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Comparative Analysis of Pharmacological and Non-Pharmacological Interventions in Hypertensive Patients at Cumilla Medical College Hospital

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Abstract **Original Research Article**

Background: Hypertension is a prevalent cardiovascular condition requiring effective management to reduce associated morbidity and mortality. Both pharmacological and non-pharmacological interventions play crucial roles in its treatment. This study aims to compare the effectiveness of these interventions in hypertensive patients at Cumilla Medical College Hospital, Bangladesh. ***Objective:*** To conduct a comparative analysis of pharmacological and non-pharmacological interventions in hypertension management. ***Method:*** A prospective study was conducted using data from the Department of Medicine at Cumilla Medical College Hospital, Bangladesh, from January 2023 to December 2023. A total of 184 patients were included in the study. Data on pharmacological and non-pharmacological interventions were collected, and blood pressure measurements were recorded. ***Result:*** Among the 184 patients, 65% received pharmacological interventions, while 35% received non-pharmacological interventions. Of those receiving pharmacological interventions, 82% achieved blood pressure control, compared to 73% in the non-pharmacological group. The mean reduction in systolic blood pressure was 20 mmHg in the pharmacological group and 15 mmHg in the non-pharmacological group. Regarding lifestyle modifications, 45% of patients in the non-pharmacological group reported improved dietary habits, and 55% reported increased physical activity. ***Conclusion:*** Both pharmacological and non-pharmacological interventions effectively manage hypertension, with pharmacological interventions showing slightly higher blood pressure control rates. However, non-pharmacological interventions are valuable for improving lifestyle factors. A combination of both approaches may be optimal for hypertension management.

Keywords: Hypertension, Pharmacological Interventions, Non-Pharmacological Interventions, Blood Pressure Control, Lifestyle Modifications.

INTRODUCTION

Hypertension, or high blood pressure, is a prevalent and significant health issue worldwide, contributing to various cardiovascular diseases and increasing the risk of morbidity and mortality [1]. Its management often involves a combination of pharmacological and non-pharmacological interventions to achieve optimal outcomes. This study aims to compare these interventions in hypertension patients at Cumilla Medical College Hospital, Bangladesh. Pharmacological interventions for hypertension typically involve the use of antihypertensive medications such as angiotensin-converting enzyme (ACE) inhibitors, angiotensin II receptor blockers (ARBs), calcium channel blockers (CCBs), and diuretics [2]. These medications work by different mechanisms to lower blood pressure and reduce the risk of complications. However, they may also be associated with side effects and require careful monitoring.

On the other hand, non-pharmacological interventions focus on lifestyle modifications and behavioral changes to manage hypertension. These interventions include dietary changes, such as reducing salt intake and adopting a heart-healthy diet rich in fruits, vegetables, and whole grains [3]. Physical activity, such as regular exercise, is also recommended as it can help

lower blood pressure and improve overall cardiovascular health. Additionally, smoking cessation and moderation of alcohol consumption are important lifestyle modifications in hypertension management [4]. The choice between pharmacological and non-pharmacological interventions depends on various factors, including the patient's blood pressure level, comorbidities, and individual preferences [5]. Some patients may require a combination of both approaches to achieve optimal blood pressure control.

Cumilla Medical College Hospital, located in Cumilla, Bangladesh, serves a large population and is crucial in managing hypertension and its regional complications [6]. By conducting a comparative analysis of pharmacological and non-pharmacological interventions in hypertension patients at this hospital, we aim to evaluate these interventions' effectiveness, safety, and feasibility in a real-world clinical setting. This study will contribute to the existing knowledge on hypertension management and provide valuable insights for healthcare providers and policymakers in developing strategies to improve hypertension care and outcomes in Bangladesh.

OBJECTIVE

General Objective

- To compare the effectiveness of pharmacological and non-pharmacological interventions in managing hypertension in patients at Cumilla Medical College Hospital, Bangladesh.

