



RESEARCH ARTICLE

**PREVALENCE OF HYPERTENSION AND OBESITY IN THE OLD AGED SUBJECTS
BELONGING TO THE REGION OF DELHI (NCR)**

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ABSTRACT

According to WHO, Hypertension is a condition in which the blood vessels have persistently high pressure. Normal adult blood pressure is 120mm Hg when the heart contracts (systolic) and 80mm Hg when the heart relaxes (diastolic). When systolic pressure is equal to or above 140mm Hg and diastolic pressure is equal to or above 90mm Hg the blood pressure is considered to be raised or high (WHO, 2015). Obesity is also a major contributing factor towards hypertension. There are at least 970 million obese people worldwide with elevated blood pressure (World Heart Federation, 2015). Looking at the severity of its occurrence a need was felt to conduct a study on hypertension in subjects belonging to the region of Delhi (NCR). Dietary interventions particularly potassium intakes have demonstrated their ability to reduce blood pressure in humans. The present study was carried out on 40 hypertensive patients belonging to the region of Delhi (NCR). The general information, medical history and dietary survey was collected through interview cum questionnaire method. The Blood pressure was measured by Sphygmomanometer. The subjects were having very high BP than prescribed normal range by WHO. The mean nutrient intake viz. calories, protein, fat, carbohydrate, sodium was calculated by seven day dietary recall method. It was found that hypertensive subjects were taking more amount of sodium in their diets. The BMI of the subjects was calculated and they were categorized according to grades of obesity. Therefore it was concluded that the subjects having high BMI were suffering from hypertension. The knowledge of nutrition education and diet was imparted for the prevention and control of hypertension.

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INTRODUCTION

Hypertension is an interesting disease entity of its own. It remains silent, being generally asymptomatic during its clinical course. As it is hidden beneath an outwardly asymptomatic appearance, the disease does immense harm to the body in the form of 'Target Organ' damage; hence, the WHO has named it the 'Silent Killer' (Yuvraj *et al.*, 2010). Hypertension stresses the body's blood vessels, causing them to clog or weaken. The goal of the American Heart Association (AHA) is to improve the cardiovascular health of all Americans by 20% till 2020 while continuing to reduce deaths from CVD and stroke by 20%. Two of the key metrics for ideal cardiovascular health are a BP of 120/80 mm Hg and sodium consumption of 1500 mg/day.

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Apart from ageing, obesity, alcohol consumption, salt sensitivity and a person's dietary choices influence hypertension risks. Nearly half of all diabetics are hypertensive (Srilakshmi, 2010). Obesity and in particular central obesity have been consistently associated with hypertension and increased cardiovascular risk. Based on population studies, risk estimates indicate that at least two-thirds of the prevalence of hypertension can be directly attributed to obesity. Obesity-related hypertension is commonly associated with further elements of the metabolic syndrome, such as insulin resistance and glucose intolerance (Narkiewicz, 2005). Excessive use of ordinary table salt is also considered as a contributory factor in hypertension. Table salt consists of over 40% of sodium and rest is chloride. Both are essential in maintaining fluid balance and thus blood pressure high prevalence of hypertension was seen in the urban and rural population of a north Indian district. Dietary modification has important therapeutic roles in blood pressure control.

Inclusion of potassium rich foods like bananas, avocados, spinach, mushrooms etc in the diet helps in lowering down BP (Ruth, 2010)

Review of literature

According to the WHO (2014) estimates, the prevalence of raised BP in Indians was 32.5%. However only about 25.6% of treated patients had their BP under control (Patil *et al.*, 2015). Data from the National Health and Nutrition Examination survey have indicated that 50 million or more Americans have high BP warranting some form of treatment. Worldwide prevalence estimates for hypertension may be as much as one billion individuals, and approximately 7.1 million deaths per year may be attributable to hypertension (2004). A high prevalence of hypertension was seen in the urban and rural population of a north Indian district. Risk factors of hypertension were age and gender in urban as well as rural population. Diabetes, higher BMI values, decreased level of physical activity and increased waist circumference also significantly contributed to the risk of hypertension, which necessitates intervention at the primary health care level for its prevention (Midha *et al.*, 2009).

The combination of obesity and hypertension is associated with high morbidity and mortality because it leads to cardiovascular and kidney disease. Potential mechanisms linking obesity to hypertension include dietary factors, metabolic, endothelial and vascular dysfunction, neuroendocrine imbalances, sodium retention, glomerular hyper filtration, proteinuria, and maladaptive immune and inflammatory responses (Marco *et al.*, 2014)

MATERIALS AND METHODS

Locale of study

The study was conducted on the subjects admitted to Hindu Rao Hospital belonging to the region of Delhi (NCR).

