



## **EFFECTS OF BALANCED DIET ON DISEASES OF HYPERTENSION BASED ON BIOCHEMICAL AND PHYSICAL PARAMETERS**

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### **ABSTRACT**

Controlling blood pressure in people with hypertension is essential for lowering cardiovascular-related mortality and morbidity. Modifications in one's way of life are one of the most powerful weapons in the fight against high blood pressure. The vast majority of controlled studies have indicated that even a small weight loss of 3-9% is associated with a significant drop in systolic and diastolic blood pressure of around 3 mm /Hg in overweight adults. Historically, it has been thought that limiting sodium chloride in one's diet would be the most important factor in bringing down blood pressure. Although its significance in population blood pressure remains debatable, changes in sodium consumption do alter blood pressure in the elderly and in patients with hypertension and diabetes. Recent meta-analyses suggest that ensuring appropriate consumption of minerals, such as potassium and presumably calcium, rather than restricting sodium intake should be the focus of dietary recommendations.

**Keywords:** Hypertension; Blood Pressure; Nutrition, Minerals, Fats, Carbohydrates, and protein and alcohol,

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## 1. INTRODUCTION

A healthy diet is one that provides sufficient micronutrients and hydration to meet the physiological demands of the body while also ensuring adequate consumption of macronutrients to support energetic and physiologic needs without excess intake. The macronutrients (carbohydrates, proteins, and fats) you eat every day are what power your cells so they can do their jobs [1]. To maintain healthy growth, development, metabolism, and physiological functioning, even trace levels of micronutrients like vitamins and minerals are necessary. Grains, fruits, legumes, and vegetables are particularly rich in carbohydrates, which constitute the body's principal fuel source [2]. Because the milling process removes the germ and bran from processed grains, they contain less fibre and minerals, whole grains are favoured for their health benefits. It has been shown through meta-analyses of prospective cohort studies that eating more whole grains reduces the risk of CHD, stroke, cardiovascular disease, and cancer, as well as the risk of death from all causes, cancer, respiratory illness, diabetes, and infectious disease. Fruits and vegetables provide not just calories but also dietary fibre, which helps you feel full and has beneficial benefits on your digestive system, cholesterol levels, and blood sugar levels [3]. Many of the health advantages linked to a diet rich in fruits and vegetables are attributed to phytochemicals, which are found mostly in fresh produce [4]. These phytochemicals include things like polyphenols, phytosterols, and carotenoids. Although the precise mechanisms by which these phytochemicals exert their effects remain unknown, we do know that they have antioxidant qualities and have a role in regulating nuclear transcription factors, lipid metabolism, and inflammatory mediators. [5] One type of phytochemical, flavonoids, has been linked to improved insulin production and decreased insulin resistance, suggesting a role for them in preventing and treating obesity and type 2 diabetes. Furthermore, polyphenols enhance gut flora and are processed by these bacteria to generate additional bioactive chemicals in a two-way interaction with the gastrointestinal microbiota. [6]

Proteins in the diet are an excellent way to get the amino acids your body needs but can't make on its own, and they're also a great source of energy (i.e., essential amino acids). Animal products (meat, dairy, fish, and eggs) and plant-based foods (legumes, soya products, grains, nuts, and seeds) are both good sources of protein for the human diet, but animal products are generally regarded as more nutritious because of their wide range of amino acids, excellent digestibility, and high bioavailability. Protein from animals, on the other hand, is high in saturated fatty acids, which have been related to heart disease, dyslipidaemia, and even some malignancies [7]. Red meat, and processed meat in particular, has been linked to an increased risk of colorectal cancer, albeit the causes are not well understood. An acidic diet, especially one high in animal-based proteins, can cause a pH imbalance in the body, leading to acidosis. [8] High levels of metabolic acids have been associated with insulin resistance, disturbed glucose homeostasis, and the formation of urinary calcium stones.

