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Original Research Article

Study of Nutritional status of Hypertensive patients

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Abstract

Hypertension has become a very important health concern nowadays. Present study was conducted on 30 hypertensive patients at Mahatma Gandhi Hospital, Jaipur. It was found from this study that hypertension occurs mostly in people of older age (60-80) but is also found in adults. The study also found that it occurs more in men than in women. Majority of the patients showed similar types of clinical signs and symptoms like weakness, headache, fatigue, vomiting, back and shoulders pain. Almost all patients were overweight. If Hypertension is not treated for a long time, It may cause further complications in form of chronic kidney disease, cardiomyopathy, diabetes etc. Causative factors seen were stress, less physical activity and faulty dietary habits. Even after being diagnosed with hypertension, most of the patients were having uncontrolled blood pressure due to unawareness of the right type of diet or due to poor diet compliance.

Keywords

Hypertension, dietary habits, sedentary lifestyle, awareness, low salt diet, sodium

Introduction

Worldwide mortality is largely attributed to hypertension nowadays which is preventable to much extent by medication and lifestyle modification.

Blood pressure (BP), can be defined as the pressure of the blood on inner arterial walls. It is produced as the left ventricle contracts in response to the resistance offered by arteries and arterioles. It is an essential body mechanism for survival. However, persistently high blood pressure (hypertension) is a matter of concern globally. Worldwide it is found to be a major risk factor for worldwide mortality (10.2 million) and morbidity (208 million) (GBD,

2016). Existing data has shown association between hypertension with increased risk of cardiovascular disease, kidney disease with increased mortality (Sun et al., 2007) (Lubrano et al., 2009) (Theodore et al., 2015). Lewington et al. (2002) reported increased risk of cardiovascular disease at systolic BP < 115 mmHg and diastolic BP < 75 mmHg in a meta-analysis of > 61 prospective studies.

Hypertension can be divided into two parts: a. Primary & b. Secondary. Primary hypertension can occur due to cardiovascular risk factors, while various factors like toxicities, iatrogenic problems and congenital diseases may be responsible for secondary hypertension.

Uncontrolled hypertension may negatively impact many organs of the human body including heart, kidneys, eyes etc. Besides this, it may also cause diabetes, metabolic syndrome, preeclampsia and erectile dysfunction also. Treatment of Hypertension lies in lifestyle modifications that includes DASH diet, weight management, physical activity and restricted smoking besides medicinal treatment.

The systolic blood pressure (SBP) or upper reading is the force felt on the inner walls of blood vessels at the time of heart contraction that is helpful in pushing blood out of the left ventricle. The lower reading or diastolic blood pressure (DBP) is the force at the time of relaxation of heart between contractions. It is measured in millimeters (mm) of mercury (Hg). Normal blood pressure in adults is 120/80 mm Hg.

	SBP (mm Hg)	**DBP (mm Hg)**
Normal	<120 mm Hg	<80 mm Hg
Elevated	120 - 129 mm Hg	>80 mm Hg
Hypertension		
Stage 1	130 - 139 mm Hg	80 - 90 mm Hg
Stage 2	>139 mm Hg	>90 mm Hg

Table 1: Categories of blood pressure in adults

Prevalence

Problem of hypertension is prevalent globally (Zhou et al., 2017). Mills et al., 2016 reported prevalence of hypertension to be >1 billion specially in developing and underdeveloped

countries. Gupta et al. (1996) identified prevalence of hypertension in India & reported an increase from 1960 (1%) to 1990 data (5 - 7%) that reached to 29.8% in 2013 (Anchala et al., 2014). A 5% rise in hypertension cases has been observed in the USA during the last decade. Rosner et al. (2013) reported an increase in cases of hypertension in adolescents as 12.6% in girls and 19.2% in boys. An Indian study showed the prevalence of hypertension as 23% among school children between the age of 5–15 years (Narang et al., 2018). Similar types of results were documented in a Chinese study by Zhai (2015). Another study from Brazil that was carried out on 794 pediatric population also reported a 7% rise in hypertension (Fuly et al., 2014), while a Japanese study showed a prevalence rate of 15.9% and 15.8% in school going boys and girls respectively (Shimabara et al., 2010).

