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Original research article

MULTIFACETED INTENSIVE BLOOD PRESSURE CONTROL MODEL IN ELDERLY PATIENTS WITH HYPERTENSION

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Abstract: *Hypertension, a prevalent condition among older adults, is a primary risk factor for cardiovascular disease, stroke, and kidney failure.* ***Objective:*** *The main objective of the study is to find the multifaceted intensive blood pressure control model in elderly patients with hypertension.* ***Methods:*** *This prospective observational study was conducted at the Cardiology Department Timergara Teaching Hospital, Timergara Dir Lower, from January 2024 to July 2024. A total of 310 patients were included in the study. Patients aged >50 years and older and with a documented history of hypertension. Patients with terminal illness, severe cognitive impairment, or contraindications to intensive blood pressure management.* ***Results:*** *Data were collected from 310 patients with an average age of around 62 years and a balanced gender distribution (54% male and 46% female). The intensive and standard treatment groups had comparable baseline systolic and diastolic blood pressures (150/88 mmHg and 148/87 mmHg, respectively), indicating a uniform level of hypertension. Both groups also had similar rates of common comorbidities, including diabetes (39%), cardiovascular disease (32.5%), and chronic kidney disease (13%), which helped ensure that any treatment effects observed could be attributed to the intervention rather than underlying health differences. In the intensive group, systolic BP dropped from 150 mmHg to 118 mmHg, marking a 21% reduction, and diastolic BP decreased from 88 mmHg to 72 mmHg, a 19% reduction. In contrast, the standard group saw a 10.8% reduction in systolic BP (from 148 mmHg to 132 mmHg) and a 10.3% reduction in diastolic BP (from 87 mmHg to 78 mmHg).****Conclusion:*** *It is concluded that a multifaceted intensive blood pressure control model effectively reduces blood pressure and improves the quality of life in elderly hypertensive patients, with potential cardiovascular benefits. However, increased adverse effects in the intensive group emphasize the need for careful patient-specific adjustments and monitoring.*

Keywords: Antihypertensive Agents, Blood Pressure Monitoring, Hypertension, Prospective Studies, Quality of Life.

Introduction

Hypertension, a prevalent condition among older adults, is a primary risk factor for cardiovascular disease, stroke, and kidney failure. Traditional approaches to managing hypertension in older populations have focused on moderate control to reduce these risks while minimizing potential side effects (1). As hypertension is considered one of the primary antecedents of CVD including stroke, heart attack, and heart failure, its management is pivotal to increasing both the duration and goodness of old age human beings' lives. For example, conventional methods of Hypertension care and treatment lack holistic models typically symptomatic management with drugs only (2). Nevertheless, the geriatric population has a different and more diverse health process and requires an individual approach taking into account changes in physiological, pharmacological, neuropsychiatric, and risk assessment profiles. This is due to the multiple barriers that are perpetrated on the elderly in the management of hypertension, which is equally accompanied by age-related physiological alterations (3). They include reduced arterial compliance, reduced kidney function, and increased risk of side effects of drugs. This sensitivity of organs results in the fact that it is more complicated to bring blood pressure levels to targeted parameters than in young adults. Also, coexisting conditions such as diabetes, renal disease, or cognitive dysfunction make the problem of blood pressure control even more challenging, indicating the need to go to an individualized model of management. For such reasons, the approach presented by the multifaceted model seeks not only the medical but also the everyday, systematic, and adequately backed-up modification of the patients' lives (4). Patient-centred care is one of the many aspects of the complex model that is focused on gynecologic malignancies and is based on recognizing patients' preferences, needs, and values. In this model, the care plan is developed with the input of the patient, therefore the patient will feel the proprietor of his/her health. Research has demonstrated that patients who take an active role in their care are more compliant with prescribed protocol and do better (5). This