Participate in stressful situations that could be hazardous. More so if they are habitual consumers of harmful fast food. Academic students' eating habits can be affected by a number of factors, including skipping breakfast or lunch at home, eating what classmates or peers prefer, eating what is inexpensive, accessible, and normal behaviour, and a lack of time or a demanding university schedule. A person's eating habits will change as a result of establishing a regular meal schedule. It's not uncommon for one student to have a very different diet than the rest of the class. All of the students have their own individual approaches to food. The use of fast food on a regular basis has been linked to increased body fat. Low-nutrient foods, such as soft drinks, or foods with a high calorie density despite a low weight.

### 1.1 Balanced diet

A balanced diet is one that has enough amounts of protein, carbohydrates, fats, vitamins, minerals, water, and fibre on a daily basis. This kind of diet is useful since it promotes health and prepares people for possible food shortages. [9] You won't go

hungry even if you skip meals for a few days or temporarily reduce your intake of a certain nutrient because of the buffer zone. In the case where an individual's balanced diet meets their RDAs, the safety net is already in place. When determining RDAs, buffers are taken into account.

- Offers a diverse menu
- The RDA for each nutrient is met.
- Maintains and encourages dietary balance and nutritional buffer, this diet helps people stay at a healthy weight in relation to their height.

It's an effort to strike a healthy balance between the various food groups consumed on a daily basis. Include foods from each food group throughout the day to maintain a healthy, balanced diet. We can get all the nutrients we need from these foods, but only if they're consumed in the right amounts and balances. The nutrients should also be stored in the body to be used during times of food scarcity. 50%-60% of the calories in a healthy diet come from carbs, 10%-15% from proteins, and 20%-30% from fats. Dietary macronutrients and other protective compounds, such as phytochemicals, should be provided in adequate quantities for optimal health maintenance.

After 8 weeks, the participants were randomised to either

- (a) the control diet,
- (b) a diet high in fruits and vegetables (8-10 servings daily) providing potassium and magnesium at the 75th percentile of US consumption and 31 g fibre daily, or
- (c) a combination diet high in fruit and vegetables (10 servings daily) and low-fat dairy products (three servings daily) and low in saturated fat and total fat, providing potassium, magnesium, and calcium.

Compared to a control diet, the DASH combo diet and the fruit and vegetable diet lowered SBP and DBP more than the control diet did while keeping sodium intake and body weight same. A bigger effect was seen in hypertensive patients. When on the combo diet, the BP drop was noticeable after only 2 weeks.

## **1.2 Nutrition and Food**

A healthy diet and regular exercise are essential components of overall physical fitness. For optimal health, fitness, and physical performance, you keep your weight and body fat % in the healthy range by careful dietary and activity planning. [10] All of these factors play a role in keeping the military prepared and operating at maximum efficiency. If you want to get in shape and eat healthily, familiarising yourself with the recommendations put forward by the United States Department of Agriculture (USDA) and using the Food Pyramid as a guide would help you immensely. In 2005, a revised food pyramid was introduced to better illustrate the types of foods and the appropriate serving sizes for optimal health. Additionally, the USDA provides a user-friendly webpage to record food intake to get a personalised eating plan based on your age, gender, and current level of physical activity. The left-hand figure climbing the stairs symbolises the importance of regular exercise and the fact that everyone has varying nutritional requirements. Indicated by the varying widths of the bands, the recommended proportions of foods from each group can be determined. [11]

For optimal health, consume foods from all six colour bands daily. The United States Department of Agriculture (USDA) suggests eating three ounces of whole-grain bread, cereal, crackers, rice, or pasta daily under the orange category (grains). Whole grain products should make up at least half of your daily grain intake. In order to ensure that you are consuming whole grains, check the ingredient list for the word "whole" before the grain's name.

Green means vegetables; consume a wide variety of greens, oranges, and beans and peas, as well as other vegetables, to obtain your daily greens.

- Red (fruits): Consume a wide variety of fruit in its many forms (fresh, frozen, canned, or dried), but limit your intake of fruit juice, which may be high in sugary, calorie-free syrups.

