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COMPARATIVE STUDY OF LIFESTYLE INTERVENTIONS ON HYPERTENSION MANAGEMENT IN PRIMARY CARE SETTING

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Abstract

Background: Hypertension is a significant public health challenge globally, affecting millions of individuals. Despite numerous pharmacological treatments, lifestyle interventions remain a cornerstone of hypertension management. **Methods:** This study was a randomized controlled trial conducted at a primary care clinic with a sample size of 200 patients diagnosed with hypertension. Participants were randomly assigned to one of two groups: dietary modification and increased physical activity, or standard care. The study duration was 12 months. **Results:** Both interventions resulted in statistically significant reductions in systolic and diastolic blood pressure. However, the group receiving combined dietary and physical activity interventions showed a more significant reduction compared to the standard care group. **Conclusion:** Lifestyle interventions, specifically a combination of dietary changes and increased physical activity, are effective in managing hypertension in a primary care setting and offer a viable alternative to medication for some patients.

Keywords: Hypertension, Lifestyle Modifications, Primary Care

Introduction

Hypertension, commonly known as high blood pressure, is a major cause of cardiovascular diseases and a significant public health issue worldwide. The global prevalence of hypertension is rising, with estimates suggesting that one billion people are affected, making it a leading cause of global morbidity and mortality. Lifestyle modifications, including diet and physical activity, are recommended as the first line of treatment in managing hypertension, but their comparative effectiveness in primary care settings remains underexplored.[1]

This paper examines the impact of different lifestyle interventions on blood pressure control among hypertensive patients in a primary care setting. The rationale behind this study is grounded in the growing need to manage hypertension effectively at the community level to prevent complications and reduce the burden on secondary and tertiary healthcare facilities.[2][3]

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Lifestyle interventions, such as dietary modifications and increased physical activity, have been shown to reduce blood pressure in various populations. Studies have highlighted the benefits of diets rich in fruits, vegetables, and low in saturated fats and sodium, particularly the Dietary Approaches to Stop Hypertension (DASH) diet. Similarly, regular physical activity is recommended as part of a healthy lifestyle and has been shown to help lower blood pressure significantly.[4][5]

Aim

To compare the effectiveness of dietary modifications and increased physical activity on blood pressure control in hypertensive patients in a primary care setting.

Objectives

1. To evaluate the impact of dietary modifications on systolic and diastolic blood pressure in hypertensive patients.
2. To assess the effect of increased physical activity on blood pressure control among hypertensive patients.
3. To compare the overall effectiveness of dietary modifications versus increased physical activity in managing hypertension.

Material and Methodology

Source of Data: Data were collected from 200 hypertensive patients attending a primary care clinic.

Study Design: The study was designed as a randomized controlled trial.

Study Location: The research was conducted at the community primary care clinic.

Study Duration: The study was carried out over a period of 12 months.

Sample Size: A total of 200 hypertensive patients were enrolled in the study.

Inclusion Criteria: Adults aged 30-65 years, diagnosed with primary hypertension.

Exclusion Criteria: Patients with secondary hypertension, pregnant women, and those with significant comorbid conditions like diabetes or kidney disease.

Procedure and Methodology: Patients were randomly assigned to two intervention groups: one focusing on dietary changes and the other on increasing physical activity. Both groups were monitored bi-monthly for changes in blood pressure.

Sample Processing: Blood pressure measurements were taken using standard procedures, ensuring accuracy and consistency across all patient visits.

Statistical Methods: Data were analyzed using SPSS software. Differences between groups were assessed using paired and unpaired t-tests, chi-square tests for categorical data, and regression analysis to adjust for potential confounders.

Data Collection: Data collection involved initial and follow-up visits, where blood pressure and adherence to the intervention were assessed. Surveys were also used to gather information on patient satisfaction and lifestyle changes.

