



A Comparative Study of Relationship Between Vegetarian and Non-Vegetarian Dietary Choices and Blood Pressure

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Abstract

Regardless of age, race, or gender, hypertension is a major independent risk factor for coronary artery disease. The World Health Organization states that hypertension is to blame for at least 45% of heart disease fatalities and 51% of stroke deaths. In the past, many people thought vegetarianism was strange and faddish, but nowadays, scientific evidence recognizes that vegetarian meals, when properly planned, are nutritionally adequate and offer positive health benefits in the prevention and treatment of chronic diseases. The purpose of the present study was to find out the prevalence of hypertension and its association with their choice of food (vegetarian or nonvegetarian). It also aimed to find out different demographic factors and their relationship with hypertension. The study was an observational, descriptive, cross-sectional study. The adult population (male and female) of Podrah, Howrah Municipal Corporation, West Bengal, India, was the subject of this study. Purposive sampling method was adopted. Based on a series of standardised questionnaires that had been pretested, the survey was conducted. The anthropometric measurements were taken following standard protocol. The association between two qualitative data sets was calculated by Pearson's chi-square test, and a "P" value was determined for understanding its association. All the statistical analysis was performed by SPSS software (Statistical Package for Social Sciences, version 20.0). 'P' value is equal to or less than 0.05 was considered statistically significant. The study analysed here compares the effects of a vegetarian food habits compared to a non-vegetarian food habits with regard to blood pressure, body composition, and other parameters. Significant association observed between these two food choices, whereas vegetarian food habits choices have a lower percentage of hypertension than the other one. Further research needs to be conducted with a larger number of subjects to prevent possible skewing of the data.

Keywords: Hypertension; Vegetarian; Non-vegetarian; Blood Pressure; Adults

Introduction

Hypertension is a major independent risk factor for coronary artery diseases, irrespective of age, race, or sex [1]. The World Health Organization states that hypertension is to blame for at least 45% of heart disease fatalities and 51% of stroke deaths

[2]. From 600 million in 1980 to 1 billion in 2008, the number of persons with hypertension has continuously risen [3]. 32.5% of persons over the age of 20 have hypertension, often known as high blood pressure (BP), and/or are using antihypertensive drugs, according to the Centers for Disease Control and Prevention [4]. Its

high incidence emphasises the significance of using public health strategies to prevent hypertension. It has been demonstrated that dietary changes are especially useful at managing and preventing hypertension [5]. In most cases, nutritional epidemiology investigates disorders while taking into account one or a small number of nutrients or foods. According to Hu et al., it can be challenging to understand the findings of nutrient analyses because people don't take nutrients singly. Dietary interventions may be simpler to execute and more comprehensive if they begin as changes in the overall dietary pattern [6]. This paper introduces vegetarian eating habits while considering how they may affect blood pressure. A vegetarian diet is one that "does not include meat (including poultry) or sea-food, or products containing those foods," according to the policy statement released by the American Dietetic Association, currently known as the Academy of Nutrition and Dietetics [7,8]. Even though this is the accepted criteria, not all researchers who study the effects of vegetarian diets have used it. In the past, there was a notion that vegetarianism was strange and faddish, but nowadays, even American Dietetic Association, recognize that vegetarian diets when properly planned are nutritionally adequate and offer positive health benefits in the prevention and treatment of chronic diseases [9]. The consumption of whole grains, legumes, vegetables, nuts, and fruits along with a regular exercise regimen and avoidance of meat and high-fat animal products are consistently linked to lower blood cholesterol levels, lower blood pressure, less obesity, and consequently lower rates of heart disease, stroke, diabetes, cancer, and mortality, according to a significant body of scientific literature. Stroke, blood vessel damage, heart attack, heart failure, and kidney failure can all be caused by hypertension [10,11].