Most of your fat intake should come from healthy sources like fish, nuts, and vegetable oils (the yellow category). Butter, stick

margarine, shortening, and lard are all solid fats that should be consumed in moderation. Choose omega fish oil-containing meals whenever possible to keep your heart healthy.

Among the many sources of calcium, the colour blue (milk) stands out. Pick skim or low-fat milk. You can get calcium from hard cheeses (cheddar, mozzarella, Swiss, or parmesan), cottage cheese, and low-fat or fat-free yoghurt if you don't like milk or can't drink it (including frozen yogurt). [12]

Like the yellow band for oils, the purple band (meat, beans, and eggs) is narrower than the others. As a visual cue, this tells you to "Go lean on protein." Meats and poultry should be baked, broiled, or grilled instead than fried if you're watching your weight. Eat additional fish, beans, peas, nuts, and seeds to spice up your diet. You should reevaluate your meat consumption and the Food Pyramid if it makes up the bulk of your meals.

## **2. MATERIALS AND METHOD**

### **Study Area**

Individuals were recruited from a super specialty hospital in Visakhapatnam, Andhra Pradesh, for the study.

### **Samples**

Several different clinical markers were examined to determine the impact of patients' eating habits on hypertension. The victims included men and women of varied ages (15-70 years). In total, 500 ill persons participated in the research. Researchers gathered data on respondents' demographics, physical appearance, and daily routines through the use of a questionnaire.

### **Methods for Selecting Appropriate Patients Inclusion requirements**

Patients for each group were chosen according to a number of different diagnostic criteria. Different types of illnesses call for different approaches. The patients were simply monitored and checked up on often.

### **Exclusion criteria**

Clinical trial subjects who opted out. Treatment failures that occurred because the

patient chose to stop receiving treatment during its course are excluded.

### **Indicative size of the sample**

500 patients were tracked on average at any one time throughout the study. In each scenario, the initial group of patients received simply medication support. Concurrently, two groups of patients were treated; one with medicine, and the other with dietary modifications.

### **Treatment for Addiction**

The first set of patients were treated with conventional medicine. The severity of an illness would dictate the strength of the medication prescribed for it.

### **Medicine and food together form a comprehensive treatment plan.**

Those in the second group were given concurrent medication and nutritional therapy. Medication was recommended by doctors based on the individual's condition and the severity of their ailment, both of which were determined by the findings of the examination.

These patients were put on special diets that didn't follow the same guidelines as the standard American diet. The average calorie requirements of the patients were determined by factoring in their age, sex, occupation, and health. Certain food groups were off-limits to patients in both treatment groups.

### **Drugs that cause dietary changes**

No one struggling with weight has ever been prescribed medicine. Diet programmes carefully crafted by experts were suggested to them. Depending on parameters including age, gender, occupation, and body mass index, the recommended calorie intake ranged from 20 to 28 kcal/kg body weight. The diet is balanced in that it contains a healthy amount of protein, carbohydrates, and essential vitamins and minerals, yet being low in fat and calories. Certain types of fried foods, sweets, dairy products, oils, and fats like ghee and cream have been banned.

