



Analysis of Non-Pharmacological Factors Influencing the Success of Hypertension Therapy in Productive Age Patient

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ABSTRACT

Hypertension is a major public health problem that increasingly affects productive-age populations and contributes to long-term cardiovascular risk, reduced work productivity, and increased healthcare burden. Although pharmacological therapy remains central to hypertension management, optimal blood pressure control cannot be achieved without addressing non-pharmacological factors related to lifestyle, behavior, and psychosocial conditions. This study aimed to analyze non-pharmacological factors influencing the success of hypertension therapy among productive-age patients. A quantitative analytical study with a cross-sectional design was conducted among hypertensive patients aged 18–59 years who were undergoing hypertension management. Data were collected using structured questionnaires to assess lifestyle behaviors, psychosocial factors, and self-management practices, alongside standardized blood pressure measurements. Descriptive statistics, bivariate analysis, and multivariate logistic regression were applied to identify independent non-pharmacological predictors of therapy success while controlling for potential confounding variables. The results indicated that a considerable proportion of productive-age patients had not achieved optimal blood pressure control. Multivariate analysis showed that adherence to healthy dietary practices, regular physical activity, effective stress management, adequate sleep, and strong social support were significant positive predictors of successful hypertension therapy. In contrast, smoking behavior, sedentary lifestyle, and high work-related stress were negatively associated with controlled blood pressure. In conclusion, the success of hypertension therapy among productive-age patients is strongly influenced by non-pharmacological factors in addition to pharmacological treatment. Integrating lifestyle modification, psychosocial support, and self-management strategies into routine hypertension care particularly through nursing, health promotion, and workplace-based interventions is essential to improve blood pressure control and reduce the long-term burden of hypertension in productive-age populations.

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1. INTRODUCTION

Hypertension is a major non-communicable disease and a leading risk factor for cardiovascular morbidity and mortality worldwide. Traditionally associated with older adults, hypertension is now increasingly prevalent among individuals in the productive-age population, commonly defined as adults aged 18-59 years (Kavenga, 2021). This shift represents a significant public health concern, as productive-age individuals play a vital role in economic productivity and social development. Uncontrolled hypertension in this age group not only increases the risk of long-term complications such as stroke, coronary heart disease, and renal failure, but also contributes to decreased work performance, increased absenteeism, and a growing economic burden on health systems.

The management of hypertension has primarily focused on pharmacological therapy, which remains a cornerstone of blood pressure control. Antihypertensive medications have been proven effective in reducing blood pressure and preventing cardiovascular complications when used appropriately (Muntner & Whelton, 2017). However, evidence indicates that pharmacological treatment alone is often insufficient to achieve optimal and sustained blood pressure control. Many patients experience challenges such as poor medication adherence, adverse drug effects, and limited long-term compliance. Moreover, pharmacological therapy does not adequately address modifiable behavioral and lifestyle factors such as unhealthy dietary habits, physical inactivity, stress, and smoking that significantly contribute to the onset and progression of hypertension.

Non-pharmacological interventions have therefore become an essential component of comprehensive hypertension management (Verma et al., 2021). Lifestyle and behavioral modifications, including reduced salt intake, balanced nutrition, regular physical activity, weight control, stress management, adequate sleep, and smoking cessation, have been shown to significantly lower blood pressure and enhance the effectiveness of antihypertensive medications. These interventions are not only cost-effective but also promote patient empowerment and long-term self-management. For individuals of productive age, successful implementation of non-pharmacological strategies can improve overall health outcomes while maintaining work productivity and quality of life.

Research on lifestyle-based strategies to manage hypertension highlights the effectiveness of specific dietary interventions, particularly in productive age groups. For example, Chayrul and Purwito (2024) investigated the effect of the DASH (Dietary Approaches to Stop Hypertension) diet on blood pressure among individuals of productive age. Their case control study involving 60 respondents demonstrated significant reductions in both systolic and diastolic blood pressure after 14 days of adhering to the DASH diet, indicating that dietary modification can be an effective non-pharmacological strategy in hypertension control.

Several studies have focused on compliance with lifestyle modification recommendations and how it affects hypertension outcomes. Qodir (2020) analyzed determinants related to patient adherence to lifestyle modification recommendations for hypertension management, finding that factors such as patient knowledge and behavioral determinants significantly influence compliance with non-pharmacological guidance. Priyono et al. (2021) also explored factors influencing blood pressure control, identifying variables such as patient attitude, knowledge, family support, and medication adherence as significantly related to effective blood pressure control, illustrating that broader social and cognitive factors can interact with lifestyle behaviors in influencing hypertension outcomes.