Observation and Results

Table 1: Comparative Effectiveness of Dietary Modifications and Increased Physical Activity

Variable	Group 1: Dietary Modifications (n=100)	Group 2: Physical Activity (n=100)	Test of Significance (t-value)	95% CI of Difference	P value
Baseline	145 ± 10	146 ± 11	-0.68	-3.2 to 1.2	0.498

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Systolic BP (mmHg)					
Baseline Diastolic BP (mmHg)	90 ± 8	91 ± 9	-0.83	-2.9 to 1.1	0.406
Post-intervention Systolic BP (mmHg)	130 ± 12	138 ± 14	-4.27	-11.6 to -4.4	0.0002
Post-intervention Diastolic BP (mmHg)	85 ± 7	89 ± 8	-3.75	-6.5 to -1.5	0.0003
Change in Systolic BP (mmHg)	-15 ± 4	-8 ± 3	10.75	-8.9 to -4.1	<0.0001
Change in Diastolic BP (mmHg)	-5 ± 2	-2 ± 1	9.50	-4.2 to -1.8	<0.0001
Adherence Rate (%)	80 (80%)	65 (65%)	Chi-square = 5.76	N/A	0.016

The table 1 evaluates the effects of dietary modifications versus increased physical activity on hypertension management among 200 participants divided into two equal groups. At baseline, both groups had similar systolic and diastolic blood pressures with no significant differences between them, as indicated by the p-values (0.498 for systolic and 0.406 for diastolic blood pressures). However, significant differences emerged post-intervention. The dietary modifications group showed greater reductions in both systolic (from 145 ± 10 mmHg to 130 ± 12 mmHg) and diastolic blood pressures (from 90 ± 8 mmHg to 85 ± 7 mmHg) compared to the physical activity group, which saw smaller reductions. The change in systolic blood pressure was -15 mmHg in the diet group versus -8 mmHg in the exercise group, with a highly significant p-value (<0.0001). Similarly, diastolic blood pressure changes were -5 mmHg and -2 mmHg, respectively, also yielding a highly significant p-value (<0.0001). Additionally, adherence rates were higher in the diet group (80%) compared to the exercise group (65%), which is statistically significant (p=0.016).

Table 2: Impact of Increased Physical Activity on Blood Pressure

Measurement	**Pre-Intervention**	**Post-Intervention**	**Test of Significance (t-value)**	**95% CI of Change**	**P value**
Systolic BP (mmHg)	146 ± 11	138 ± 14	4.36	-10.9 to -5.1	0.0001
Diastolic BP (mmHg)	91 ± 9	89 ± 8	2.22	-4.5 to -0.5	0.027

Table focuses on the impact of increased physical activity on blood pressure among 100 participants. The results show a notable decrease in both systolic and diastolic blood pressures post-intervention (from 146 ± 11 mmHg to 138 ± 14 mmHg and from 91 ± 9 mmHg to 89 ± 8 mmHg, respectively). The changes observed are statistically significant with p-values of 0.0001 for systolic and 0.027 for diastolic pressures. The 95% confidence

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intervals further support the efficacy of physical activity in reducing blood pressure levels among hypertensive patients.

Table 3: Overall Effectiveness of Interventions in Managing Hypertension

Intervention	Change in Systolic BP (mmHg)	Change in Diastolic BP (mmHg)	Test of Significance (t-value)	95% CI of Difference	P value
Diet vs. Physical Activity	-15 ± 4 vs. -8 ± 3	-5 ± 2 vs. -2 ± 1	10.75 for systolic, 9.50 for diastolic	Systolic: -8.9 to -4.1, Diastolic: -4.2 to -1.8	Systolic: <0.0001, Diastolic: <0.0001

Table compares the overall effectiveness of dietary modifications versus increased physical activity in managing hypertension. The data clearly demonstrate that dietary changes have a more pronounced effect on both systolic and diastolic blood pressure reductions compared to physical activity. The reductions in systolic (-15 mmHg vs. -8 mmHg) and diastolic blood pressures (-5 mmHg vs. -2 mmHg) between the groups show highly significant differences with t-values of 10.75 and 9.50, respectively. The corresponding p-values are less than 0.0001 for both measures. The 95% confidence intervals underline the robustness of these findings, emphasizing the greater efficacy of dietary interventions over physical activity alone in hypertension control.

Discussion

In table 1 presents a comparative analysis of the effectiveness of dietary modifications versus increased physical activity on blood pressure control among hypertensive patients. At baseline, there were no significant differences in systolic and diastolic blood pressures between the two groups, indicating that any observed post-intervention differences are attributable to the interventions themselves. Post-intervention results show significantly greater reductions in both systolic and diastolic blood pressures in the dietary modifications group compared to the physical activity group. These findings align with prior research, such as the landmark DASH study, which demonstrated the efficacy of dietary approaches in significantly lowering blood pressure Espinel E *et al.*(2023).[6] Furthermore, adherence rates were notably higher in the dietary group, suggesting that dietary interventions might be more acceptable or easier to follow for patients in a primary care setting. This is consistent with findings from other studies emphasizing the role of patient education and tailored dietary advice in improving adherence to lifestyle modifications Hanssen H. (2023).[7]

The data from Table 2 underscore the beneficial effects of increased physical activity on reducing both systolic and diastolic blood pressures, with significant reductions post-intervention. These results are supported by extensive literature, including a meta-analysis by Cornelissen and Smart, who reported that regular aerobic exercise leads to significant reductions in both systolic and diastolic blood pressures in individuals with hypertension Lauder L *et al.*(2023).[8] The changes observed in this study are within the range reported in the literature, reinforcing the importance of physical activity as a cornerstone in the management of hypertension.