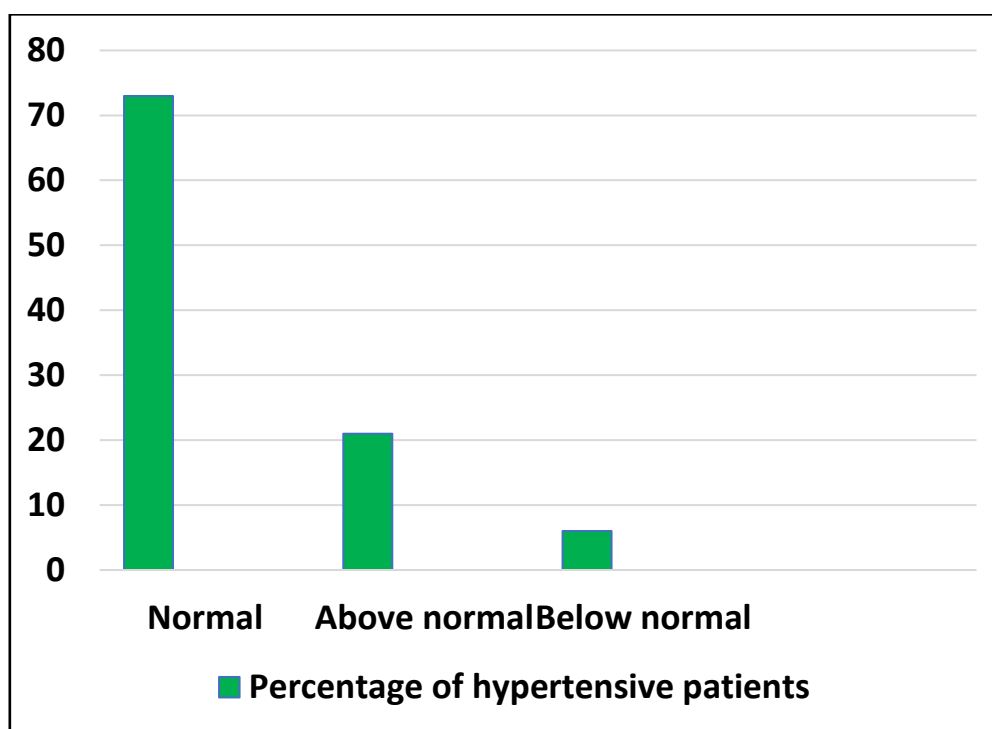
## **3. RESULTS**

**Table 1. Distribution patterns of Hypertension patient**

Characteristics	Drug treated	Drug +diet treated
Male	62	65
Female	38	35
30-40 years	10	17
41- 50 years	51	33
51-60 years	39	50
Heavy workers	35	40
Semi inactive workers	23	20
Inactive workers	42	40
Monthly income (Rs.) < 10,000	25	41
Monthly income (Rs.) 10, 000-20, 000	47	33
Monthly income (Rs.) 20,000-30,000	28	26
Vegetarian	33	20
Non-Vegetarian	67	80
Alcoholic	25	18
Non-alcoholic	75	82
Steady exercise	15	10
Non-Exercise	85	90
Open diabetic	43	45
Modest diabetic	42	41
Good control diabetic	15	14

