

ASSESSING ROLE OF DIETARY AND LIFESTYLE CHANGES IN THE MANAGEMENT OF HYPERTENSION: A CROSS-SECTIONAL STUDY

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Abstract

Background: High blood pressure is one of the significant risk factors for heart disease across the world. Although pharmacologic therapies are effective, lifestyle and dietary changes have become essential elements in the prevention and management of this condition.

Objective: To determine the success of diet and lifestyle interventions in the control of blood pressure in hypertensive patients.

Material and Methods: This study was conducted descriptively at Hayatabad Medical Complex Peshawar KPK from Jun 2024 to Jun 2025. One hundred and fifty adult hypertensive patients were enrolled. Structured questionnaires and clinical blood pressure were used to measure data. Respondents who claimed lifestyle changes were grouped into adherent and non-adherent.

Results: Sixty percent (90 out of 150) of participants made lifestyle changes, including limiting salt intake, increasing fruit and vegetable consumption, and exercising regularly. These participants exhibited a significant reduction in blood pressure, with a mean systolic blood pressure of 132.7 ± 8.4 mmHg compared to 142.3 ± 10.2 mmHg in the non-adherent group ($p < 0.001$). Similarly, diastolic blood pressure was lower in the adherent group (82.1 ± 6.7 mmHg) compared to the non-adherent group (88.9 ± 7.5 mmHg, $p < 0.001$). Additionally, the adherent group showed improvements in BMI and physical activity levels, with 55% losing at least 1 BMI unit compared to 18% in the non-adherent group, and 64.4% engaging in regular physical activity (≥ 3 times/week) compared to 21.6% in the non-adherent group.

Conclusion: Life and food habits are essential factors in achieving better control over blood pressure, and therefore, special attention should be given to this aspect in blood pressure management programs.

Keywords: Hypertension, Lifestyle Modification, Dietary Changes, Blood Pressure Control, Cardiovascular Health.

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Introduction:

Hypertension (HTN) is a significant health challenge in the world and one of the top factors of cardiovascular morbidity and mortality¹. According to World Health Organization report the prevalence of HTN has increased from 650 million in 1990 to 1.28 billion in 2019, with most of the cases being in middle to older aged individuals from low and middle income countries². The global differences in HTN prevalence is mainly due to gaps in awareness and medical illiteracy between low and high income countries³. According to National Diabetic Survey (2016-2017) the prevalence of HTN in Pakistan is estimated to be 46%⁴. Poor dietary habits, inactive lifestyle, Alcohol consumption, aging, rennin-Angiotensin-Aldosterone system, hyperactivity and endothelial dysfunction are the major

factors for development of HTN.

Increasing evidence shows that non-pharmacological interventions are very crucial in the prevention and treatment of hypertension, especially lifestyle and dietary changes which, in certain instances, restore normal blood pressure levels on their own⁵.

The overview of new research demonstrates that long-term adherence to a lifestyle changes improves the control of hypertension, particularly in cases where patients are informed about the effects of their actions and encouraged by physicians to remain adherent over time⁶. Multidimensional interventions related to lifestyle, including diet, physical activity, and stress, have been found to reduce the incidence

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of hypertension and attenuate its development⁷. It is crucial to focus on a balanced diet that contains whole grains, fruits, vegetables, lean proteins, and low-fat dairy and to limit intake of trans fats, sugar, sodium and Alcohol. Such eating habits not only aid in controlling blood pressure but also resist the overall characteristics of metabolic syndrome⁸. High fiber diets, bioactive compounds in herbs and spices, nitrate-rich vegetables and dietary micronutrients such as potassium, calcium, magnesium, and vitamin D help to reduce blood pressure and enhance vascular function, promote the presence of the diversity of gut microbiota and consequently immune responses and metabolic pathways related to the maintenance of blood pressure.

Nutritional awareness can significantly predict diet adherence, indicating that education programs, which are extensive and tailored to individual needs, should be used effectively

Material and Method:

Study Design: Descriptive Cross-sectional study.

Study setting: The research was conducted in the Department of Medicine at Hayatabad Medical Complex Peshawar KPK.

Duration of Study: 1 year, from Jun 2024 to Jun 2025.

Inclusion Criteria: This study encompassed patients aged 30-70 years who had primary hypertension and were in the outpatient department. Only a volunteer were enrolled, provided they were willing to participate and sign an informed consent form. To be evaluated, the patients who indicated that they made dietary or lifestyle changes during the last year were chosen.

Exclusion Criteria: Secondary hypertension, pregnancy-induced hypertension, cognitive deficits, chronic kidney disease, or any other conditions affecting the blood pressure regulation process were considered as exclusion criteria.