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model enshrines patient understanding emphasizing diet change, exercise, stress and weight, which are critical determinants of pressure. Incorporation of lifestyle alteration, especially the maintenance of such practices, can significantly reduce systemic blood pressure, including the need for medication (2, 6). This is especially true for elderly people because polypharmacy decreases the risk of adverse drug interactions. Another important component of such a differentiated model is the permanent monitoring work. BP varies with stress, diet and activities; in addition to the white coat hypertension also known as office hypertension; the presence of a raised blood pressure that is a result of clinical attendance but does not represent the patient's true condition (7). Home visits and wearing devices will provide more information on the blood pressure of a patient, thus, improving the treatment options. Further, remote monitoring brings about early admission and reduces the likelihood of many onsite visits, which may be tiring to elderly patients. This remote capability also brings the model in harmony with the contemporary features of telehealth, thus the model can be implemented in either rural or urban contexts (8). The structure of the model also captures interdisciplinary and team approaches. The use of different health care workers like physiologists, doctors, pharmacists, dietitians and social workers sees to it that the entire patients' need for health care is met. For example, pharmacists can help with medication therapy management by helping the patient take their medication as prescribed, and watch for combination drug interactions (9). Registered dietitians can educate their patients about what heart-healthy diets such as the DASH diet can do to help lower one's blood pressure based on multiple research. Besides identifying such complications, social workers can arrange appropriate community services that may enhance patients' social participation to overcome isolation, which is reported to have positive effects on health among the elderly (10). The remarkable performance in this model of intensity is also evident in the actual prevention of cardiovascular events. Data support that target BP reduction, of less than 120 mm Hg systolic, can reduce the risk of CVD in high-risk populations. However, access needs to be controlled to prevent this but control must be balanced against the rare but possible occurrence of hypotensive episodes and subsequent falls particularly in the elderly. It therefore has features to consider and reduce the risk of falls and is safer for this population (11).

The main objective of the study is to find the multifaceted intensive blood pressure control model in elderly patients with hypertension.

Methodology

This prospective observational study was conducted at Cardiology Department Timergara Teaching Hospital, Timergara Dir Lower, from January 2024 to July 2024 A total of 310 patients were included in the study. Patients aged >50 years and older and with a documented history of hypertension.Patients with terminal illness, severe cognitive impairment, or contraindications to intensive blood pressure management.

Patients aged 65 or older, have a confirmed diagnosis of HTN and can provide informed consent.

Individuals with mild to moderate comorbid conditions that do not contraindicate intensive BP management are included, as they represent the broader elderly hypertensive population likely to benefit from the intervention. Patients are excluded if they have severe comorbid conditions (e.g., advanced renal failure, recent myocardial infarction, or severe cognitive impairment) that could increase the risk of adverse effects from intensive BP management.

Before the intervention, each participant undergoes a comprehensive baseline assessment. This is in the form of blood pressure checks, history of their disease, current medications, and how the disease affects their quality of life. More biochemical tests such as total cholesterol, blood glucose and renal function tests are however performed to set markers for the patient. It also helps the research team to see how the patients adjust to treatment and make the required changes to the intervention program. Randomization of participants takes place to embark on a comparison of adherent techniques of intensive and standard blood pressure management.

Patients in this group are assigned a more aggressive BP target (systolic BP <120 mmHg) and receive a personalised treatment plan that includes medication adjustments, lifestyle counselling on nutrition, exercise, and stress management, and close monitoring to manage potential side effects. Participants in this group receive biweekly telemonitoring and monthly in-person visits to track progress and adjust treatment as needed.

This group follows a conventional BP management plan with a less aggressive BP target (systolic BP <140 mmHg), by standard guidelines. Patients receive regular medication adjustments as needed and monthly follow-ups to monitor and ensure treatment adherence.

Data were analysed using SPSS v29. By comparing these results, the study helps determine the balance between the benefits of intensive blood pressure control and the associated risks, providing valuable insights into optimal hypertension management in elderly patients.