**Table 2. Diet on BMI of hypertensive patients**

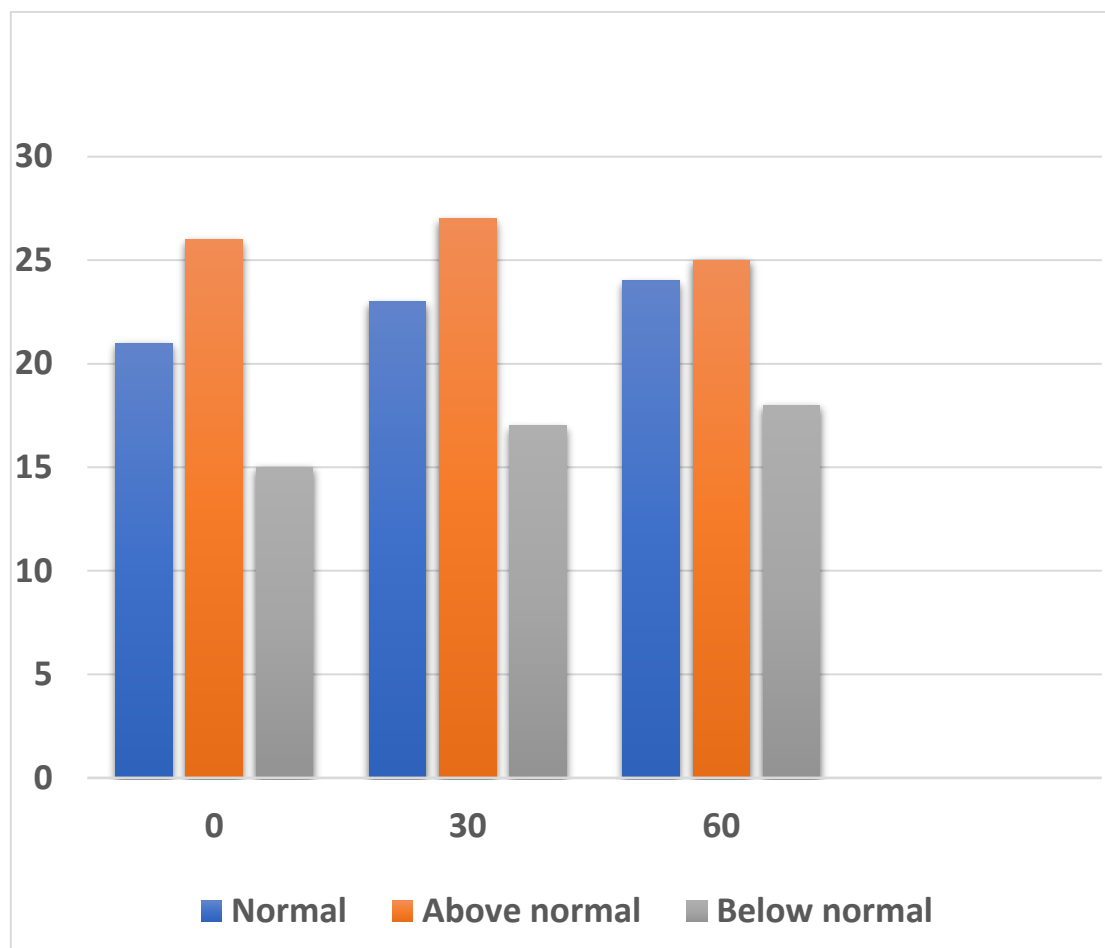
BMI category	Percentage of hypertensive patients
Normal	73
Above normal	21
Below normal	6



**Fig 2. Percentage of hypertensive patients having different categories of BMI.**

**Table 3. Effect of drug on BMI of hypertensive patients**

Duration of treatment	Normal	Above normal	Below Normal
0	21	26	15
30	23	27	17
60	24	25	18



**Fig 2. Effect of drug on BMI of hypertensive patients**

#### 4. DISCUSSIONS

About 65% of the drug's patients were men, while the remaining 35% were women. One-seventh of the patients were between the ages of 31 and 40, one-third were between the ages of 41 and 50, and half were over the age of 60. [13] Forty percent of the patients were considered to be members of the labour class, while twenty percent were classified as semi-sedentary and forty percent were considered to be completely sedentary. Even though most of them didn't drink, there were a few heavy drinkers among them. All of the patients have varied eating routines. In this group of patients, only 20% were vegetarians; the rest were non-vegetarians. Overwhelmingly,

hypertension individuals were in stage I (96%) or mildly elevated (4%). [14] Patients with hypertension had a considerable reduction in their blood pressure as a result of the medicine, with readings trending down towards the normal range. Nearly 95% of patients had blood pressure readings that were abnormal. Their average blood pressure was found to be 200/142 mmHg. After taking their medication as directed, however, nearly all of the patients saw a decrease in their blood pressure, with a mean reading of 174/131 mg/Hg. [15]

#### 5. CONCLUSIONS

Elevated blood pressure in the arteries is known as hypertension. Because of this, the

heart has to pump blood through the body at a faster rate than usual. As a result, it is a leading cause of stroke, heart attack, heart failure, and chronic renal disease. Managing hypertension through one's diet is crucial. For the purpose of this study, individuals with hypertension were given the formulated diet in order to regulate their body mass index and blood pressure. Those with hypertension did not universally have to be overweight. The diet was low in salt and fat and high in vitamins and minerals yet contained moderate amounts of protein and carbohydrates. Patients' body weight was not considerably altered, but it was managed. Most people's blood pressure dropped from an elevated number towards normal even after 30 days of treatment. This result highlighted the significance of food modification in managing hypertension.

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