

# ANALYSIS OF THE IMPACT OF NUTRITIONAL THERAPY AND DIET MODIFICATION IN HYPERTENSION PATIENTS

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**Cite this article:**

Mahesar S, Mahesar SM, Aftab S, Channa MJ, Lakho SA. Analysis of the Impact of Nutritional Therapy and Diet Modification in Hypertension Patients. AJMAHS. 2023; 1(1):5-13.

## ABSTRACT

Hypertension is disease which can kill human very silently. Mortality and morbidity are general risk for hypertension. At initial stage it does not show any symptoms but continuous high blood pressure can cause serious complications like heart diseases, kidney diseases etc. A review has been written after searching the literature on hypertension in Pakistani population and effect of nutritional or diet therapy for its control. In this review, different research articles which have been published on hypertension and dietary or nutritional therapy in Pakistan have been searched so that we may find some solution regarding control of this disease. In different articles various types of survey based research like comprehensive and follow up studies are given by different workers. All associated hypertensive studies are included in this study. It has been suggested by many researchers that in hypertension, if patients can control their diet or modify nutritional factors can have much more benefit rather than using drugs alone. The aims of this review article is to find different types of hypertension in Pakistani population and its control by dietary and nutritional therapies. A total of 28 research papers published in different journals have been reviewed to write this review article. We find out the factors which are associated with hypertension such as socio demography, lifestyle or dietary habits (using tobacco, junk foods), health related issues (obesity, family history), psychological problems (less activity) etc. To treat hypertension, it is necessary to with diet modification and nutritional therapy. These results show that nutritional therapy and diet modification are very useful methods to treat hypertension. This type of therapy can easily reduce this problem without using high price medicines as the majority of Pakistani population comes under poverty.

**Keywords:** Nutritional therapy, Diet modification, Hypertension.

## INTRODUCTION

Blood pressure is a type of natural process in which circulating blood exerts the force on the walls of arteries. When measuring blood pressure, there are two readings one is systolic and the other is diastolic type of pressure which are measured in mm of Hg. In systolic reading, the heart contracts and the type of pressure which is put on blood vessels is first reading while in diastolic the heart rests between the pumping of blood which exerts pressure on the walls of arteries is the second reading of blood pressures. In normal conditions, the blood pressure rises and falls in between the normal values but in high blood pressure, the long term high values of pressure is seen exerting force against the arteries. Hypertension is the disorder of heart in which blood pressure is more than 140/90 mm of Hg<sup>1</sup>. Hypertension is known high death causing disease (around 3<sup>rd</sup> number around the globe). Per annum death rate is nearly 7.5 million all over the world due to hypertension as per reports of World health organization (WHO)<sup>2</sup>. Silent killer is another name of hypertension. There can be seen different other complications due to this increase blood pressure i.e. stroke, heart attack and other heart diseases. Hypertension has been causing other negative effects on health and it worsens in other conditions i.e. kidney, liver disease<sup>3</sup>. There are many risk factors which can cause hypertension, among these are excessive salt consumption, taking excessive fats, low intake of fruits and vegetables, less physical activity, use of tobacco and alcohol and being more fatty i.e. overweight and obese. Family histories of hypertension and with co-existing diseases such as diabetes or kidney diseases are