The scientific evidence relating vegetarian diets to a better lipid profile [13], a lower prevalence of obesity, hypertension, hypercholesterolemia, type 2 diabetes mellitus, and a lower prevalence of mortality from ischemic heart disease and stroke is based on their nutritional composition [12]. As a result of their high caloric density, excessive saturated fat, and simple sugar content, diets based on the intake of meat and its derivatives, however, significantly contribute to the rise in these chronic noncommunicable illnesses [14]. Due to enhanced platelet aggregation, eating red meat has been linked to a variety of conditions including arterial thrombosis, myocardial ischemia, high blood pressure, and acute thrombotic infarction [15]. Moreover,

consuming meat products with saturated fats can greatly boost the release of insulin, which may result in insulin resistance and the development of type II diabetes mellitus [16]. Moreover, a vegetarian diet is crucial for enhancing the psychological aspect of quality of life [17]. According to scientific data, limiting diets that are based on meat and its derivatives, fish, and poultry may improve various measures of people's mental health [18]. According to WHO guidelines, it also promotes better mental health, decreased rates of anxiety and depression, higher levels of life satisfaction, and increased emotional wellbeing [19-21]. The inclusion of vitamin C, folic acid, and carotenoids may contribute to these benefits of the quality-of-life components. Several vitamins and minerals that can be found in fruits and vegetables work as cofactors to produce dopamine and other neurotransmitters [22].

The purpose of the present study was to find out the prevalence of hypertension and its association with their choice of food (vegetarian or nonvegetarian). Along with it, the present study also aimed to find out different demographic factors and their relationship with hypertension.

Methodology

This cross-sectional study was conducted among 100 younger adults, aged 20–30 years, selected from Podraha, Howrah Municipal Corporation, and West Bengal, India. The study was conducted from November 2021 to January 2022. Purposive sampling was used to conduct this observational and descriptive study. Furthermore, the respondents were screened according to the objective of the study. Height and weight were measured, and a minimum of three blood pressure readings using a random baseline mercury sphygmomanometer were taken from each individual using standard protocol [23,24]. Pretested, standardised questionnaires were used to collect details about dietary habits and other parameters of the study.

The data were put in a Microsoft Excel worksheet (Microsoft, Redwoods, WA, USA) and checked for accuracy. Coding was done accordingly. The association between two attributes was calculated by Pearson's chi-squared test. P 0.05 was considered statistically significant. All statistical tests were conducted using Statistical Package for the Social Sciences software, version 20.0 (SPSS Inc., Chicago, IL, USA), by keeping BMI status level (undernutrition/normal/overweight or obese (I,II and III)) as a dependent variable.

Results and Discussion

The blood pressure difference according to the distribution of the population study is shown in table 1.

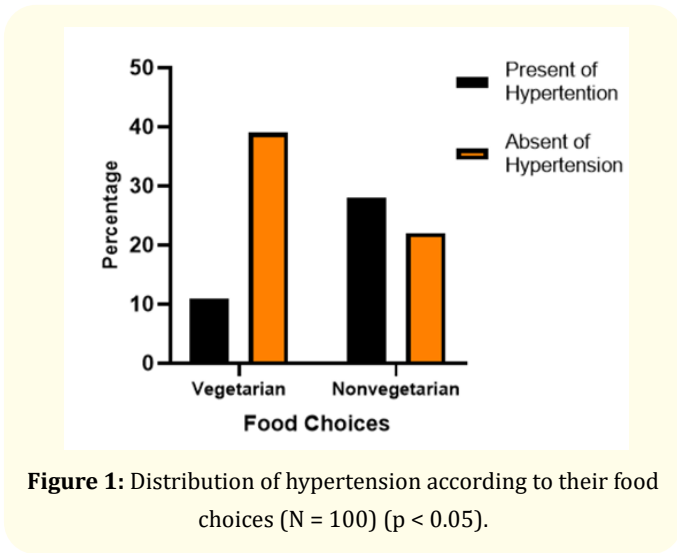


Figure 1: Distribution of hypertension according to their food choices (N = 100) (p < 0.05).

