relationship of consumption of salt and edible oil & hypertension in kashmiri population. The study was taken from Oct. 2012 to Sept. 2013 in District Pulwama.. The sampling method used was multistage ,10% villages from each block were taken for study using population proportion to size method (PPS). From each selected village 5% households were taken by systemic random method for the study. Minimum sample required was calculated .We have taken a sample size of 2100, out of which 1007 participants were males and 1093 participants were females. In each household, inmates of age 18 years and above were screened for hypertension. Those found fulfilling the inclusion criteria laid down for hypertension (JNC-VII 2003) were subjected to pretested questionnaire and two blood pressure readings were taken. In results; The overall prevalence was 14.56%, 13.8% in males and 15.3% in females.4.84%, 8.5% and 6.8% females were in pre-hypertension, stage-I and stage-II hypertension respectively.Among males 4.76% in pre-hypertension, 6.5% in stage-I and 7.3% were with hypertension. Pre-hypertensives are consuming about 7.58gms(mean), stage-I 7.94gms and stage-II 10.30gms of salt per 24 hours(/day). Pre-hypertensive subjects were consuming 3.92 cups of salt tea, Stage-I hypertension on average 4.89 cups of salt tea and in stage-II were consuming 7.35 cups The mean edible oil consumption per day, per subject in the study was 35.04 grams for pre-hypertensives, 37.61 grams for stage-I hypertensives and 49.62 grams for stage-II hypertensives.

KEY WORDS: *District Pulwama, hypertension, Prevalence*

INTRODUCTION

Almost 1 billion people worldwide have high blood pressure, and over half a billion more will have this silent killer by 2025.It translates into millions of deaths from heart disease alone. The dangers go well beyond the heart, High blood pressure is a leading cause of strokes and kidney failure. It also plays a role in blindness and even dementia. It has been estimated that hypertension accounts for 6% of deaths worldwide[1].

Cardiovascular diseases caused 2.3 million deaths in India in the year 1990; this is projected to double by the year 2020[2]. There is a strong correlation between changing lifestyle factors and increase in hypertension in India. The first meaningful scientific evidence for a positive association between salt consumption and level of blood pressure was published by Dahl in 1960.[3]Dahl described a remarkable linear relationship between average sodium intake and prevalence of hypertension across five population groups.[1]Since then, abundant evidence of a causal association between dietary sodium intake and high blood pressure has emerged from animal experiments and from observational epidemiological studies and randomized controlled clinical trials.[4,5]The Nature of genetic contribution and gene environment interaction in accelerating the hypertension epidemic in India needs more studies.

Pooling of epidemiological studies shows that hypertension is present in 25% urban and 10% rural subjects in India. At an underestimate, there are 31.5 million hypertensives in rural and 34 million in urban populations. A total of 70% of these would be Stage I hypertension (systolic BP 140-159 and/or diastolic BP 90-99 mmHg). Recent reports show that borderline hypertension (systolic BP 130-139 and/or diastolic BP 85-89 mmHg) and Stage I hypertension carry a significant cardiovascular risk and there is a need to reduce this blood pressure[6].Control of the cardiovascular diseases will require modification of risk factors that have two characteristics.

First, the risk factor must have high attributable risk or high prevalence or both, and secondly, most or all of the risks must be reversible cost-effectively. Blood pressure is directly associated with risks of several types of cardiovascular diseases, and the associations of BP with disease risk are continuous with large proportions of most populations having non-optimal blood pressure values. Moreover, most or all BP-related risks appear to be reversible within a few years with inexpensive interventions. In India cardiovascular diseases cause 1.5 million deaths annually. Hypertension is directly responsible for 57% of all stroke deaths and 24% of all coronary heart disease deaths. This fact is important because hypertension is a controllable disease and a 2 mm Hg population wide decrease in BP can prevent 151,000 stroke and 153,000 coronary heart disease deaths. [7]

Hypertension is one of the most important modifiable risk factors for CHD in western and Asian population Studies from India and Bangladesh have shown an increasing trend in the prevalence of hypertension

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. Prevalence of hypertension is 20% worldwide, 27-30% in India.