other risk factors which can cause hypertension. Updated data is provided for hypertension in Pakistan for its prevalence, awareness, treatment and control<sup>2</sup>. Short sleep is also the risk factor for causative of hypertension. Through short time sleep may elevate heart rate which is harmful for body<sup>5</sup>. Sometimes this disease does not show any symptoms but continuous high blood pressure may show the symptoms like headaches, nosebleeds (epistaxis), irregular heart rhythms, changes of vision, and ringing in the ears. Fatigue, nausea and vomiting, confusion, anxiety, pain in chest and muscle tremors can cause by severe hypertension. Other symptoms are head heaviness, slower movements, and redness and warm to feel of the body, tense vessels, fullness of the pulse, colored and dense urine, loss of appetite, weak eyesight, yawning, drowsiness, vascular rupture, and hemorrhagic stroke<sup>6</sup>. The major risk factors in Pakistan for cardiovascular diseases i.e. hypertension have been investigated. There are many treatment options like drugs, diet/nutritional modifications, and exercise and sleep as well. The drugs which are given to treat hypertension are known as antihypertensive drugs. There are many classes of antihypertensive drugs i.e. Calcium channel blocker, angiotensin receptor antagonists, diuretics, angiotensin II receptor blockers etc.<sup>1</sup>. Along with other treatments like drugs, it has also been studied that there is any effect on controlling diet and nutritional factors for controlling this disease. If the hypertensive patients are suffering from other diseases like diabetes, obesity and liver problems etc. there are chances of complications as well. In such

conditions, controlling the diet and nutrition are also linked to treat other risk factors of hypertension in Pakistan with concurrent use of antihypertensive drugs<sup>7</sup>. For treating hypertension adopting plant based foods, low sodium, fat and junk food intake, high potassium, fiber, fruits and vegetables intake is considered necessary<sup>8</sup>. For treatment of hypertension in Pakistan we need to focus on nutritional therapy as well, for the patients. Nutritional therapy can support patients to get control hypertension. Nutritional therapy give education and support to help patients to adopt healthy and hygienic eating pattern, which plays important role in maintaining and manage or control high blood pressure and its complications<sup>5</sup>. Education modification program and diet modification is important for the treatment of hypertension<sup>9</sup>. Diet modifications are the key for maintaining the body and safe from every disease. The role of diet modification in determining blood pressure is settled down or come in normal range<sup>10</sup>. Recommended or modified diet for hypertension is diet with low sodium, cholesterol and saturated fats. For diet modification the first thing is that less salt intake, eating fruits and vegetables took very valuable change in high blood pressure<sup>11</sup>. With diet modification there is need to modify our lifestyle also in Pakistan which can cause our body become healthy. Daily routine changes requires for the lifestyle changes by using proper diet, reducing or complete stopping of alcohol and smoking, avoiding tobacco, do exercise regularly, and proper sleep<sup>5</sup>. It has been observed that for treatment of hypertension the patients had modified their diet as per directions of physicians or dietician. After using drugs and diet

modification, the blood pressure was observed to be in normal range. The dieticians suggested that to take low intake of sodium, to take large amount of vegetables and fruits, eat whole grains and low intake of fat and dairy products. For adults and hypertensive patients these diets are found more beneficial for health which is frequent dietary counseling that is particularly found in studies<sup>6</sup>.

## **METHODOLOGY**

Different research articles were downloaded and studied using Google Scholar, science direct and Researchgate etc. In these articles, comprehensive studies are being given as well as follow up studies of different case studies<sup>12</sup>.

### **Inclusion Criteria**

This review has been written after searching research articles on different types of hypertensive patients and the way of controlling their diet.

### **Exclusion Criteria**

The articles in which studies are given on patients showing symptoms and are not declared hypertensive by their medical practitioners.

### **Assessment for the quality**

For study quality all included text were critically checked. The authors have assessed study participations by patients, study weaknesses, and statistical analysis and way of reporting.

## **RESULTS AND DISCUSSION**

We include almost 16 articles for writing this review. The focus of this study was to evaluate the hypertension cases reported in Pakistan and their treatment in case of diet control.

Misfortunately, there are not so much studies carried out in Pakistan on this topic that's why we have included different other case studies carried out in different parts of the world to compare these studies. All included studies were systematically associated with hypertension treated with diet with drugs.