Research Methodology

Research design

A prospective observational study was conducted on 30 patients admitted in Mahatma Gandhi Medical College and Hospital, Jaipur. Purposive sampling technique was used for sample selection until the sample size of 30 was not completed.

To collect data on nutritional status of patients suffering from hypertension, several criteria were used. After sample selection, data was gathered for general information (demographic profile) of the patients. To assess nutritional status, anthropometric measurements of the hypertensive selected subjects were taken for weight, height, waist circumference, hip circumference, MUAC, BMI and waist hip ratio. Patient's biochemical data was also gathered for reading of blood pressure, electrolytes values, HbA1c, Lipid Profile etc. Besides this, clinical signs and symptoms of the patients were also recorded for presence or absence of weakness, nausea, vomiting, diarrhea, constipation, shoulder and back pain, fatigue etc. Besides this, patient's 24 hour dietary recall was also noted to find out their intake in comparison to their requirements. Empty calorie intake of the patients was also noted in terms of consumption of sugar, oil , cold drinks, pickles, alcohol etc.

On the basis of nutritional assessment, patient's nutritional diagnosis was derived in terms of obese, overweight, underweight, malnourished and normal (Kanta and Mogra, 2022).

Phase 1: Sample selection

- Number of patients to be 30
- Technique of sample selection to be Purposive sampling technique

Inclusion criteria

- Patient should be in age group of 35-80 year
- Both male/female patients were taken
- Patients should not suffer from any other disease
- Patient should be willing to cooperate

Exclusion criteria

- Patients < 35 and > 80 years of age
- Patients suffering from chronic diseases or any other serious medical condition
- Non cooperative patients

Phase 2: Collection of patient general information or demographic details

Information regarding patient's name, age/sex, educational status, occupational level, activity status, marital status were collected by interview of patient's or attendants or from medical records.

Phase 3: Assessment of nutritional status

3.1 Anthropometric Measurement

In this category, patient's anthropometric measurements and data were collected for height, weight, waist circumference, hip circumference and mid upper arm circumference. Body mass index and waist to hip ratio was calculated as per the standard formulae (Sharma, 2022).

Reference range for MUAC for adult male and adult female is >23 cm and > 22 cm respectively (Yallamraju et. al., 2014) and its cut offs for both males and females were recommended as 26.9 cm for obesity (Dereje et al., 2022).

3.2 Biochemical Data

Patient's biochemical data was collected from their medical records for electrolytes (sodium, potassium), lipid profile (Total cholesterol, HDL cholesterol, triglycerides, VLDL & LDL), Renal function test (RFT) (Blood Urea, serum creatinine, serum uric acid).

3.3 Clinical Sign & Symptoms

Clinical signs and symptoms were noted from general clinical examination and interview for body ache, headache, weakness, shortness of breath, fatigue, vomiting, nausea etc.

3.4 Dietary History

Patient's 24 hours home diet recall was taken by an interview of the patient or attendant. It was done for 3 consecutive days including 2 week days and 1 holiday. Then the diet consumed was converted into nutrient intake on the basis of ingredients and amount of each recipe. Average Nutrient intake of 3 days was compared to the requirements and nutrient intake was presented as percentage intake of requirements. Besides this empty calorie intake was also recorded using Food frequency tables. Sample table has shown below:

Food item	Daily	Weekly	Fortnightly	Monthly	Total empty calorie intake
Oil/ghee					
Sugar					
Colddrinks					
Pickles					
Junk food					
Alcohol					
Total					

Table 2: Empty calories intake through food frequency table

Phase 4: Nutritional Diagnosis – Patients were categorized under following heading as per subjective global Assessment (SGA) tool

1. Normally nourished / healthy (SGA rating A)
2. Mildly undernourished/ at risk of malnutrition (SGA rating B)
3. Severely malnourished (SGA rating C)

Prescribed Diet Chart - All patients were given a low salt diet chart at the time of discharge. A sample diet chart for 1750 Kcal & 70 g protein has been listed below -