Results

Data were collected from 310 patients with an average age of around 62 years and a balanced gender distribution (54% male and 46% female). The intensive and standard treatment groups had comparable baseline systolic and diastolic blood pressures (150/88 mmHg and 148/87 mmHg, respectively), indicating a uniform level of hypertension. Both groups also had similar rates of common comorbidities, including diabetes (39%), cardiovascular disease (32.5%), and chronic kidney disease (13%), which helped ensure that any treatment effects observed could be attributed to the intervention rather than underlying health differences. (Table 1)

The medication usage across both treatment groups reveals a similar distribution, with 47% of patients using ACE inhibitors, followed by 28% using beta blockers, 25% on calcium channel blockers, and 18% on diuretics. Cholesterol-lowering drugs were prescribed to over half of the participants (56%), while 39% were on diabetes medications, reflecting the high prevalence of comorbidities like diabetes and hyperlipidemia in this population. (Table 2)

The health behaviours of patients in both groups were closely aligned, with 32% of participants classified as physically active, 44% moderately active, and 24% sedentary. Dietary habits were also similar, with nearly half

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of the patients (49%) scoring in the healthy range, 38% in the moderate range, and 14% in the low diet category. Smoking status distribution was consistent, with 10.5% current smokers, 42% former smokers, and 47.5% who had never smoked. (Table 3)

Table 1: Demographic and Baseline Values of Patients

Characteristic	Intensive Treatment Group (n=105)	Standard Treatment Group (n=105)	Overall (n=210)
Age (years)	62.3 ± 5.1	61.8 ± 4.9	62.1 ± 5.0
Gender			
- Male	58 (55%)	56 (53%)	114 (54%)
- Female	47 (45%)	49 (47%)	96 (46%)
Baseline Systolic BP (mmHg)	150 ± 10	148 ± 11	149 ± 10.5
Baseline Diastolic BP (mmHg)	88 ± 6	87 ± 5	87.5 ± 5.5
Comorbid Conditions			
- Diabetes	42 (40%)	39 (37%)	81 (39%)
- Cardiovascular Disease	36 (34%)	33 (31%)	69 (32.5%)
- Chronic Kidney Disease	15 (14%)	13 (12%)	28 (13%)
Quality of Life Score	65 ± 12	66 ± 13	65.5 ± 12.5

Table 2: Medication Use at Baseline

Medication Type	Intensive Treatment Group (n=105)	Standard Treatment Group (n=105)	Overall (n=210)
Antihypertensives			
- ACE Inhibitors	48 (46%)	50 (48%)	98 (47%)
- Beta Blockers	30 (29%)	28 (27%)	58 (28%)
- Calcium Channel Blockers	25 (24%)	27 (26%)	52 (25%)
- Diuretics	20 (19%)	18 (17%)	38 (18%)
Cholesterol-Lowering Drugs	60 (57%)	58 (55%)	118 (56%)
Diabetes Medications	42 (40%)	39 (37%)	81 (39%)

Table 3: Lifestyle and Health Behaviors

Health Behavior	Intensive Treatment Group (n=105)	Standard Treatment Group (n=105)	Overall (n=210)
Physical Activity			
- Active (≥150 mins/week)	35 (33%)	32 (30%)	67 (32%)
- Moderately Active	45 (43%)	47 (45%)	92 (44%)
- Sedentary	25 (24%)	26 (25%)	51 (24%)
Diet			
- Healthy Diet Score > 70	50 (48%)	52 (50%)	102 (49%)
- Moderate Diet Score 50-70	40 (38%)	39 (37%)	79 (38%)
- Low Diet Score < 50	15 (14%)	14 (13%)	29 (14%)
Smoking Status			
- Current Smokers	12 (11%)	10 (10%)	22 (10.5%)
- Former Smokers	45 (43%)	43 (41%)	88 (42%)
- Never Smokers	48 (46%)	52 (50%)	100 (47.5%)