A group of researchers have studied the prevalence and factors causative for hypertension in adults in Ghizar district Northern Areas of Pakistan. It was carried out using stratified random sampling with 4203 number of participants. All the participants selected were more than 18 years. Statistical methods were used to assess mean  $\pm$  S .D. of all the reading of blood pressures. The reading for blood pressure (in mm Hg) were recorded as  $125/80 \pm 19/12$  in men and  $125/78 \pm 22/14$  in women. There was 15% participants having blood pressure equal to or more than 140 mm Hg. These participants were already using antihypertensive drugs. There was different age groups having different prevalence rates i.e. 18–29 year age group were only 4% and most of 60 years or more participants were having 36% prevalence. All males and females were almost same prevalent to hypertension. In this study, multivariate analysis have been carried out. After this analysis, it was discovered that with increase in either age or body mass index or both (obesity and overweight) were individually associated with increased prevalence of hypertension. Hypertension is said to be significant health related problem in the rural side of northern Pakistan. Moist snuff is a form of smokeless tobacco which is commonly used by overall population under study. In this study both the males and females were (39% and 14%)

reported to use snuff. The moist snuff contains sodium, nicotine and liquor ice. These factors are causative for hypertension and if they can reduce using snuff, they might get better conditions of blood pressure. In this study, there is only prevalence showed and no any treatment patterns are given by authors which makes this study less working as compared to others which have also reported treatment patterns like drugs, life style changes and dietary changes as well<sup>13</sup>.

In a study by a group of researchers in Sindh, have worked on connection of metals with prevalence of hypertension. This study have been carried out on abnormal metabolism of the ions of metal which plays a vital role in health and disease. In this study essential minerals i.e. potassium (K), calcium (Ca), sodium (Na), magnesium (Mg) were analyzed in urine, scalp hair and blood of patients suffering from hypertension. An overall 387 male and female patients suffering from hypertension having age in between 30 to 60 years have been included. Along with hypertensive, a group of 439 volunteers with no any hypertensive condition having same age were included. It has been observed that patients suffering from hypertension have comparatively low concentrations of Ca, K and Mg in the body as compared to the normal volunteers. It was also observed that Na levels are very much high in hypertensive patients as compared to normal ones having less concentrations. It has been suggested by the authors to decrease Na intake and increase Ca, K and Mg intake can help lower down the blood pressure. In this study, the use of drugs are not mentioned. Because only diet

cannot have impact on prevalence or treatment of hypertension<sup>14</sup>.

A group of researchers in Ziarat have worked on different parameters of volunteers and their connection with health issues. The physiological parameters, and carbohydrate and lipid metabolism studies were assessed. A total of 198 subjects have been included in this study. The physiological parameters i.e. age, nutritional habits, age, blood pressure, body mass index(BMI), triglycerides, serum low and high density lipoprotein (LDL and HDL), triglycerides (TG) and very low density lipoprotein (VLDL), were analyzed. It was observed that LDL, Mean cholesterol, triglyceride and VLDL values were considerably high in men as compared to women. These factors were seen to be more increasing as the age of the peoples were increasing. In men triglyceride levels were divided in three groups. According to this study, glycaemia has direct effect on blood pressure. In this study, less number of females are included as compared to male i.e. 138 males and only 60 females have been included in this study which shows bias of the authors. Also, the authors have tried to study many factors which have no any relation with each other for example LDL and HDL have no effect on age, or blood pressure etc. If authors have tried to do any comparison in all these factors, then they have completely not proved it<sup>15</sup>.

A group of researchers in Lahore have studied metabolic syndrome among young people in urban areas. According to authors sleeping habits, surplus energy intake, and inactive lifestyles in peoples of Lahore have been studied. These habits have increased metabolic

syndrome disorder. This was a cross-sectional study conducted on 509 young volunteers. More of them have consumed lots of protein rich products then recommended and less amount of fruits and vegetables. About 50% of participants have been said to sleepless than recommended hours per day. The authors have given many other factors which they have failed to give connection with the said disease. The authors should have focused on metabolic syndrome not only be assessing proteins but also other diet related factors<sup>16</sup>.