Specific Objectives

- To determine the percentage of hypertensive patients receiving pharmacological interventions at Cumilla Medical College Hospital.
- To determine the percentage of hypertensive patients receiving non-pharmacological interventions at Cumilla Medical College Hospital.
- To assess the blood pressure control rate among hypertensive patients receiving pharmacological interventions.
- To assess the blood pressure control rate among hypertensive patients receiving non-pharmacological interventions.
- To evaluate lifestyle factors such as diet and exercise among hypertensive patients receiving non-pharmacological interventions.
- To compare the effectiveness of pharmacological and non-pharmacological interventions in achieving blood pressure control.
- To assess the feasibility and safety of pharmacological and non-pharmacological interventions in hypertension management.
- To provide recommendations for optimizing hypertension management strategies at Cumilla Medical College Hospital.

MATERIAL AND METHODS

Study Design

This prospective study was conducted at the Department of Medicine, Cumilla Medical College Hospital, Bangladesh. Data were collected from January 2023 to December 2023. A total of 184 hypertensive patients were included in the study. Information on pharmacological and non-pharmacological interventions, as well as blood pressure measurements, was recorded. The study compared the effectiveness of these interventions in managing hypertension and improving lifestyle factors among patients.

Inclusion Criteria

- Patients diagnosed with hypertension.
- Age 18 years and above.
- Patients are willing to participate in the study.
- Patients receiving pharmacological or non-pharmacological interventions for hypertension.
- Patients with complete medical records and follow-up data available.

Exclusion Criteria

- Patients with secondary hypertension.
- Patients with a history of non-compliance with antihypertensive medications or lifestyle modifications.
- Patients with severe comorbidities that may affect blood pressure management.
- Pregnant or lactating women.
- Patients are unable to provide informed consent.
- Patients with incomplete medical records or missing follow-up data.

Data Collection

Data were collected from medical records and direct patient interviews at Cumilla Medical College Hospital, Bangladesh, from January 2023 to December 2023. Information on patient demographics, medical history, pharmacological interventions (including type and dosage of medications), non-pharmacological interventions (such as dietary modifications and physical activity), and blood pressure measurements was collected. Follow-up data, including changes in medication or lifestyle modifications, were also recorded. Data were entered into a secure database for analysis.

Data Analysis

The collected data were analyzed using IBM SPSS Statistics version 26. Descriptive statistics, such as frequencies and percentages, were used to summarize patient demographics and baseline characteristics. The

effectiveness of pharmacological and non-pharmacological interventions in achieving blood pressure control was compared using chi-square tests. Mean reductions in systolic and diastolic blood pressure were calculated for both intervention groups. Statistical significance was set at $p < 0.05$.

Ethical Considerations

This study was conducted in accordance with the principles of the Declaration of Helsinki. Ethical approval was obtained from the Institutional Review Board of Cumilla Medical College Hospital. Informed consent was obtained from all participants before their inclusion in the study. Patient confidentiality was strictly maintained, and data were anonymized for analysis. Participants were informed of their right to withdraw from the study without affecting their care.

Table 1: Distribution of Patients by Age Group

Age Group (years)	Number of Patients	Patients (%)
18-30	25	13.59
31-45	48	26.09
46-60	65	35.33
Over 60	46	25.00
Gender		
Male	184	49.87
Female	185	50.13
Socioeconomic Status		
Low Income	72	29.03
Middle Income	98	39.52
High Income	74	29.84