Selection of the subjects

- Forty subjects were selected between 50-60 years of age from the region of Delhi (NCR) suffering from severe hypertension by random sampling method.
- The height and weight of all the subjects were measured to find the obese subjects among them.
- From the above the BMI of the subjects was calculated.
- The blood pressure of the surveyed 40 patients, 20 males and 20 females was taken by Sphygmomanometer.
- The objective and the experimental protocol of the study was explained to the subjects and their prior consent was taken.

Table 1. BMI Classification

BMI	Nutritional grad	Classification
≥ 18.5 - < 20.0	Low Normal	WHO (1998)
≥ 20 - < 25.0	Normal	
≥ 25.0 - < 30.0	Over Weight	
≥ 30 - 34.9	Obesity I	
≥ 35 - 39.9	Obesity II	
≥ 40	Obesity III	

Experimental plan

The study was constituted of phases and the classification of subjects is elaborated as under.

Phase 1: These studies consist of collection of data regarding general information, physical activity pattern, health record, blood pressure levels, and assessment of nutritional status by using dietary survey and anthropometry methods. All the information was collected by interview cum questionnaire method. BMI was used to classify subjects into grades of obesity as classified by WHO (1998), it was calculated by using the formula given by Quetlet (1935)-

$$\text{Body Mass index} = \frac{\text{Weight}}{\text{Height (Meters)}^2}$$

Phase 2: In this phase the subjects were divided in two experimental groups which included:

First experimental group (E1): This group comprised of males whose blood pressure levels were elevated as identified from the sphygmomanometer. The BP vales were taken and then the dietary survey was carried out.

Second experimental group (E2): This group comprised of females whose blood pressure levels were taken and the same protocol was carried out as above.

Statistical analysis of data

The collected data were decoded. Tabulated and statistically analyzed using standard techniques such as arithmetic mean, standard deviation and average.

RESULTS AND DISCUSSION

The subjects were conscious about their high blood pressure levels. Hypertension was linked to obesity in the present study and it was seen that people with higher BMI values were found to have elevated blood pressure levels and that obesity can be a contributing factor towards hypertension and increase risk of cardiovascular diseases.

The subjects were divided into two experimental groups comprising of E1 and E2 belonging to the region of Delhi NCR. The height and weight of the subjects was measured and their BMI was calculated and thereby they were classified into grades of obesity and overweight given by WHO (1998).

Energy: The mean daily intake of energy of hypertensive males of Delhi (NCR) was 2755 ± 258.4536 respectively while the mean value of hypertensive female subjects was found to be 1930±201.783. Excessive calorie intake leads to obesity which further might cause hypertension. In the present study as well subjects being obese suffered from elevated BP levels.

Carbohydrates: The mean value of carbohydrates of hypertensive males belonging to the region of Delhi (NCR) was 364.5 ± 33.12223. Similarly the mean value of hypertensive females from Delhi (NCR) was 278.5± 25.11632.

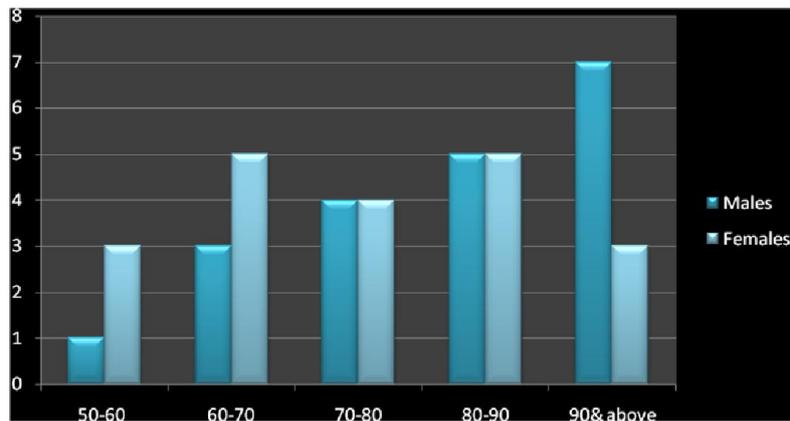


Fig 4.1. Bar graph showing the weight (kgs) of the selected subjects

Table 4.1. The average height, weight and BMI of the selected subjects belonging to the region of Delhi (NCR)

Assessment of nutritional Status	E1 Group (males) N*=20	E2 Group (females) N*=20
Average Height	166.7 ± 7.320164	158.75 ± 7.2575
Average Weight	82.25 ± 14.46916	73.75 ± 13.4642
Average BMI	29.405 ± 3.41009	29.1 ± 3.14553

N*= total number of subjects

According to average BMI the subjects were categorized as Overweight and Grade 1 obesity