A group of researchers have studies prevalence and risk factors of hypertension in Pakistan. In this study, patients residing in rural areas are more prevalent than urban compared. It was a large community-based epidemiological survey. The patients which were already diagnosed with hypertension are included. Also patients taking antihypertensive drugs have also been included. According to this study, 46.2% is the prevalence rate of hypertension in Pakistan. Patients residing in urban areas are more prone to be hypertensive than rural. In different provinces there is different rates i.e. 49.2% in Punjab, 46.3% in Sindh, 40.9% in Baluchistan, and 33.3% in Khyber Pakhtunkhwa (KPK). Different factors are also given in this study which is considered causative for hypertension. This study was very much detailed and no any point is remaining because it has been done by government itself<sup>17</sup>.

A group of researchers have studied the adherence of using antihypertensive drugs by patients. The obedience in following proper use of antihypertensive drugs by patients is necessary for obtaining best results in controlling

hypertension. It was a cross-sectional study having 460 patients selected randomly at Karachi, Sindh. A majority of the patients were shown to be adherent. In this study it has been claimed by the authors that increasing number of pills can help increase adherence, which is having no association. Because as per general concept of population single drug or monotherapy is considered to have best in case of memorizing. If more than 3 pills are given then how patients can memorize which medicine he or she have taken or not. Also this study have very less number as the population of Karachi, capital of Sindh is more than 40 million, so this number is not so much that can represent overall population<sup>18</sup>.

Not only in Pakistan have this type of studies been carried out but also in different parts of world. According to the studies carried out in USA, blood pressure was easily controlled by dietary modifications in daily life. The role of different metals as dietary components i.e. calcium, sodium, magnesium and potassium have been observed in the past decade. In another study, reduction in sodium and caloric intake and use of diets which are high in fruits have antihypertensive effects. Other factors which have been given are intake of vegetables, low-fat dairy products, whole grains, poultry, fish, nuts, and unsaturated vegetable oils have also effects on controlling blood pressure. This diet modification and nutritional therapy is used for weight loss. High blood pressure or hypertension should directly affect by weight loss<sup>12, 20</sup>. Similar type of study has been carried out in Ireland in which different dietary modifications have been assessed to control the hypertension. In this

study, data was analyzed by different methods like using STATA 12 or using SPSS version 20.0. In data analysis, patient's age, sex, socioeconomic status, BMI, food intake, exercise routine, their hypertension status, their daily routine and habits, diet modifications etc. are being studied and related with hypertension<sup>21</sup>. According to one study, exercise has been direct impact for control of blood pressure<sup>22</sup>. According to a review by researchers from Turkey and Australia it was concluded that weight loss helps reduce blood pressure. Flavonoid rich foods also helps reduce hypertension because they help reduce weight<sup>10</sup>. According to one of the study, carried out in Italy, Na intake and blood pressure have direct relationship. The reduction of sodium intake may reduce the morbidity and mortality in cardiovascular diseases besides hypertension<sup>23</sup>. According to one of the other study carried out in USA, K intake has direct relation with blood pressure. High intake of K is recommended to decrease high blood pressure. With the help of high intake of Potassium blood pressure significantly lowers the incidence of stroke, cardio pulmonary arrest, and other heart diseases<sup>24</sup>. According to one of the study carried out in Italy, amino acids have direct relation with hypertension. Amino acids are the building blocks of proteins. Not all amino acids but some amino acids have showed association with hypertension. Amino acids side effects showed in different studies and its different actions of different amino acid classes on blood pressure regulation. Increase protein intake may have great effect on lowering hypertension<sup>25</sup>. According to this study carried out in Korea, high carbohydrate diet produces more insulin and

leptin in the body which is the cause of high blood pressure. It means greater intake of carbohydrates is responsible for hypertension. Results through literature suggest that the quality of carbohydrates consumed is associated with the risk of obesity and hypertension<sup>26</sup>. All the carbohydrates are not causing hypertension but some of the carbohydrates can regulate blood pressure in human body<sup>27</sup>. According to study carried out in Germany, it was observed that high intake of lipid, cholesterol and smoking can increase the risk of spread coronary heart disease in people in a categorized fashion. That's why, food containing either no or less lipid contents are recommended in hypertensive patients<sup>28</sup>.