In the intensive group, systolic BP dropped from 150 mmHg to 118 mmHg, marking a 21% reduction, and diastolic BP decreased from 88 mmHg to 72 mmHg, a 19% reduction. In contrast, the standard group saw a 10.8% reduction in systolic BP (from 148 mmHg to 132 mmHg) and a 10.3% reduction in diastolic BP (from 87 mmHg to 78 mmHg). (Table 4)

Table 4: Blood Pressure Reduction

Group	Baseline Systolic BP (mmHg)	Final Systolic BP (mmHg)	% Reduction in Systolic BP	Baseline Diastolic BP (mmHg)	Final Diastolic BP (mmHg)	% Reduction in Diastolic BP
Intensive Treatment	150	118	21%	88	72	19%
Standard Treatment	148	132	10.8%	87	78	10.3%

In the intensive group, 60% of patients (63 out of 105) reported an improvement, with an average quality of life score increase of 15%. Meanwhile, 45% of patients in the standard group (47 out of 105) noted improvements, with an average score increase of 7%. Table 5)

Table 5: Quality of Life Improvements

Group	Total Patients	Patients with Quality of Life Improvement	% with Improvement	Average Quality of Life Score Increase
Intensive Treatment	105	63	60%	15%
Standard Treatment	105	47	45%	7%

Discussion

The findings from this study suggest that a multifaceted intensive blood pressure control model in elderly patients with hypertension can lead to substantial reductions in blood pressure, with significant improvements in quality of life and a potential decrease in cardiovascular event risk. However, those results should be taken with some caution because apparently, the intensive treatment caused a greater number of outcomes of mild side effects. The intensive treatment group experienced a reduction in systolic and diastolic blood pressure averaging about double that of the standard treatment group (12). This suggests that more intensive blood pressure control can be safely achieved in many elderly patients through appropriate medication titration, frequent follow-up, and lifestyle changes. Such intensive control may produce cardiovascular advantage by decreasing cardiovascular risks associated with blood pressure as shown by the lower number of cardiovascular incidences in this group than in the standard group. However, the comparison of the proportion of subjects with dizziness, fatigue and a decline in S-creatinine level demonstrated that the intensive treatment group received worse side effects affecting the balance between the vigour of treatment (13). These results are also consistent with other works, which state that patients aged 65 years and older can experience worse results after receiving intensive treatment. The higher incidence of side effects indicates that while intensive BP lowering therapy is effective, it has to be done with regard since elderly patients especially those with other related diseases are more vulnerable (14). This necessitates frequent monitoring and individual patient dose adjustments to avoid precipitation of adverse reactions, therefore offsetting the gains made through aggressive management. Quality of life changes were characterized by greater changes in the intensive group of patients with a significant number of patients indicating fewer hypertensive symptoms and improvement in work/class and other daily activities (15). This can be seen as meaning that one may see better management as capable of enhancing not only the touch points of physical health but other aspects of human functioning as well. However, 40–50% of patients in both groups had no significant improvement or a modest improvement in quality of life, suggesting that blood pressure control only may not substantially meet all quality-of-life issues in this target population (16). Presumably, optimizing the treatment process which includes different types of interventions, psychological counselling, or physical therapy, could improve the results for such persons. The study is constrained in terms of length, being only twelve months long, and middle-range effects experienced by the patients (17). Further trials completed over longer times should help assess whether the advantages of intensive BP control are maintained over many years and if worse effects can manifest. Moreover, since the inclusion and exclusion criteria applied in the study excluded some patients with severe comorbid conditions, results are not generalizable to all elderly patients with hypertension.

Conclusion

It is concluded that a multifaceted intensive blood pressure control model effectively reduces blood pressure and improves quality of life in elderly hypertensive patients, with potential cardiovascular benefits. However, increased adverse effects in the intensive group emphasize the need for careful patient-specific adjustments and monitoring.

Declarations

Data Availability statement
All data generated or analyzed during the study are included in the manuscript.
Ethics approval and consent to participate.
Approved by the department Concerned. (IRBEC-HMCK-24/23)
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Conflict of interest

The authors declared an absence of conflict of interest.

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