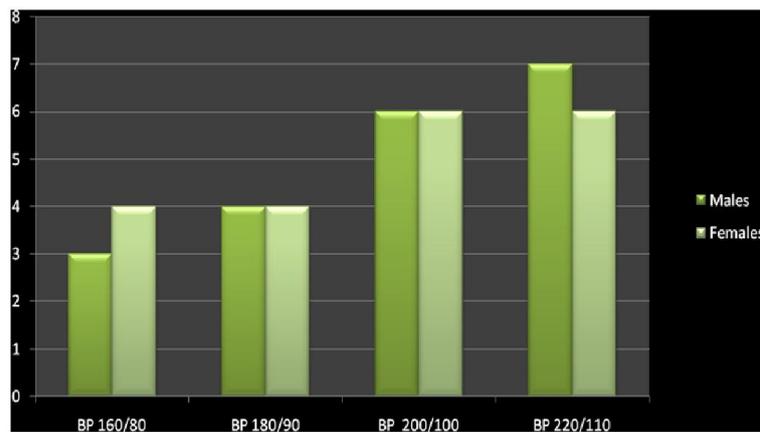


Fig 4.3. Bar graph showing the Blood pressure values of the selected subjects belonging to the region of Delhi (NCR)

Table 4.2. Mean of daily nutrient intake of the selected subjects belonging to the region of Delhi (NCR)

Nutrient	Male	Female	RDA (g/day) Males	Females
Energy(Kcal)	2755 ± 258.4536	1930 ± 201.783	2425	1900
Carbohydrates (g)	364.5 ± 33.12223	278.5 ± 25.11632	300	275
Proteins (g)	77.15 ± 11.64044	52.08 ± 7.284286	60	50
Fats and oils (g)	43.15 ± 7.255435	37.10 ± 8.387548	20	20
Sodium (mg)	2940 ± 351.5213	2480 ± 329.23	2500(mg/day)	2300(mg/day)

Proteins: The mean value of proteins of the hypertensive males belonging to the region of Delhi (NCR) was found to be 77.15 ± 11.64044 . Similarly the mean value of hypertensive females was found to be 52.08 ± 7.284286 . The proteins contribute to 4kcal/gm and a combination protein, fats and carbohydrates gives total energy value.

Fats: The fat intake of both male and female subjects was quite high as compared to RDA.

The mean value of fats for hypertensive males belonging to the region of Delhi (NCR) was 43.15 ± 7.255435 g/day. Similarly the mean value of fats intake was found to be 37.10 ± 8.387548 for hypertensive females. One gram of fat in the body contributes 9kcal so fats are dense foods.

Sodium: The mean value of sodium intake for hypertensive males was found to be 2940 ± 351.5213 and the mean value of sodium intake for hypertensive females was 2480 ± 329.23 .

The sodium intake values was more in both males and females due to higher intake of sodium rich preserved foods thereby leading to increased BP values.

Conclusion

Hypertension is reported to be the fourth contributor to premature death in developed countries and the seventh in developing countries. Heredity, obesity, smoking and stress are the predisposing risk factors in hypertension. In this study 40 subjects were taken on the basis of random sampling and then divided into 20 males and 20 females. The subjects had a high sodium intake and were mostly overweight or obese leading to increased risk of hypertension. Excessive intake of calorie dense fatty foods and sodium rich preserved foods was the main reason for hypertension. The nutrition education and planned diets was given to the hypertensive subjects.

In this study as mentioned above the seven day dietary recall of the subjects and the anthropometric measurements were taken. It was concluded that the subjects had a high salt intake leading to hypertension and also obesity was found to be a contributing factor towards hypertension. Strong evidence supports the recommendation of a diet containing high potassium, moderate alcohol, and high fiber intake. As a whole, a DASH diet pattern rich in fruits, vegetables, low-fat dairy products, whole grains, nuts, and fish with reduced amount of red meat was recommended. Moderate or low intake of fat, sugar-sweetened food, beverages, papad, chutney, Pickles and trans fats was recommended to the patients. All the patients were advised to follow Dietary Approaches to control Hypertension. Studies have shown that high intake of fruits and vegetables results in low mortality among those with stroke. Fibre and folic acid have also been associated with protection from stroke. Green leafy, cruciferous vegetables and citrus fruits in particular are found to be protective. Earlier Kempner's rice fruit diet was suggested for hypertension. This diet is very restrictive and was deficient in many nutrients (Srilakshmi, 2010). Kempner's Rice Diet program began at Duke University in Durham, North Carolina in 1939. The treatment was a simple therapy of white rice, fruit, juice, and sugar, and was reserved for only the most seriously ill patients.

Also the benefits of the Rice Diet far exceed those of any drug or surgery ever prescribed for chronic conditions, including coronary artery disease, heart and kidney failure, hypertension, diabetes, arthritis, and obesity (Dougall, 2013). We also recommended Kempner's rice fruit diet but for shorter period of time i.e. for 15 days. Further the balanced diet and low sodium diet improved the condition of the hypertensive patients. The weight reduction was also encouraged among the subjects.

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