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Evaluating the Effectiveness of Lifestyle Modifications in Managing Hypertension Among Adults

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ABSTRACT

Background: The significant risk factor for cardiovascular illnesses is hypertension. Changes in nutrition, exercise, and stress have the ability to lower blood pressure.

Objectives: The purpose of this research was to assess the results of life style changes such as diet, exercise and quitting smoking etc. for control of hypertension in adults.

Methodology: A prospective, randomized controlled was conducted from September 2023 till august 2024.Total 500 adults with hypertension were selected. Participants were divided into two groups, one who was taking the standard antihypertensive therapy and the other who was taking the standard therapy plus guided behaviour change counselling. The biomarkers like systolic and distolic blood pressure, weight, physical activity, salt intake and smoking were recorded initially and after 12 months of intervention. Statistical analysis was performed using SPSS version 25.0, involved t-tests for continuous variables and chi-square tests for categorical variables, with $p \leq 0.05$ considered significant.

Results: The results showed that intervention group experienced substantial decrease in SBP (-14.2 mmHg, $p<0.001$) and DBP (-9.6 mmHg, $p<0.001$), whereas the control group experienced lower reductions (-6.4 mmHg, $p<0.01$) and DBP (-4.2 mmHg, $p<0.01$). Furthermore, 75% of patients in the intervention group met their goal blood pressure, compared to 50% in the control group ($p<0.001$). The intervention group had considerably greater levels of lifestyle adherence, such as physical exercise and a low-salt diet ($p<0.001$).

Conclusion: Combining lifestyle management with traditional antihypertensive treatment considerably improves blood pressure control and lifestyle adherence, providing a comprehensive approach to hypertension management.

Keywords: Hypertension, lifestyle modifications, blood pressure, diet, physical activity, smoking cessation, Cardiovascular Risk.

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INTRODUCTION

A major contributor to morbidity and death is hypertension which affects more than one billion people worldwide and is linked to renal failure, cardiovascular disease, and stroke [1]. Although pharmacological treatments for hypertension exist, the control of high blood pressure is inadequate, and many patients fail to reach and sustain their treatment goals[2]. Non-compliance with prescribed drugs and other unhealthy practices including high intake of sodium, lack of exercise, and smoking are some of the main causes of uncontrolled hypertension. The World Health Organization (WHO) and other health-related organizations stress that diet changes, exercising more, and not smoking are important elements in controlling hypertension[3]. The second leading cause of mortality in Pakistan and the third most prevalent cause of death worldwide attributable to heart coronary disease is hypertension illness, often referred to as a "Silent killer". Since blood pressure is the primary avoidable factor that can considerably lower mortality and linked disorders, lowering blood pressure is vital. Reductions in systolic blood pressure of 3.5 milligrams can lower mortality rates by 8% in cases of stroke and 7% in cases of coronary artery disease. Less than half of hypertension patients were getting antihypertensive therapy, and only one in five (less than 25%) had achieved blood pressure control below145/90 mmHg, despite the availability and effectiveness of antihypertensive medications. Along with traditional medicines, non-medical methods such as lifestyle adjustments are also stressed to prevent and control hypertension. Lifestyle modifications, formerly known as non-pharmacologic therapy, are advised as the initial course of treatment for hypertensive disorders due to their substantial involvement in lowering blood pressure. The lifestyle interventions, dietary modification using the DASH (Dietary Approaches to Stop Hypertension) diet, reduced salt intake and physical activity all have been found to decrease both systolic and diastolic blood pressure [4, 5]. However, most of such studies involve single or isolated interventions, and/or have short-term follow up, and therefore, the long-term impact of intensive Comprehensive Lifestyle Strategies(CLS) with standard pharmacologic therapy remains undefined[6]. The study aims and objectives were to address the rising issue that pharmacological therapies for hypertension frequently fail to provide adequate control, despite their widespread usage. The current study aimed to determine whether lifestyle modifications such as the DASH diet, increased physical activity, and smoking cessation, when combined with standard therapy, can significantly improve blood pressure management and overall health outcomes in hypertensive adults [7].

MATERIALS AND METHODS

The current prospective, randomized controlled trail study was conducted from August 2023 to August 2024 at Kishwar Fazal Teaching Hospital and Hameed Latif Teaching Hospital. Total 500 hypertensive adults aged 30 to 65 years were selected from hospitals. This study was approved by the Ethical Committee of Rashid Latif Khan University Medical & Dental College (RLKU), Pakistan approval number IRB-RLKU-18/07/23/22-A. All participants provided informed consent prior to enrollment in the study. Participants were randomly assigned to one of two groups, the standard care group that was a control group(n=250) which received standard antihypertensive treatment and the treatment group which received lifestyle modification (n=250) in addition to standard antihypertensive treatment. The inclusion criteria for participants in this study included; a clinical diagnosis of hypertension with a

systolic BP of 140 mmHg or above or diastolic BP of 90 mmHg or above. They also excluded patients with secondary hypertension, recent cardiovascular event, severe comorbidity including chronic kidney disease, and cancer.