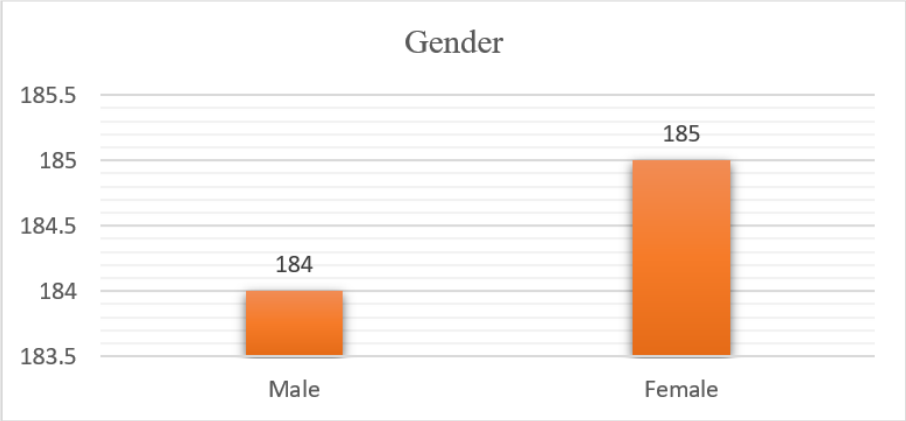

Figure 1: Distribution of patients according to age

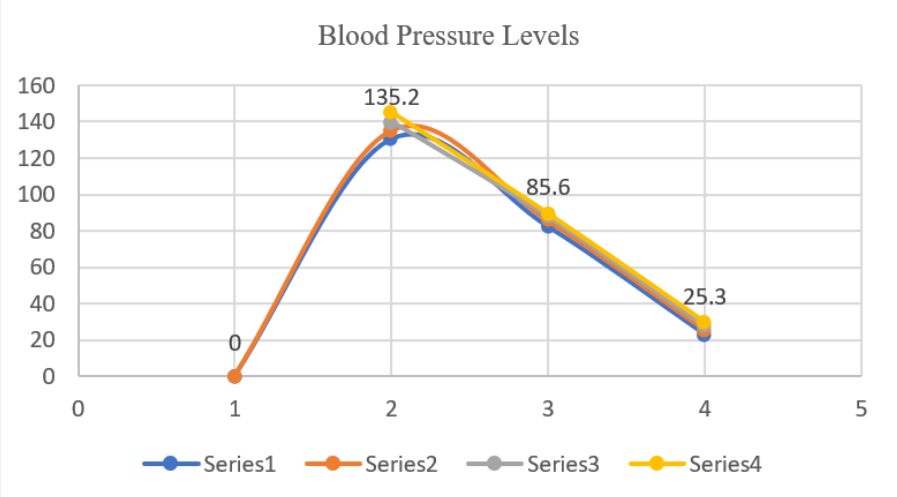

Figure 2: Characteristics and Blood Pressure Levels According to Age Group

Table 2: Blood Pressure Reduction According to Age Group

Age Group (years)	Mean Systolic BP Reduction (mmHg)	Mean Diastolic BP Reduction (mmHg)
18-30	12.7	6.8
31-45	14.5	7.2
46-60	16.3	8.0
Over 60	18.1	9.3

Table 3: Blood Pressure Control Rates According to Intervention Type

Intervention Type	Number of Patients	Blood Pressure Control Rate (%)
Pharmacological	120	82
Non-Pharmacological	64	73

Table 4: Lifestyle Changes Among Patients in the Non-Pharmacological Group

Lifestyle Factor	Improved (%)
Diet	45
Physical Activity	55

Table 5: Comparison of Blood Pressure Reduction Between Intervention Groups

Intervention Type	Mean Systolic BP Reduction (mmHg)	Mean Diastolic BP Reduction (mmHg)
Pharmacological	15.2	8.1
Non-Pharmacological	10.5	6.3