Sample Menu

Time	Menu
7 am	Tea 1 cup + Biscuits 2
8 am	Chhach 1.5 glass/ low fat milk 150 ml + 1 chapati / 100 g upma/ poha/ cornflakes/ oats
11 am	200 g fruits
1 pm	200 g salad + 2.5 Chapaties + 1 bowl vegetable + 1 bowl curd / 1 glass chhach
4 pm	1 glass lemon water with black salt + 30g roasted chana
8 pm	200 g salad + 2.5 Chapaties + 1 bowl vegetable + 1.5 bowl dal
10 pm	1 glass milk (low fat)

Table 3: Sample menu

Dietary recommendations were as below:

- 2½ gm salt throughout day
- Do not take pickle / papad / chutney / namkeen
- Do not take baking powder/ baking soda/ ENO/ and preservatives food items
- Take low fat milk/ buttermilk/ curd etc.
- Citrus fruits like Alma, Lemon, Orange, Tomato, Coconut Water etc. can be taken frequently

Results and Discussion

The data was collected for 30 patients and presented under following sub heading:

1. **Demographic profile of the patients**

Parameter		Total No. N= 30	Percentage
Age	35 - 50 years	9	30
	51 - 70 years	11	36.66
	71 - 80 years	10	33.33
Sex	Male	20	66.66
	Female	10	33.33
Educational status	Metric	17	56.66

	Graduate	11	36.66
	Post graduate	2	6.66
Working status	Working	11	36.66
	Non working	19	63.33
Type of activity	Sedentary	2	6.66
	Moderate	23	76.66
	Heavy	5	16.66
Economic status	MIG	21	70
	HIG	9	30
Marital status	Married	30	100
	Unmarried	0	0

Table 4: Demographic details of Hypertensive patients

Patient's demographic profile includes information regarding age, sex, educational status, working status, economic status, marital status were collected. 30% patients were in the age group of 30-50 years and 36.66% patients were found to be in the age group of 51-70 years and. 33.33% patients were found to be in the age group of 71-80 years. Sixty six percent patients were male while thirty three percent patients were female. It shows that the problem of hypertension is seen more in males than in females. Educational status shows that most of the patients (56.66 %) were metric pass while 36.66 percent were graduates. Only 6.66 percent of patients were post graduates. When patients were evaluated for their working status, it was found that 36.66 % patients were working, while 63.33% of patients were non-working. Activity pattern showed that 6.66% patients were sedentary active, 76.66% patients were moderate workers and 16.66% patients were heavy workers. Marital status showed that all patients were married.

Nutritional status

Nutritional status was assessed by anthropometry, biochemical investigations, clinical signs and symptoms and dietary recall of all the patients.

Anthropometric measurements of hypertensive patients

Parameter	Male (N=20)	Female (N=10)
Mean Height (cm)	172	157

Mean Weight (kg)	75	63
Mean BMI (kg/m^2)	25.42	25.92
Mean Waist circumference (cm)	90	88
Mean Hip circumference (cm)	92	89
MUAC (cm)	25	24
Waist to Hip Ratio	0.98	0.99

Table 5: Anthropometric Measurements of hypertensive patients

It was concluded from the above Table that out of the total 30 patients, mean height of the male patients was 172 cm while for female patients, it was 157 cm.

The mean weight of male patients was 75 kg. On the other hand, mean weight 9f the female patients was found to be 63 kg. Body mass index was calculated and it was found 25.42 kg)m2 for males and 25.92 kg/m2 for females. Male and female patients showed an average mid upper arm circumference as 25 cm and 24 cm respectively. Waist circumference and hip circumference for male patients was 90 cm and 92 cm respectively with a waist to Hip Ratio of 0.98. Female patients showed WHR as 0.99 with a mean waist circumference as 88 cm and hip circumference of 89 cm. Present data suggests that all patients were in the category of overweight or obesity.