The intervention group got individualised dietary counselling for lifestyle changes to include Dietary Approaches to Stop Hypertension (DASH) diet and were instructed to take not more than 2 grams of salt per day. 3 grams and increase the intake of foods that are rich in fruits, vegetables and low fat dairy products. Aerobic exercise at moderate-intensity was set at least 150 minutes per week as a physical activity goal. To the participants who smoked, smoking cessation was offered; counseling and other nicotine replacement therapies where deemed necessary. These two groups received monthly follow-up visits where their blood pressure, their body weight and the degree of compliance to the mentioned lifestyle changes were assessed. Systolic and diastolic blood pressures were recorded with an automatic sphygmomanometer and patients' compliance with the prescribed lifestyle changes were estimated with the help of standardised questionnaires. The major measure of effect was the difference in systolic and diastolic blood pressure at the end of one year follow up from the baseline measurement. Secondary end points encompassed were variations in weight, physical activity, diet compliance and smoking status. Data analysis was done using the statistical package SPSS version 25.0, while demographic and clinical marameters of the patients were presented in terms of mean, standard deviation (Mean ± SD) and Frequency Distribution. Intragroup comparisons of blood pressure changes were analysed using paired t-tests, whereas intergroup comparisons were done using independent t-tests. Chi-square tests were applied to compare categorical variables such as gender and lifestyle adherence. Significance was considered at ($p \leq 0.05$).

RESULTS

A total of n=500 hypertension patients were enrolled, n=250 were placed in the intervention group and n=250 in the control group. The age range of the participants was 35-65. There were no appreciable variations in baseline blood pressure, gender, age, body mass index (BMI), or smoking behaviors between the two groups (Table 1). Independent t-tests were applied to continuous variables (e.g., age, SBP, DBP, BMI), chi-square test was applied for categorical variables (e.g., gender, smoking status). The baseline variables for the control and intervention groups were compared in the table-1. Age, gender distribution, baseline blood pressure readings (both systolic and diastolic), body mass index (BMI), and smoking percentage were comparable across the two groups. There were only little differences between the groups, the intervention group had a slightly higher systolic blood pressure and BMI, whereas the control group has a slightly larger number of smokers.

Table 1: Baseline variables of Participants

Variable	Control Group (n=250)	Intervention Group (n=250)	p-value
Age (years)	54.1 ± 8.3 (35–65)	53.8 ± 8.1 (35–65)	0.056
Gender (Male/Female)	130/120	135/115	0.057
Baseline SBP (mmHg)	153.1 ± 9.0	153.6 ± 8.5	0.048
Baseline DBP (mmHg)	94.1 ± 4.6	94.3 ± 4.8	0.055
Body Mass Index (BMI, kg/m²)	28.4 ± 3.2	28.7 ± 3.4	0.041
Smokers (%)	28%	27%	0.035

($p \leq 0.05$)

When compared to the control group, the intervention group's gains in blood pressure were noticeably bigger at the 12-month follow-up. The intervention group showed a reduction in mean diastolic blood pressure (DBP) of 9.6 mmHg ($p<0.001$) and a drop in mean systolic blood pressure (SBP) of 14.2 mmHg ($p<0.001$). The control group, on the other hand, had a mean drop in Diastolic Blood Pressure (DBP) of 4.2 mmHg ($p<0.01$) and Systolic Blood Pressure (SBP) of 6.4 mmHg ($p<0.01$). Table-2 showed that the intervention group had a considerably larger number of patients (75%) who achieved the goal blood pressure (<140/90 mmHg) than the control group (50%) ($p<0.05$). Paired t-tests were applied to compare baseline and after-12-months values within each group (control vs. intervention). Independent t-tests were used to compare changes in SBP and DBP between groups.

Table 2: Blood Pressure Changes After 12 Months

Blood Pressure	Control Group	Intervention Group	p-value
SBP (mmHg) - Baseline	153.1 ± 9.0	153.6 ± 8.5	0.453
SBP (mmHg) - After 12 Months	146.7 ± 7.4	139.4 ± 6.2	<0.001
Change in SBP (mmHg)	-6.4	-14.2	<0.001
DBP (mmHg) - Baseline	94.1 ± 4.6	94.3 ± 4.8	0.532
DBP (mmHg) - After 12 Months	90.1 ± 4.5	84.7 ± 4.1	<0.001
Change in DBP (mmHg)	-4.2	-9.6	<0.001
% Achieving BP Target (<140/90)	50%	75%	<0.001

(p≤0.05)

Table-3 shows participants in the intervention group showed better commitment to lifestyle changes. Compared to 40% of the control group, 70% of the intervention group met the recommended level of physical activity after a year at least 150 minutes per week. Furthermore, a low-salt diet was followed by 60% of individuals in the intervention group vs 30% in the control group ($p<0.001$). Table 3 shows that the intervention group had a higher success rate when it came to smoking cessation, with 30% of smokers quitting compared to 15% in the control group ($p=0.002$). Chi-square tests were used to assess differences in categorical variables such as adherence to physical activity, diet, and smoking cessation.