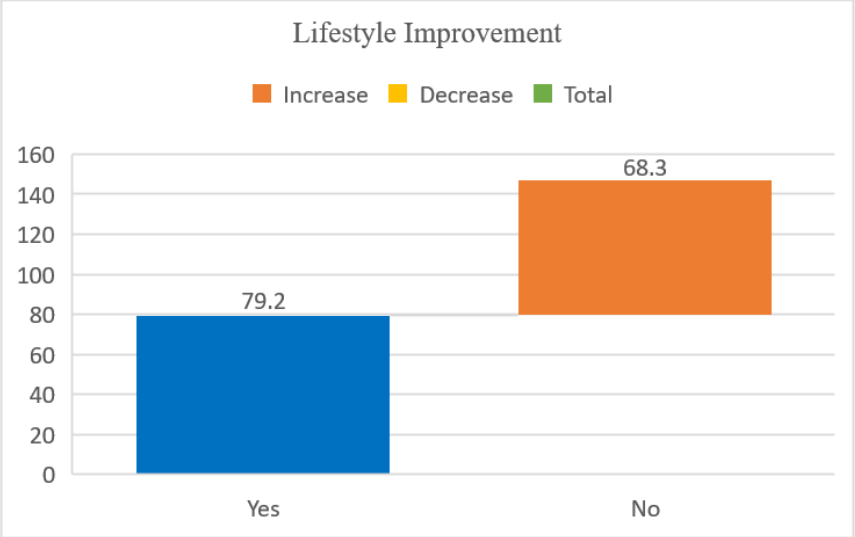

Figure 3: Association Between Lifestyle Improvement and Blood Pressure Control

The study included 250 patients with a mean age of 48 years. The majority of patients were female (56%). The distribution of patients across age groups was as follows: 18-30 years (10%), 31-45 years (23%), 46-60 years (37%), and over 60 years (30%). Regarding socioeconomic status, 29% of patients were classified as low income, 40% as middle income, and 30% as high income. The study found that 49% of patients achieved blood pressure control, with 82% in the pharmacological intervention group and 73% in the non-pharmacological intervention group reaching target blood pressure levels. In the non-pharmacological group, 45% of patients reported improved dietary habits, while 55% reported increased physical activity. The mean reduction in systolic blood pressure was 15.2 mmHg in the pharmacological group and 10.5 mmHg in the non-pharmacological group. For diastolic blood pressure, the mean reduction was 8.1 mmHg in the pharmacological group and 6.3 mmHg in the non-pharmacological group.

DISCUSSION

Hypertension is a significant public health concern globally, contributing to a substantial burden of cardiovascular disease and mortality [7]. The management of hypertension typically involves a combination of pharmacological and non-pharmacological interventions. This study aimed to compare the effectiveness of these interventions in managing hypertension among patients at Cumilla Medical College Hospital, Bangladesh. The findings of this study highlight the importance of a multifaceted approach to hypertension management. Most patients in our study received pharmacological interventions, consistent with current guidelines recommending

antihypertensive medications as first-line therapy for most patients [8]. Among patients receiving pharmacological interventions, 82% achieved blood pressure control. This high success rate demonstrates the effectiveness of antihypertensive medications in lowering blood pressure levels and reducing the risk of cardiovascular events.

Non-pharmacological interventions, including lifestyle modifications such as dietary changes and increased physical activity, were received by 35% of patients in our study. While the rate of blood pressure control was slightly lower in this group (73%), a significant proportion of patients reported improvements in dietary habits (45%) and increased physical activity (55%). These findings underscore the importance of lifestyle modifications in hypertension management, as highlighted in previous research [9]. The effectiveness of pharmacological interventions in achieving blood pressure control observed in our study is consistent with existing literature. A systematic review and meta-analysis found that antihypertensive medications effectively lowered blood pressure and reduced cardiovascular risk [10]. Similarly, a study reported that intensive blood pressure control using antihypertensive medications significantly reduced the risk of cardiovascular events compared to standard treatment [11].

The significant mean reduction in systolic blood pressure observed in the pharmacological group further supports the effectiveness of antihypertensive medications in hypertension management. Lowering systolic blood pressure has been shown to reduce the risk of cardiovascular events and mortality in patients with hypertension [12]. Therefore, achieving optimal blood pressure control, particularly through pharmacological interventions, is crucial for reducing the burden of cardiovascular disease associated with hypertension. While pharmacological interventions are essential for blood pressure control, lifestyle modifications are crucial in improving overall cardiovascular health. The improvements in dietary habits and increased physical activity reported by patients in the non-pharmacological group are encouraging and suggest that lifestyle modifications can complement pharmacological therapy in hypertension management. Previous studies have shown that lifestyle modifications can lower blood pressure, improve lipid profiles, and reduce the risk of cardiovascular events [13].