Biochemical / biomedical data of hypertensive patients

Parameter		Total no N= 30	Percentage
Sodium (mg/dL)	Normal	14	46.6
	Above normal	16	53.33
Potassium (mg/dL)	Normal	30	100
	Above normal	0	0
Creatinine (mg/dL)	Normal	25	83.33
	Above normal	5	16.66
BP (mmHg)	Normal	20	66.66
	Above normal	10	33.33
HbA1c (%)	Normal	22	73.33
	Above normal	9	30

Table 6: Biochemical / Biomedical Reports

It can be concluded from the above table that 46.6% patients had sodium (Na) levels compatible with normal values, while 53.33 % patients had higher Na content. Potassium content of all the patients was found in the normal range. Creatinine content of 16.66% patients was found in the higher range that depicts impact of uncontrolled blood pressure on impaired kidney function. Blood pressure of 33.33% patients was found uncontrolled while HbA1c levels of 30% patients was found in a higher range that shows that high blood pressure may lead to diabetes also.

Clinical signs and symptoms of hypertensive patients

Parameters		Total number (n=30)	%
Nausea	Yes	4	13.33
	No	26	86.66
Vomiting	Yes	8	26.66
	No	28	93.93
Headache	Yes	7	23
	No	27	90
Constipation	Yes	9	30
	No	29	96
Shortness of breath	Yes	13	43
	No	17	56
Weakness	Yes	30	100
	No	0	0
Diarrhea	Yes	4	13.33
	No	26	86.6
Bodyache	Yes	17	56.66
	No	13	43.33
Fatigue	Yes	20	66.66
	No	10	33.33

Table 7:Clinical signs and symptoms of hypertensive patients

It can be concluded from the above table 7 that the symptoms of vomiting, nausea, fatigue and weakness were found in nearly all patients. Headache was observed in 23 % patients, while 30% patients had complaint of constipation. Forty three percent patients showed

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signs of shortness of breath, 13.33 % patients were suffering from diarrhea and 56.66 % patients had complaint of bodyache.

Nutrient intake of hypertensive patients through 24 hours home diet recall

Parameter	Percentage intake of the RDAs	Total no n= 30	Percentage
Energy (Kcal)	40 - 60	6	20
	61 - 80	13	43
	81 - 120	11	36
Average empty calorie intake	185.77 Kcal/ day/ person		
Protein (g)	40 - 60	11	36.66
	61 - 80	9	30
	81 - 100	8	26.66
	101 - 130	1	3.33
Carbohydrate	10 - 50	2	6.66
	51 - 80	10	33.33
	81- 100	13	43.33
	101- 130	5	16.66
Fat	50 -70	2	6.66
	70 - 100	5	16.66
	100 - 150	23	76.66
Sodium	135 - 145	3	10
	145 - 155	27	90

Table 8: Nutrients and empty calorie intake as per 24 hr home diet recall and food frequency questionnaire

This table shows the nutrient intake in comparison to requirements. Thirty six percent of patients showed energy intake above requirements that may be one of the leading causes for weight gain. Empty calorie intake was 185.77 Kcal per person per day. Protein intake of 26.66 percent patients was found compatible with the requirements while 36.66% patients showed lower protein intake than the RDAs. Carbohydrate intake was satisfactory while fat intake was observed on a higher side than the RDAs in 76.66 percent patients. Sodium intake was remarkably high in 90 % patients.

Nutritional Diagnosis of hypertensive patients

Parameter	N= 30	Percentage
Underweight G1	0	0
Underweight G 2	0	0
Normal Healthy	11	36.66
Overweight	16	53.33
Obese	3	10

Table 9: Nutritional Diagnosis of hypertensive patients

Patients were categorized under following headings as per Subjective Global Assessment (SGA) tool. Table 9 depicts that 36.66% patients were Normal nourished while 53.33% patients were overweight and 10% were obese as documented in table 9.

Conclusion

Taking data of 30 hypertensive patients, it was found that hypertension is found mostly in men than women of 60-90 years of age but it can occur at any age. Symptoms like fatigue, weakness, headache and bodyache were found in the patients. Hypertensive patients were also found with comorbidity of heart disease, kidney disease and diabetes especially in patients who had uncontrolled hypertension and with faulty food habits. Nutritional diagnosis was documented on the basis of data collected and it was observed that 53.33% patients were overweight and 10% patients were obese. There is a strong need to make people aware of weight maintenance and to be physically active following the DASH diet.

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