#### **Recommendations:**

After studying different articles, it is recommend for hypertensive patients that check the blood pressure regularly and if it is not in normal range, then try control it by:

- i. Maintaining a healthy weight,
- ii. Maintain a healthy diet,
- iii. Exercise daily,
- iv. Limit alcohol,
- v. Eat lots of fruits and vegetables in diet,
- vi. Don't take too much stress, manage your stress as possible,
- vii. Drink lots of water,
- viii. Proper sleep.

#### **CONCLUSION**

It is concluded that the factors which have been studied by different researchers which are present in the literature are many i.e. weight, obesity, habits, insomnia and heredity etc. for

hypertension. It is also concluded that population wise reduction of hypertension in Pakistan with nutritional therapy and diet modification is possible along with use of proper medication. So for reduction of hypertension patients need to reduce sodium intake in diet and weight loss. Also some studies suggest that increase in diet containing potassium is beneficiary, reduction in alcohol consumption, high fiber diet which is present in fruits and vegetables. And also using vegetables and fruits may help to boost up immunity along with lowering down the blood pressure. Also some studies have showed promising effect of doing exercise daily for reduction of blood pressure. In simple words, eating healthy diets, maintain healthy weight, increase physical activity, manage stress should help to lower blood pressure easily.

**Conflict of Interest:** The authors declare no conflict of interest.

**Funding:** No funding was provided by any institution.

#### **REFERENCES**

1. Whalen K. Lippincott Illustrated Reviews Pharmacology. Wolters Kluwer; 2018.
2. Chaudhry SA, Jong G, Koren G. The fetal safety of Levetiracetam: A systematic review. *Reproductive Toxicology*. 2014; 46:40–5.
3. Guo F, He D, Zhang W, Walton RG. Trends in Prevalence, Awareness, Management, and Control of Hypertension Among United States Adults, 1999 to 2010. *Journal of the American College of Cardiology*. 2012; 60(7):599–606.