Average systolic blood pressure is higher for men than for women during early adulthood, although among older individuals the age-related rate of rise is steeper for women. Consequently, among individuals age 60 and older, systolic blood pressures of women are higher than those of men. Among adults, diastolic blood pressure also increases progressively with age until 55 years, after which it tends to decrease. The consequence is a widening of pulse pressure (the difference between systolic and diastolic blood pressure) beyond age 60.

Both environmental and genetic factors may contribute to variations of blood pressure and hypertension prevalence. Hypertension is present in all populations except for a small number of individuals living in primitive, culturally isolated societies. Studies of societies undergoing "acculturation" and studies of migrants from a less to a more urbanized setting indicate a profound environmental contribution to blood pressure. Among populations, hypertension prevalence is related to dietary NaCl intake, and the age-related increase of blood pressure may be augmented by a high NaCl intake. Low dietary intakes of calcium and potassium may also contribute to the risk of hypertension. There are other environmental factors too that may contribute to hypertension. Hypertension represents a polygenic disorder in which a single gene or combination of genes act in concert with environmental exposures to contribute effect on blood pressure[8].Kashmir is not far behind regarding the increased prevalence of hypertension. The earlier studies from the Valley, showing the prevalence of hypertension may not hold true now.Prevalence of hypertension was assessed in District Pulwama & is about 32 kilometres from Srinager city[9].

Methodology

A community based cross-sectional descriptive study was carried out to assess the relationship of hypertension and daily consumption of salt and edible oil in kashmiri population.The study was taken from Oct. 2012 to sep. 2013.

Selection of population

District Pulwama was undertaken for the study , the total population of District Pulwama is 4,57,883 , approximatly 56% of this population comprise 18 years and above population which is 2,56,414 [9].

Sampling method

The sampling method used was multistage, list of all villages of each block was obtained from respective block headquarters (BMO's office) with population of each village and a cumulative population list was

calculated for each Block. 10% villages from each block were taken for study using population proportion to size method (PPS). From each selected village 5% households were taken by systemic random method for the study**.** Minimum sample required was calculated using formula, $n = Z^2 \times P(1-P)/d^2$, where, Z = 1.96(with 95% confidence interval), P = 13% (prevalence), d is (precision) ±5% = 5% (0.05), which makes 774 participants. We have taken a sample size of 2100, out of which 1007 participants were males and 1093 participants were females. In each household, inmates of age 18 years and above were screened for hypertension. Those found fulfilling the inclusion criteria laid down for hypertension (JNC-VII 2003) were subjected to pretested questionnaire about salt intake , number of cups of salt tea , use of edible oil and two blood pressure readings were taken 10 minutes apart, by mercury sphygmomanometer which was standardised. Both blood pressure measurements were taken after the subject was resting for at least 5 minutes in a sitting position. Blood pressure measurements were obtained on the right arm using a cuff of appropriate size and with instrument at the level of the heart. The cuff pressure was inflated 30mmHg above the level at which the radial pulse disappears, then deflated slowly at the rate of 2 mmHg per second and the readings recorded to the nearest 2 mmHg. The first and the fifth Korotkoff sounds were taken as indicative of the systolic and diastolic blood pressure respectively. The average of the two readings of systolic and diastolic blood pressure was used as the blood pressure of the participant.

Definition: Blood pressure is pressure exerted on the vessel wall, **normal** systolic < 120mmHg and diastolic <80mmHg. **Pre-hypertension** 120-139 mmHg systolic and 80-89mmHg diastolic. **Stage-I Hypertension** 140-159 mmHg systolic and 90-99mmHg diastolic. **Stage-II hypertension systolic** ≥ 160 mmHg and diastolic ≥ 100 mmHg [10] .

TABLE 1

JNC-VII classification	**Systolic blood pressure**	**Diastolic blood pressure**
Normal	≤ 120 mmHg	≤ 80 mmHg
Pre-hypertension	120-139 mmHg	80-89 mmHg
Stage-1	140-159mmHg	90-99mmHg
Stage-2	≥ 160mmHg	≥ 100mmHg

TABLE 2 : **POPULATION CHARACTERISTICS OF THE STUDY**

Population characteristics (%)	
Total population screened	2100 participants
Males	1007 (48%)
Females	1093 (52%)
Overall prevalence of hypertension	306 (14.56%)
Prevalence in males	139 (13.8%)
Prevalence in females	167 (15.3%)