Procedure: The structured questionnaire employed a face-to-face interview to collect data. The self-administered questionnaire aimed to cover areas that included demographic information, medical history, food habits, physical activity, smoking, alcohol consumption, and compliance with lifestyle changes involving salt restriction, increased intake of fruits and vegetables, and regular physical exercise. Blood pressure was measured with a calibrated sphygmomanometer, according to accepted standards, using two readings (taken after a five-minute interval). The mean between the two readings was noted. A scoring scale based on the current guidelines was used to assess adherence to diets and lifestyles. The participants have been grouped into two categories: Adherent and Non-Adherent. Their effectiveness was assessed by

comparing the mean values of blood pressure, as well as other clinical indicators, between the two groups.

Statistical Analysis: Analysis of data was done using SPSS 25. Descriptive statistics were determined, and chi-square and t-tests were interpreted to illustrate the presence of statistical significance where the p-value was less than 0.05.

Results:

There were a total of 150 hypertensive patients who participated in the study. The average age of the participants was 54.3 (standard deviation = 9.6) years, Female to Male Ratio was 58 and 42 percent respectively. 62% of the participants had a three-year history of diabetes. 68% of all patients were overweight or obese regarding their BMI. Most of them (74%) had low to moderate activity levels, and 40% reported having poor eating habits before enrollment. Out of all, 90 (60%) respondents made a change to their diet and changes in their lifestyles after diagnosis. They comprised decreased salt consumption (88.9%), fruit and vegetable consumption (71.1%), frequent physical exercise (64.4%), and smoking cessation (16.7%). The remaining 60 patients (40 percent) experienced no major change their routine.

Table 1: Baseline Characteristics of Study Participants (n = 150)	
Variable	Frequency (%) or Mean ± SD
Age (years)	54.3 ± 9.6
Gender (Male/Female)	63 (42%) / 87 (58%)
Duration of Hypertension	
– Less than 1 year	24 (16%)
– 1 to 3 years	33 (22%)
– More than 3 years	93 (62%)
BMI Category	
– Normal	48 (32%)
– Overweight/Obese	102 (68%)

The average systolic and diastolic blood pressure was compared in participants who followed lifestyle modification and those who did not, showing a significant differences. The dietary and physical activity group had a mean BP of 132.7 +/- 8.4 mmHg in terms of systolic BP as compared to 142.3 +/- 10.2 mmHg in the non-adherent group. Similarly, diastolic BP was low in the adherent group (82.1 + 6.7 mmHg) in comparison to the adherent group (88.9 + 7.5 mmHg), and the differences were found to be statistically significant (p < 0.01).

Table 2: Blood Pressure Comparison Based on Lifestyle Adherence			
Parameter	Adherent Group (n=90)	Non-Adherent Group (n=60)	p-value
Mean Systolic BP (mmHg)	132.7 ± 8.4	142.3 ± 10.2	<0.001
Mean Diastolic BP (mmHg)	82.1 ± 6.7	88.9 ± 7.5	<0.001

Adherents to lifestyle changes also achieved better weight control. Out of the adherent group, 55% lost at least 1 unit of BMI as compared to 18% among the non-adherent group. 64.4

of the adherent participants reported increased physical activity as compared to 21.6 of the non-adherent group.

Table 3: Lifestyle Modification Outcomes		
Outcome	Adherent Group (%)	Non-Adherent Group (%)
BMI Reduction ≥ 1 Unit	55%	18%
Regular Physical Activity (>3x/week)	64.4%	21.6%
Salt Restriction	88.9%	13.3%
Increased Fruit/Vegetable Intake	71.1%	18.3%

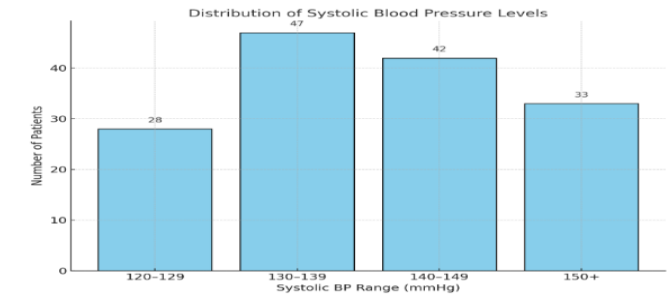


Figure I: Graph: Distribution of Systolic Blood Pressure Levels
This graph shows that most patients fall within the range of 130-139 mmHg, especially those who were able to implement lifestyle changes. The non-adherent group had the highest systolic pressures (150+).