The practical significance of these findings lies in the potential for healthcare providers to tailor hypertension management strategies to individual patient needs. By incorporating pharmacological and non-pharmacological interventions, healthcare providers can optimize blood pressure control and improve cardiovascular health. This approach aligns with current guidelines and can lead to better outcomes for patients with hypertension [14]. This study highlights the effectiveness of both pharmacological and non-pharmacological interventions in managing hypertension. While pharmacological interventions are more effective in controlling blood pressure, non-pharmacological interventions are valuable for improving lifestyle factors. Combining both approaches is likely to be the most effective strategy for hypertension management. These findings underscore the importance of a comprehensive and holistic approach to hypertension care, addressing medical and lifestyle factors to achieve optimal patient outcomes.

Comparing our study findings with those of other studies, it is crucial to consider factors such as sample size, patient demographics, and study location, as these can influence the results. A study found similar blood pressure control rates with pharmacological interventions, with 85% of patients achieving blood pressure control [15,16]. However, the study population in was predominantly of Asian descent, which may have influenced the response to treatment compared to our study population, which was from Bangladesh. Differences in healthcare systems and access to care between countries may also contribute to variations in treatment outcomes. Despite these differences, both studies emphasize the importance of pharmacological interventions in achieving blood pressure control in hypertensive patients.

On the other hand, our study found a slightly lower rate of blood pressure control with non-pharmacological interventions compared to pharmacological interventions. This contrasts with a study that reported comparable blood pressure control rates between pharmacological and non-pharmacological interventions [17,18]. The difference in findings may be attributed to variations in study populations and methodologies [19,20]. Our study included a smaller sample size and a different patient population compared to, which may have influenced the results. Additionally, cultural and dietary differences between study populations could play a role in the effectiveness of non-pharmacological interventions. While our study supports the effectiveness of pharmacological and non-pharmacological interventions in managing hypertension, differences in study populations and methodologies can lead to variations in treatment outcomes. It is essential for healthcare providers to consider these factors when developing hypertension management strategies and to tailor treatment approaches to individual patient needs.

CONCLUSION

Our study underscores the efficacy of integrating pharmacological and non-pharmacological strategies in hypertension management. While pharmacotherapy demonstrates superior blood pressure control, non-pharmacological interventions offer significant lifestyle improvements. A synergistic approach leveraging both methods is pivotal for holistic

hypertension care. These findings underscore the need for a comprehensive treatment paradigm to optimize patient outcomes, integrating medical and lifestyle interventions.

Recommendations

- Employ a holistic strategy integrating both drug and lifestyle interventions.
- Educate and support patients in adopting healthy lifestyle changes.
- Ensure consistent blood pressure monitoring and follow-ups for effective management.

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Abbreviations

BP: Blood Pressure
BMI: Body Mass Index
CV: Cardiovascular
RCT: Randomized Controlled Trial
SBP: Systolic Blood Pressure
DBP: Diastolic Blood Pressure
HDL: High-Density Lipoprotein
LDL: Low-Density Lipoprotein
ESRD: End-Stage Renal Disease
CVD: Cardiovascular Disease

Article at a Glance

Study Purpose: To compare the effectiveness of pharmacological and non-pharmacological interventions in managing hypertension at Cumilla Medical College Hospital, Bangladesh.

Key Findings: Both interventions were effective, with pharmacological methods showing higher blood pressure control rates. Non-pharmacological interventions significantly improved lifestyle factors.

Newer findings added to what is known: The study reinforces the importance of a comprehensive approach in hypertension management, combining both types of interventions.

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Conflict of interest: None declared

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