Table 3 compares the overall effectiveness of dietary modifications versus increased physical activity in managing hypertension. The data indicate that dietary changes have a more pronounced effect on both systolic and diastolic blood pressure reductions compared to physical activity. This is in line with previous research suggesting that while both interventions are effective, dietary modifications might offer more substantial benefits in

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blood pressure control Kota V *et al.*(2023).[9] These findings might reflect the multifactorial impact of diet, which can influence various aspects of cardiovascular health beyond just weight control, including electrolyte balance, kidney function, and arterial stiffness Krishnamoorthy Y *et al.*(2023).[10]

Conclusion

This randomized controlled trial demonstrated the significant and beneficial effects of lifestyle interventions on blood pressure control among hypertensive patients in a primary care setting. Our findings clearly show that both dietary modifications and increased physical activity significantly reduce systolic and diastolic blood pressures, albeit with differing magnitudes of effect.

Dietary modifications emerged as the more effective intervention, achieving greater reductions in both systolic and diastolic blood pressures compared to increased physical activity alone. Specifically, patients who adhered to dietary interventions experienced an average reduction of 15 mmHg in systolic and 5 mmHg in diastolic blood pressures. These results are in line with existing literature that supports dietary changes, particularly those involving reduced sodium intake and increased consumption of fruits and vegetables, as a cornerstone in managing hypertension effectively.

Increased physical activity also proved to be beneficial, leading to a significant decrease in blood pressure levels, though the reductions were less pronounced than those achieved through dietary changes. This underscores the importance of incorporating regular physical activity into the daily routine of hypertensive patients, as it remains a vital component of cardiovascular health.

Moreover, adherence rates were notably higher in the dietary intervention group compared to the physical activity group, suggesting that dietary changes may be more feasible for patients to implement and maintain in the context of primary care. This highlights the need for primary care practitioners to focus on patient education and personalized dietary advice as part of a comprehensive approach to hypertension management.

In conclusion, while both interventions are recommended, dietary modifications appear to offer superior benefits in reducing blood pressure among hypertensive patients. These findings advocate for the prioritization of dietary interventions in hypertension management strategies in primary care settings, coupled with sustained efforts to enhance patient adherence and education about the benefits of a healthy lifestyle. Additionally, further research is encouraged to explore the combined effects of both dietary and physical activity interventions to maximize health outcomes for hypertensive patients.

Limitations of Study

1. **Short Duration of Study:** The study was conducted over a relatively short period (12 months), which may not fully capture the long-term adherence and sustainability of lifestyle changes or their prolonged impact on blood pressure and cardiovascular health.
2. **Sample Size and Generalizability:** The sample size of 200 participants, while adequate for initial findings, is relatively small for generalizing the results to a broader population. Moreover, the study's setting in a single primary care clinic limits the generalizability of the findings to other geographic and demographic contexts.
3. **Self-Reported Adherence:** The study relied partly on self-reported adherence to dietary and physical activity interventions, which can introduce bias and inaccuracies. Objective measures of adherence would provide more reliable data.

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4. **Control of Confounding Variables:** Although the study accounted for several baseline characteristics, other potential confounders such as socioeconomic status, stress levels, genetic predispositions, and concurrent medical treatments were not fully controlled or explored. These factors could influence the outcomes and effectiveness of lifestyle interventions.
5. **Lack of a Combined Intervention Group:** The study did not include a group receiving a combined intervention of both dietary modifications and increased physical activity, which could have provided insights into the synergistic effects of these interventions on blood pressure control.
6. **Variability in Intervention Implementation:** The details of how dietary and physical activity interventions were implemented could vary, potentially affecting the consistency and efficacy of the interventions. Standardized protocols and monitoring would help in minimizing this variability.
7. **Single-blinded Design:** The study's design was single-blinded, meaning the participants were aware of their group assignment. This awareness could have influenced their behavior and responses, potentially introducing bias.

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