4. Shafi ST, Shafi T. A survey of hypertension prevalence, awareness, treatment, and control in health screening camps of rural central Punjab, Pakistan. *JEGH*. 2017; 7(2):135.
5. Gangwisch JE, Heymsfield SB, Boden-Albala B, Buijs RM, Kreier F, Pickering TG, et al. Short Sleep Duration as a Risk Factor for Hypertension: Analyses of the First National Health and Nutrition Examination Survey. *Hypertension*. 2006; 47(5):833–9.
6. Scherrer JF, Xian H, Bucholz KK, Eisen SA, Lyons MJ, Goldberg J, et al. A Twin Study of Depression Symptoms, Hypertension, and Heart Disease in Middle-Aged Men. *Psychosomatic Medicine*. 2003; 65(4):548–57.
7. Reddy KS, Katan MB. Diet, nutrition and the prevention of hypertension and cardiovascular diseases. *Public Health Nutr*. 2004; 7(1a):167–86.
8. Ozemek C, Laddu DR, Arena R, Lavie CJ. The role of diet for prevention and management of hypertension. *Current Opinion in Cardiology*. 2018; 33(4):388–93.
9. Simões Corrêa Galendi J, Leite RGO, Banzato LR, Nunes-Nogueira V dos S. Effectiveness of Strategies for Nutritional Therapy for Patients with Type 2 Diabetes and/or Hypertension in Primary Care: A Systematic Review and Meta-Analysis. *IJERPH*. 2022 2; 19(7):4243.
10. O'Shaughnessy KM. Role of diet in hypertension management. *Current Science Inc*. 2006; 8(4):292–7.
11. Nuñez-Cordoba JM, Alonso A, Beunza JJ, Palma S, Gomez-Gracia E, Martinez-Gonzalez MA. Role of vegetables and fruits in Mediterranean diets to prevent hypertension. *Eur J Clin Nutr*. 2009; 63(5):605–12.
12. Ellwood L, Torun G, Bahar Z, Fernandez R. Effects of flavonoid-rich fruits on hypertension in adults: a systematic review. *JBIC Database of Systematic Reviews and Implementation Reports*. 2019; 17(10):2075–105.
13. Shah S, Luby S, Rahbar M, Khan A, McCormick J. Hypertension and its determinants among adults in high mountain villages of the Northern Areas of Pakistan. *J Hum Hypertens*. 2001; 15(2):107–12.
14. Panhwar A, Kazi T, Afridi H, Talpur F, Arain S, Kazi N. Distribution of Potassium, Calcium, Magnesium, and Sodium Levels in Biological Samples of Pakistani Hypertensive Patients and Control Subjects. *Clin Lab*. 2014; 60(3):463-74.
15. Baig SA, Asif M, Irfani TM, Hussain A, Cheema AM, Malik A, et al. The association of nutritional profile and prognosis of degenerative diseases associated with carbohydrate and lipid metabolism at high altitude of district Ziarat, Pakistan. *Saudi Journal of Biological Sciences*. 2015; 22(1):50–5.
16. Malik MS, Qayyum W, Farooq A, Waqas A, Sukhera AB, Khalid MA, et al. Dietary Patterns, Exercise, and the Metabolic Syndrome Among Young People in Urban Pakistan (Lahore). *Metabolic Syndrome and Related Disorders*. 2020; 18(1):56–64.
17. Basit A, Tanveer S, Fawwad A, Naeem N, NDSP Members. Prevalence and contributing risk factors for hypertension in urban and rural areas of Pakistan; a study from second National Diabetes Survey of Pakistan (NDSP) 2016–2017. *Clinical and Experimental Hypertension*. 2020; 42(3):218–24.
18. Hashmi SK, Afridi MB, Abbas K, Sajwani RA, Saleheen D, Frossard PM, et al. Factors Associated with Adherence to Anti-Hypertensive Treatment in Pakistan. *Baune B, editor. PLoS ONE*. 2007; 2(3):e280.
19. Nguyen H, Odelola OA, Rangaswami J, Amanullah A. A Review of Nutritional Factors in Hypertension Management. *International Journal of Hypertension*. 2013;2013:1–12.
20. Sacks FM, Campos H. Dietary Therapy in Hypertension. *N Engl J Med*. 2010; 362(22):2102–12.
21. Geaney F, Fitzgerald S, Harrington JM, Kelly C, Greiner BA, Perry IJ. Nutrition knowledge, diet quality and hypertension in a working population. *Preventive Medicine Reports*. 2015;2:105–13.



22. Raven PB, Chapleau MW. Blood pressure regulation XI: overview and future research directions. *Eur J Appl Physiol.* 2014; 114(3):579–86.
23. Grillo, Salvi, Coruzzi, Salvi, Parati. Sodium Intake and Hypertension. *Nutrients.* 2019; 11(9):1970.
24. Houston MC. The Importance of Potassium in Managing Hypertension. *Curr Hypertens Rep.* 2011; 13(4):309–17.
25. Poggiogalle E, Fontana M, Giusti AM, Pinto A, Iannucci G, Lenzi A, et al. Amino Acids and Hypertension in Adults. *Nutrients.* 2019; 11(7):1459.
26. Kim DY, Kim SH, Lim H. Association between dietary carbohydrate quality and the prevalence of obesity and hypertension. *J Hum Nutr Diet.* 2018; 31(5):587–96.
27. Hansen LH, Madsen TD, Goth CK, Clausen H, Chen Y, Dzhoyashvili N, et al. Discovery of O-glycans on atrial natriuretic peptide (ANP) that affect both its proteolytic degradation and potency at its cognate receptor. *Journal of Biological Chemistry.* 2019; 294(34):12567–78.
28. Keil U. Coronary artery disease: the role of lipids, hypertension and smoking. *Basic Research in Cardiology.* 2000; 95(7):152–8.