Table:3. **Distribution of hypertension (stage-I+stage-II), as per JNC-7, in the sample screened (2100 participants), males (1007 participants) and females (1093 participants)**

SEX	n	**JNC-7 Classification**				(Stage-I + Stage-II) Hypertension
		Normal BP	**Pre-Hyper-tension**	**Stage-I**	**Stage-II**	
Female	1093	873 (79.87)	53 (4.84)	93 **(8.5)**	74 **(6.8)**	167 **(15.3)**
Male	1007	820 (81.42)	48 (4.76)	65 **(6.5)**	74 **(7.3)**	139 **(13.8)**
Total	2100	1693 (80.61)	101 (4.80)	158 (7.52)	148 (7.04)	306 **(14.56)**

χ^2=3.352, df=3, sig= 0.340

The total population screened in District Pulwama (2100), 1007 males and 1093 females. The males(1007), 820(81.42%) were with normal blood pressure, 48(4.76%) pre-hypertensive and 139(13.8%) with hypertension.In females(1093), 873(79.87%) were with normal blood pressure , 53(4.84%) pre-hypertensive and 167(15.3%) with hypertension.The overall prevalence of hypertension was 14.56%, 13.8% in males and 15.3% in females. Stage-1 hypertension was observed more in females (8.5%) than males(6.5%), while as stage-II hypertension was more in males (7.3%) as compered to females (6.5%).

Table: 4. **Distribution of hypertension among sample population who fulfilled the criteria(JNC-VII), (407) , as per their gender.**

SEX		TOTAL	JNC-7 CLASSIFICATION			(Stage-I+stage-II)
			pre-hypertension	**stage-I**	**stage-II**	Hypertension
	Female	220 (54.05)	53 (52.47)	93 **(58.88)**	74 **(50)**	167 **(54.47)**
	Male	187 (45.94)	48 (47.52)	65 **(41.13)**	74 **(50)**	139 **(45.42)**
Total		407 (100)	101 (100)	158 (100)	148 (100)	306 (100)

χ^2=2.551, df= , sig= 0.279

The distribution of pre-hypertension among sample population who fulfilled the criteria of JNC-VII was 53(52.47%) in females and 48(47.52%) males. Likewise hypertension 167(54.47%) in females and 139(45.42%) in males.

The distribution of stage-I hypertension was more among females (58.88%) as compared to males (50%), while the distribution of stage-II hypertension was more in males (50%) as compared to females (41.13%).

Table:5 PREVALENCE OF BLOOD PRESSURE AS PER AGE GROUPS

SEX					**JNC-7 CLASSIFICATION**			
			n	**NORMAL BP**	**pre-hypertension**	**stage-I**	**stage-II**	**HTN (stage-I+stage-**

								II)
Male	**AGE GROUPS**	**18-31**	400	386 (96.5)	9 (2.25)	4 (1.0)	1(0.25)	5 **(1.25)**
		32-45	289	262(90.65)	13 (4.49)	1(0.34)	13(4.49)	14**(4.84)**
		46-59	174	151(86.78)	7 (4.02)	9(5.17)	7 (4.02)	16**(9.19)**
		>=60	144	21 (14.58)	19 (13.19)	51(35.41)	53(36.80)	104**(72.22)**
	Total		1007	820	48	65	74	139
Female	**AGE GROUPS**	**18-31**	441	412(93.42)	14 (3.17)	12 (2.72)	3 (0.68)	15 **(3.40)**
		32-45	331	279(84.29)	16 (4.83)	23 (6.94)	13 (3.92)	36 **(10.87)**

		46-59	185	139(75.13)	7 (3.78)	25(13.51)	14 (7.56)	39 **(21.04)**
		>=60	136	43 (31.61)	16 (11.76)	33(24.26)	44(32.35)	77 **(56.61)**
	Total		1093	873	53	93	74	167

χ^2= 547 df= 9 sig=0.000(males), χ^2=291 df= 9 sig=0.000(females)

Males: Out of 400, in 13-30 age group, 5(1.25) were hypertensive. In

289, in 32-45 age group 14(4.84) were hypertensive. In 174, 46-59 age group, 16(9.19) were hypertensive. In 144, ≥60 age group, 104(72.22) were hypertensive. 2) Females :Out of 441, in the age group of 18-31, 15(3.40) were hypertensive. In the age group of 32-45, 36(10.87) were hypertensive. Out of 185, 46-59 age

group, 39(21.04) were hypertensive. Also in the age group of ≥60, study subjects 136, 77(56.61) were hypertensive.