Anthropometric characteristics	Vegetarian (n = 50) Mean (SD)	Non-vegetarians (n = 50) Mean (SD)
Weight (Kg)	57.75 ± 1.2	55.75 ± 4.14
Waist Circumference (cm)	81.2 ± 1.84	81.8 ± 2.86
Hip Circumference (cm)	95.1 ± 1.4	96.3 ± 0.98
Waist/Hip (WHR)	0.85 ± 0.009	0.84 ± 0.08
Systolic Blood pressure (mm of Hg)	129 ± 19	133 ± 18
Diastolic Blood pressure (mm of Hg)	82 ± 12	85 ± 12
Body Mass Index (Wt./Ht ²)	21.4 ± 0.7	19.87 ± 0.44

Table 1: Distribution of anthropometric characteristic among two groups (N = 100).

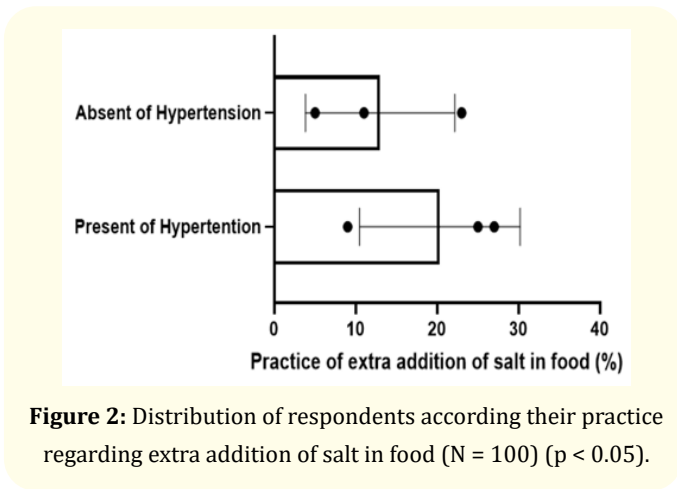


Figure 2: Distribution of respondents according their practice regarding extra addition of salt in food (N = 100) (p < 0.05).

Parameters	Present of Hypertension		Total n (%)	Chi-square test (p)
	No n (%)	Yes n (%)		
Sex				
Male	51(78.46)	14(21.53)	65(100)	23.8 (0.00)
Female	10(28.57)	25(71.42)	35 (100)	
Age (years)				
31-40	14 (100)	0 (0.00)	14 (100)	13.34 (0.01)
41-50	16(69.56)	7(30.43)	23 (100)	
51-60	31(49.20)	32(50.79)	63 (100)	
Occupation				
Govt. Job	20(80)	5(25)	25(100)	19.46 (0.01)
Private Job	22(78.57)	6(21.42)	28 (100)	
House wife	2 (100)	0 (0.00)	2 (100)	
Student	8(44.44)	10(55.55)	18 (100)	
Others	9(33.33)	18(66.66)	27(100)	
Marital Status				
Married	61(71.76)	24(28.23)	85 (100)	27.6 (0.01)
Unmarried	0(0.00)	9(100.0)	9 (100)	
Others	0(0.00)	6(100.0)	6 (100)	
Type of Exercise				
Brisk Walk	32(82.0)	7(17.94)	39 (100)	21.72 (0.02)
Yoga	14(77.7)	4(22.22)	18 (100)	
Others	15(34.88)	28(65.11)	43(100)	
Habit of Smoking				
No	50(78.12)	14(21.87)	64 (100)	21.91 (0.01)
Yes	11(30.55)	25(69.44)	36 (100)	
Alcohol Consumption				
No	61(71.76)	24(28.23)	85 (100)	27.6 (0.00)
Yes	0(0.00)	15 (100)	15 (100)	

Table 2: Distribution of different parameters in association with presence or absence of hypertensions among the targeted respondents (N = 100).