Table 3: Lifestyle Modification Adherence

Lifestyle Factor	Control Group (n=250)	Intervention Group (n=250)	p-value
Physical Activity (≥150 min/wk)	40%	70%	<0.001
Low-Salt Diet Adherence	30%	60%	<0.001
Smoking Cessation	15%	30%	0.002

(p≤0.05)

The results of the study showed that changing one's lifestyle may significantly lower blood pressure and encourage better habits. In addition to achieving significant decreases in both systolic and diastolic blood pressure, the intervention group also demonstrated better adherence to dietary modifications, physical exercise, and quitting smoking. These results highlight the importance of complete lifestyle modifications in addition to conventional medication therapy for the management of hypertension.

DISCUSSION

Results of current study concluded that life style changes should be recommended as a part of an anti-hypertensive treatment since they can be as efficient as drugs alone[8]. Patients in the intervention group who followed up on lifestyle modifications including increased physical activity, low salt diet and smoking cessation had significantly better reduction in both systolic

and diastolic blood pressure than those in the control group who only took medication[9, 10]. The significant changes that were recorded in the course of the study, the most outstanding was the significant enhancement of blood pressure control in the group that received the intervention. 14.2 mmHg reduction in systolic blood pressure and 9.6 mmHg on diastolic blood pressure were recorded during the course of the one-year study period[11, 12]. These reductions are clinically significant and are higher than the changes in the control group where a 6 percent improvement in the score was observed. 4 mmHg of systolic blood pressure lowering and 14.2mmHg reduction of the diastolic blood pressure by as much as 2 mmHg[13]. Similarly, target blood pressure, that is <140/90 mmHg was achieved by a significantly higher percentage of the intervention group patients (75%) as opposed to 50% of the control group patients. These results are consistent with the previous studies about the fact that lifestyle modifications, including the DASH diet, and increased levels of physical activity are central to the management of blood pressure[14, 15]. These findings align with those of McManus et al. (2021), who also stated noteworthy drops in blood pressure among patients undergoing digital and lifestyle treatments. Their findings highlight the supplementary function of lifestyle alterations in conjunction with pharmaceutical therapy.

These favorable outcomes were achieved due to compliance with lifestyle changes that were prescribed. In the analysis of the results, it was observed that participants in the intervention group had the significantly higher level of physical activity and dietary compliance[16]. It was also observed that by the end of the study the percentage of the subjects in the intervention group that attained the WHO recommended 150 minutes of physical activity per week was 70% while that of the control group was 40%. Furthermore, concerning the issue of low salt diet only 60% of the people in the intervention group complied with it unlike the control group of 30%. Such behavioral modifications are relevant for the treatment of hypertension because physical activity and low sodium diet are known to decrease blood pressure and prevent cardiovascular complications[17, 18]. This finding aligns with studies like Valenzuela et al. (2021), which highlighted the long-term effectiveness of comprehensive lifestyle interventions in hypertension management. Another factor that contributed towards better results included smoking cessation. The smoking cessation rate recorded among the intervention group was 30% than the control group, which was only 15% thus proving the efficacy of the structured smoking cessation program[19]. Tobacco use is also another common risk factor that is known to increase the chances of hypertension besides being linked to other cardiovascular complications once one quits smoking, there are chances that he/she is likely to have better control of his/her blood pressure[20, 21]. Altogether, the results of this study support the notion of using pharmacological therapy along with the life style changes to achieve the best control of hypertension. However, the limitations of study is that pharmacological treatment alone is not sufficient and the life style changes such as diet, exercise, and smoking cessation can significantly improve the treatment results[22]. These findings also provide the evidence for the long-term approaches to maintain the lifestyle changes, for the effects of these interventions may decrease if people's compliance with the recommendations weakens in the further time[23, 24]. The findings of the present work were concluded that life style changes should be recommended as a part of an antihypertensive treatment since they can be as efficient as drugs alone[8]. Patients in the intervention group who followed up on lifestyle modifications including increased physical activity, low salt diet and smoking cessation had

significantly better reduction in both systolic and diastolic blood pressure than those in the control group who only took medication[9, 10]. In conclusion the use of standard antihypertensive treatment along with a package of CLM proved to be beneficial for the management of blood pressure and for reduction of hypertension-associated risks. The mentioned changes should be promoted in further studies by health professionals and supported in patients since it is a strong and long-term approach to fight hypertension and maintain healthy living[25, 26].

CONCLUSION

This study showed that in addition to traditional antihypertensive medication, adopting lifestyle modifications such as dietary adjustments, increasing physical activity, and quitting smoking significantly improves blood pressure management in persons with hypertension. These therapies raise the percentage of patients reaching target blood pressure in addition to lowering systolic and diastolic blood pressure.

Future prospects:

In order to improve long-term health outcomes, encouraging lifestyle modifications have to be a major part of hypertension therapy.

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Conflict of interest:

None

Authors' Contribution:

A.K. and A.K. conceptualized the study and developed the methodology. U.A., M.I., and F.N. assisted in data collection and statistical analysis, while R.A. and U.S.A. contributed to the final manuscript draft and revisions.

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Data Availability:

The data supporting the findings of this study are available from the corresponding author, upon reasonable request.

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