SALT TEA (No of cups, 24 hrs)		**n**	**Mean**	**Std. deviation**	**Std. Error**	**95% Confidence Interval for Mean**		**Sig.**
	Pre-Hypertension	101	3.92	1.681	.336	3.23	4.61	0.000
	Total	**407**	5.92	2.462	.135	5.66	6.19	

Table: 6. Number of cups of **SALT TEA** (**noon chaie**)and blood pressure

Pre-hypertensive subjects were consuming 3.92 cups of salt tea, Stage-I hypertension on average 4.89 cups of salt tea and in stage-II were consuming 7.35 cups.(statistical test used ANOVA)

OIL(24 hrs) in gms		Total	Mean	Std. deviation	Std. Error	95% Confidence Interval for Mean		Sig.
						Lower Bound	Upper Bound	
	Stage-II	148	49.62	12.487	1.023	47.60	51.64	0.000
	Pre-Hypertension	101	35.04	10.126	2.025	30.86	39.22	0.000
	Total	407	42.82	13.357	.734	41.38	44.27	

Table: 7→ Distribution of **edible oil consumption in grams per day(24hrs).**

The statistical test used ANOVA

The mean edible oil consumption per day, per subject in the study was 35.04 grams for pre-hypertensives, 37.61 grams for stage-I hypertensives and 49.62 grams for stage-II hypertensives.

Statistical test used ANOVA

Pre-hypertensives are consuming about 7.58gms(mean), stage-I 7.94gms and stage-II 10.30gms.

DISCUSSION

The present, cross-sectional study was conducted in district pulwama of Kashmir division from oct. 2012 to sep. 2013. The total population screened was 2100, 1007 males and 1093 females. The study was conducted on 18 years and above male and female population, to find out the magnitude of hypertension and to evaluate its relationship with daily salt intake and edible oil consumption. Studies in a variety of laboratory animals have demonstrated that a high dietary intake of salt results in hypertension.[11] Recently, Denton *et al.* reported the findings of a 3-year experiment conducted in 26 chimpanzees. This experiment, conducted in the species that is phylogenetically closest to humans, provides direct evidence in favour of a causal relationship between high salt intake and hypertension.[12] Studies in low blood pressure populations and in migrants from these societies to more westernized environments provide strong evidence for a causal relationship between high salt intake and hypertension.[13,14] Typically, these populations consume less

dietary sodium than their counterparts in westernized societies.[13,14] Migration from relatively isolated societies to more westernized environments has been associated with an increase in the average level of blood pressure, a steeper slope of blood pressure with increasing age and a higher prevalence of hypertension.[13,14] We examined the effect of lifestyle change including dietary sodium intake on blood pressure in the Yi people, an ethnic minority group in Southwestern China.[14,15] Blood pressure rose very little with increasing age after puberty in the Yi farmers who lived in their natural environment in remote mountainous areas and consumed a diet low in sodium content. In contrast, Yi migrants and Han people who lived in urban areas consumed a diet which was higher in sodium content and experienced a much greater increase in blood pressure with progressive ageing.[14], These findings suggest that changes in lifestyle, including a higher intake of dietary sodium, contribute to the higher blood pressure among Yi migrants.[15]INTERSALT, a cross-sectional study of 10 074 participants from 52 populations in 32 countries reported a strong, positive association between urinary sodium excretion and blood pressure.[16]

Randomized controlled clinical trials provide unbiased evidence for a causal relationship between dietary sodium intake and blood pressure. During the past 30 years, more than 80 randomized controlled trials have been conducted & the findings in each case shows a reduced intake of dietary sodium was associated with a significant diminution in blood pressure. As expected, the effect was smaller in normotensive people compared to hypertensive patients