Table 2 reveals that, out of 100 individuals, 21.53% of hypertensive patients are men and 71.42% are women. Using the chi-square test, a statistically significant association was observed between participant gender and blood pressure. Also, out of 100 participants, 33.33% of the hypertension patients went to elementary school, 50% went through the tenth grade, and 53.335 went to university. Using the chi-square test, a statistically significant association between participant education and blood pressure was observed. The table also shows that out of 100 people, 30.43% of the hypertensive population belongs to 41-50 age group, and 50.79% of the hypertensive population belongs to

the 51–60 age group. The table-2 shows that out of 100 people, 25% of the hypertensive population have a government job, 21.42% of the hypertensive population are private job, 55.55% of them are students and the rest belong to others. Significant statistical association was found between BP and occupation of the participants using the chi-square test (square: are- 19.p -, p- .001). According to table-2, 28.25% of the hypertensive population is married. Significant statistical association was found between BP and marital status of the participants using chi-square test (Chi-square- 27.602, p- .000).

Parameters	Present of Hypertension		Total n (%)	Chi-square test (p)
	No n (%)	Yes n (%)		
Choice of Food Habit				
Vegetarian	39(78.0)	11(22.0)	50 (100)	12.14 (0.01)
Non-vegetarian	22(44.00)	28(56.0)	50 (100)	
Milk or milk product consumed on daily basis				
No	52(71.23)	21(28.76)	73 (100)	11.09 (0.01)
Yes	9(33.33)	18(66.66)	21(28.76)	
Type of Cooking oil used				
Refined oil	9(31.03)	20(68.96)	29(100)	21.88 (0.01)
Mustard oil	40(78.43)	11(21.56)	51 (100)	
Coconut oil	1 (100)	0 (0.00)	1 (100)	
Vanaspati	1(100)	0(0.00)	1 (100)	
Ghee	5(83.33)	1(16.66)	6(100)	
Vegetable oil	5(41.66)	7(58.33)	12(100)	
Red Meat Intake				
No	54(69.23)	24(30.76)	78 (100)	10.06 (0.01)
Yes	7(31.81)	15(68.18)	22(100)	
Extra addition of salt in food				
Often	27(84.37)	5(15.62)	32 (100)	22.96 (0.02)
Rarely	25(69.44)	11(30.55)	36 (100)	
Never	9(28.12)	23(71.87)	32(100)	

Table 3: Distribution of different dietary food choices in association with presence or absence of hypertensions among the targeted respondents (N = 100).

It also, depicts that 17.94% of the hypertensive patients do brisk walking, 22.22% of those do yoga everyday while 65.11% of them do other sorts of exercise. Significant statistical association was found between BP and types of exercise using chi-square test (Chi-square-21.723, p- .000). The table-2 shows 21.87% of

the hypertensive subjects do not smoke, while 69.44% of them do. Significant statistical association was found between BP and smoking using chi-square test (Chi-square-21.915, p- .000).

Table 3 above demonstrates that out of 100 respondents, 50 are vegetarians and the remaining 50 are non-vegetarian. Using the

chi-square test, a statistically significant association between BP and the types of foods consumed was observed (Chi-square-12.14, $p < 0.01$). In present study, vegetarians fared better (Figure 1). Baines et al [25] achieved comparable results. A range of physical and chronic illnesses, such as type II diabetes, cardiovascular disease, high blood pressure, and different malignancies, have also been reported to be protected against by using vegetarian diets [26-28]. Even some vegetarian foods have been shown to improve cognitive abilities [29]. Dietary fiber, phenols, and antioxidants are indicators of these advantageous benefits. An overabundance of free radicals in the body is one of the primary causes of the diseases already mentioned. Vegetarian diets contain antioxidants and other bioactive substances that shield the body from damaging free radicals and lower the risk of oxidative stress and inflammation. Moreover, they stop cancer cell proliferation and malignant transformation, as well as cancer mutation [30]. As opposed to non-vegetarians, vegetarians exhibited lower diastolic and systolic blood pressure readings, according to prior studies [31]. Consuming some foods, such as fruits, vegetables, and legumes, appears to have a protective effect on lowering blood pressure levels in addition to avoiding meat [32], as these foods contain phytosterols, monounsaturated fats, and polyunsaturated fats. It has been shown to drastically lower serum cholesterol levels, which can increase the risk of high blood pressure [33]. Although the protective effects of vegetarian diets on blood pressure are not completely understood, there is evidence that consuming essential nutrients like soy protein, dietary fiber, potassium, calcium, magnesium, and phosphorus, as well as antioxidants like vitamins C and E, can significantly lower blood pressure levels [34,35]. Vegetarians in this study exhibited greater LDL levels than non-vegetarians. The consumption of refined carbohydrates, which is frequently associated with larger negative effects not only on the lipid profile but also on blood pressure, is the most likely explanation for the high LDL content and higher blood pressure levels in vegetarians [34]. Contrarily, it is intriguing that vegetarians do not have a greater BMI than nonvegetarians despite having higher blood pressure readings, as obesity is the primary risk factor for hypertension [35]. However, it should be noted that BMI may not always adequately account for findings indicating large variations in blood pressure between vegetarians and nonvegetarians. Vegetarian diets may typically have lower salt concentrations than meat-based diets, although no discernible