Discussion:

This study studied the role of dietary and lifestyle interventions in hypertension management in a group of adult patients in a tertiary care hospital. The results highlight the high values of non-pharmacological interventions, primarily, diet changes and physical activity improvement, toward reaching the control of high blood pressure. These findings are comparable to international guidelines that advocate lifestyle management to be part of the core approach in the control of hypertension⁵. The success of lifestyle interventions is supported by multiple studies. Ojangba *et al.* stated that persistent maintenance of lifestyle interventions such as healthy eating, exercise, and stress reduction showed significant benefit to hypertension outcomes when strengthened by health education and support⁶. About two-thirds of the individuals in this study recorded at least following a single lifestyle change and they were found to improve significantly in their systolic and diastolic blood pressure. As was pointed out by Valenzuela *et al.*, lifestyle interventions achieve not only decrease in blood pressure, but also prevent the development of hypertension in pre-hypertensive subjects⁷. Such a preventive effect of non-pharmacological intervention is a major consideration in low and middle income population. The role of lifestyle changes in the reduction of cases of resistant hypertension was also proven in the TRIUMPH trial where there was a significant

decrease to the cases of resistant hypertension even in patients who did not respond to medication ⁹. This is aligned to the findings where the average of systolic blood pressure was 132.7 mmHg with the adherent participants which is lower than 142.3 mmHg recorded in the non-adherent counterparts. Lifestyles have diverse effects on the various physiological mechanisms of blood pressure regulation. Ghodeswar *et al.* reports that besides regulating blood pressure, balanced diet, physical activities and sleep patterns would decrease systemic inflammation and enhance endothelial functioning¹⁰. Changing one's diet directly impacts vascular resistance and fluid balance, including the restriction of salt and the consumption of more fruits and vegetables with a higher potassium content. Moreover, there is also evidence that peculiarities of the diet can diminish the attributes of metabolic syndrome, which is a proven cause of hypertension⁸. Fiber and probiotic-rich diets can alter the gut microbiota composition and result in reducing systemic inflammation and improved vascular tone^{11,12}. This finding is in agreement with the results, as patients who increase their intake of fruits and vegetables report better control of their blood pressure. This is consistent with studies indicating that the diversity of the gut microbiome, enhanced by the use of plant-based diets, is linked to favorable blood pressure patterns¹³.

Another way in which bad lifestyle habits cause hypertension is using autonomic nervous system dysregulation. Valensi has demonstrated that poor dietary intake and obesity may enhance the activity of the sympathetic mediator, leading to an elevation of blood pressure¹⁴. Patients can correct their autonomic balance by managing these risk factors with eating and exercise habits. Moreover, low levels of micronutrients, including magnesium, potassium, or calcium- have also been correlated to increased blood pressure. The meta-analysis by Chiu *et al.* demonstrates that micronutrient repletion can enhance outcomes related to hypertension¹⁵. The intake of herbs and spices containing bioactive elements also offers a potential therapeutic prospect. Alkhatib *et al.* describe the antihypertensive effects of such compounds as curcumin and quercetin, which have the properties of vasodilators and antioxidants¹⁶. The introduction of dietary fiber has also been shown to reduce systolic and diastolic blood pressure, as affirmed by Reynolds *et al.*¹⁷, which supports the relevance of whole-food-based approaches. This paper also highlights the advantages of the DASH diet, particularly for younger individuals. Couch *et al.* concluded that DASH-based interventions produced positive effects on vascular health in adolescents with elevated blood pressure¹⁸. These evidences convince the need to teach people healthy lifestyles at an early point to create healthy ways of living

before the disease develops. Alzahrani *et al.* reviewing the role of dietary nitrates which are present in leafy green vegetables and beets, which elevate the production of nitric oxide, leading to Vasodilation and low BP¹⁹. According to biology, there must be consideration of behavioral factors. Mohebbi *et al.* found that dietary adherence among hypertensive patients was significantly determined by nutrition knowledge and illness perception²⁰. This shows the need to incorporate behavior change models in clinical practice.

In this study, the participants who complied with lifestyle modifications were more aware of hypertension and had been counseled by the medics. According to Wadden *et al.*, the fact that pharmacological therapy and lifestyle modification go together poses a chance of implementing a comprehensive approach, particularly in patients with anti-obesity drugs²¹. Lastly, there are complicated metabolic and hormonal imbalances in the case of obesity-related hypertension. Shams *et al.* explain how the vascular and renal systems of the body interact with adiposity to increase blood pressure²². Combating obesity through nutrition and physical activity is beneficial to blood pressure control.

Conclusion:

This study highlights the importance of dietary and behavioral changes in the effective management of hypertension. Patients who maintained a healthy lifestyle exhibited remarkably lower systolic and diastolic blood pressure compared to those who failed to do so. This emphasizes the importance of combining non-pharmacological treatments with medical therapy. It is necessary to provide patient education, behavioral support, and scheduled counseling to achieve long-term adherence. Lifestyle interventions offer an affordable, available, and practical approach to long-term management of blood pressure.

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