Several recently published trials .[17-19] like The Trial of Nonpharmacologic Interventions in the Elderly (TONE) was a randomized controlled trial designed to determine whether weight loss and/or a reduction in dietary sodium intake enhance blood pressure control and reduce the need for antihypertensive drug therapy in older people with hypertension. After 30 months, the per cent of participants who were free of an endpoint (blood pressure >150/90 mmHg, resumption of antihypertensive medication, or a blood pressure-related clinical complication) was 38% in those assigned to counselling in sodium reduction versus 24% in those assigned to usual care ($P < 0.001$). Cappuccio and colleagues conducted a double-blind crossover trial &[18] In this trial, a reduction in sodium intake of 83 mmol/day was significantly associated with a reduction of 7.2 mmHg in SBP and 3.2 mmHg in DBP

The magnitude of the blood pressure reduction resulting from a lowering of dietary sodium varies among different population subgroups. The proportion of salt-sensitive and salt-resistant individuals has varied from one study to another based on the definition of salt-sensitivity and the methods used to assess its presence or absence.[20] Both genetic and environmental factors may play an important role in determining salt-sensitivity.[20,21] Due to the technical difficulties of performing such studies, population-based investigations to assess the frequency of salt-sensitivity in the general population have not been conducted. Based on the available data, however, a majority of hypertensive and normotensive people respond to sodium reduction. Therefore, one could expect that salt-sensitivity is a common phenomenon in human populations.

An intervention to lower blood pressure in the general population should not only result in a substantial reduction in the prevalence of hypertension but also a large decrease in cardiovascular risk. Cook and colleagues examined the potential impact of a population-wide reduction in blood pressure using data from the Framingham Heart Study and the National Health and Nutrition Examination Survey II.[22] According to their estimates, a population-wide reduction in DBP of as little as 2 mmHg should result in a 17% reduction in the prevalence of hypertension, a 15% reduction in the risk of stroke and transient ischaemic attack and a 6% reduction in the risk of coronary heart disease.[22] Further, they estimated that this blood pressure reduction should prevent 93% of the strokes and transient ischaemic attacks, as well as 100% of the incident coronary heart disease events that could be prevented by treatment of all hypertensive patients with antihypertensive drug therapy.[22] The results underscore the potential value of complementing traditional hypertension detection and treatment approaches with public health interventions aimed at achieving a slight downward shift in the blood pressure of the general population.[23]

Edible oil consumption:

The mean edible oil consumption per day, per subject in our study was 35.04 gms for pre-hypertensives, 37.61 grams for stage-I hypertensives and 49.62 grms for stage-II hypertensives.

Kripa Ram et al[24], jully 2010, studied desert population of INDIA,observed 32.3 ± 14.9 gram/day.

Mean blood pressure:

The mean systolic blood pressure in pre-hypertension is 129±2.32 mmHg, spread of 5.613 SD and diastolic mean of 85±1.37 with 3.318 SD.

Mean stage-I systolic blood pressure was 144±0.77, SD 4.896 and diastolic was 92±0.56 mmHg, SD 3.546.

The mean for stage-II systolic blood pressure was 171±2.45 mmHg , SD 15.178, diastolic 105±1.33 , SD 8.246.

SUMMARY & CONCLUSION

The overall prevalence was 14.56%, 13.8% in males and 15.3% in females.4.84%, 8.5% and 6.8% females were in pre-hypertension, stage-I and stage-II hypertension respectively.Among males 4.76% in pre-hypertension, 6.5% in stage-I and 7.3% were with hypertension. Pre-hypertensive subjects were consuming 3.92 cups of salt tea, Stage-I hypertension on average 4.89 cups of salt tea and in stage-II were consuming 7.35 cups. The mean edible oil consumption per day, per subject in the study was 35.04 grams for pre-hypertensives, 37.61 grams for stage-I hypertensives and 49.62 grams for stage-II hypertensives . Pre-hypertensives are consuming about 7.58gms(mean), stage-I 7.94gms and stage-II 10.30gms.Evidence from animal experiments, observational studies, and randomized controlled trials provide overwhelming support

for a causal relationship between dietary sodium intake and elevated blood pressure. Three large meta-analyses have provided consistent evidence of blood pressure lowering following a reduction in dietary sodium intake. In addition, results from the large TONE and a recent trial by Cappuccio *et al*., provide additional confirmation that sodium reduction significantly lowers blood pressure in both hypertensive and normotensive populations.

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