difference has been seen [36]. The addition of extra salt in food also plays an important role in the consequences of hypertension (Figure 2).

The majority of the anticipated growth in hypertension is mostly attributable to a projected rise in the prevalence of hypertension in emerging nations, primarily as a result of changes in diet and lifestyle. An unhealthy lifestyle during young adulthood can be associated with increased risk with many non-communicable diseases including B P in the Middle Ages [37]. The most effective population-based strategy for the prevention of hypertension is a change in diet and lifestyle. Research demonstrates that vegetarian diets, which omit meat protein and are lower in total protein, can lower blood pressure. Yet, similar BP reductions are observed by consuming more fruit, vegetables, fish, nuts, and low-fat dairy products, while consuming less sugar and saturated fat [39]. Some studies also discussed the consumption of soft drink which also causes metabolic syndrome like hypertension [38].

The finding that eating more meat is linked to a higher risk of hypertension is generally in line with earlier research. For instance, red meat consumption above 1.5 servings per day was linked to a 35% increased risk of hypertension compared to women who consumed meat less frequently than once per month in a prospective cohort of 28,766 females aged 45 years [40]. Similar findings were seen in a smaller prospective cohort of 1,709 males; these individuals experienced a 66 mm of Hg larger rise in systolic blood pressure (SBP) after 7 years of follow-up compared to men who consumed 8 servings of red meat per month [41]. Women who had fewer than 5 servings of processed meat per week had a 17% higher risk of hypertension than women who consumed less than 1 serving per week, according to a more recent French prospective study [42]. Consequently, these findings and other research together imply that a long-term meat-free diet may lower the chance of acquiring hypertension.

Essential hypertension won't be widespread among civilizations or populations that regularly consume low salt diets (perhaps 5 g of NaCl per person per day or less) [43]. Essential hypertension will be widespread in civilizations or populations that consume a lot of salt (more than 10-15 g per person per day). Which one person in a group will contract the disease depends on individual susceptibility [44].

Although the harmful consequences of smoking are still not fully understood, it is probable that the hemodynamic effects of tobacco use play a role in habit formation. It has long been understood that smoking causes a rise in blood pressure and heart rate [45]. Since nicotine alone is responsible for these effects, the other substances—of which more than a thousand have been isolated—seem to be of less significance. Both an increase in cardiac production and overall peripheral vascular resistance are to blame for the rise in blood pressure. Before any increase in the level of circulating catecholamines, the blood pressure rises instantly [45,46].

Conclusions

The study analysed here compares the effects of vegetarian and non-vegetarian food habits with regard to blood pressure, body composition, and other parameters. Significant association observed between these two food choices, whereas vegetarian diet choices have a lower percentage of hypertension than the other one. Further research needs to be conducted with a larger number of subjects to prevent possible skewing of the data.

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Conflict of Interest

The authors declare no conflicts of interest.

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