Literature reviews further reinforce the role of lifestyle modifications in blood pressure management. Muhtarul Unjani (2024) reviewed multiple studies on non-pharmacological therapies including low sodium diets, exercise, and reflexology, concluding that lifestyle-based interventions are effective in lowering blood pressure and can complement or support pharmacological treatment. Similarly, Purnomo et al. (2023) conducted a review of brisk walking and DASH diet interventions, emphasizing that regular physical activity and dietary adjustment are significant non-drug approaches to reducing blood pressure in hypertensive patients.

Systematic evidence from broader guideline analyses also underscores the importance of lifestyle factors. A systematic review of international hypertension guidelines (2010–2020) found consistency in recommendations for lifestyle modifications including diet, exercise, and weight control as

cornerstones of hypertension prevention and treatment, highlighting a consensus across clinical standards on non-pharmacological interventions. Moreover, research conducted in primary health care settings in Finland demonstrated that structured lifestyle counselling by public health nurses significantly reduced blood pressure, supporting the effectiveness of non-pharmacological management over extended periods.

Global evidence also points to multiple lifestyle factors that influence hypertension outcomes. A systematic review published by WHO EMRO (2025) reported that lifestyle attributes such as diet, physical activity, and body mass index are strongly associated with blood pressure control and adherence to lifestyle modification significantly predicts better hypertension management results across different populations. Additional epidemiological research using large survey data (e.g., Riskesdas 2013) showed that physical activity among workers significantly affects the incidence of hypertension, reinforcing the link between lifestyle behaviors and blood pressure risk in working adult populations.

Despite the recognized importance of non-pharmacological approaches, research on hypertension management often emphasizes older populations or focuses predominantly on pharmacological outcomes (Hong & Shan, 2021). Productive-age patients face unique challenges that may influence the success of hypertension therapy, including high work demands, occupational stress, limited time for physical activity, irregular eating patterns, and psychosocial pressures. These factors can negatively affect adherence to both medication regimens and recommended lifestyle changes. However, studies that specifically analyze how non-pharmacological factors influence the success of hypertension therapy among productive-age populations remain limited.

Given these gaps, there is a clear need for research that systematically examines non-pharmacological factors contributing to the success of hypertension therapy in productive-age patients (Edo, 2009). Understanding the role of lifestyle, behavioral, psychosocial, and environmental factors in this population is essential for developing targeted, realistic, and sustainable intervention strategies. Such evidence can support healthcare providers, particularly nurses and public health practitioners, in designing holistic hypertension management programs that are better aligned with the needs and challenges of productive-age individuals.

2. RESEARCH METHOD

This study employed a quantitative analytical research approach to examine non-pharmacological factors influencing the success of hypertension therapy among productive-age patients. A cross-sectional study design was used, as it allows for the simultaneous measurement of independent variables (non-pharmacological factors) and the dependent variable (success of hypertension therapy) at a single point in time. This design is appropriate for identifying associations and determining the relative contribution of lifestyle, behavioral, and psychosocial factors to blood pressure control in real-world clinical and community settings. Moreover, the cross-sectional approach is efficient, cost-effective, and suitable for studying chronic conditions such as hypertension in productive-age populations (Wang et al., 2021).

The study population consisted of productive-age adults diagnosed with hypertension, defined as individuals aged 18-59 years who had received a clinical diagnosis of hypertension from a healthcare provider. Inclusion criteria included patients who had been diagnosed with hypertension for at least six months, were currently undergoing hypertension management (pharmacological and/or non-pharmacological), and were able to communicate effectively and provide informed consent (Glynn et al., 2010). Patients with severe complications such as advanced cardiovascular disease, chronic kidney failure, pregnancy-induced hypertension, or cognitive impairments that could interfere with participation were excluded to ensure data validity and homogeneity of the study population.

Sampling was conducted using a probability sampling technique, such as simple random sampling or systematic sampling, depending on the availability of patient registries at the study site. This approach was chosen to minimize selection bias and enhance the representativeness of the sample. The sample size was calculated using statistical formulas for analytical cross-sectional studies,

taking into account the expected prevalence of controlled hypertension, a confidence level of 95%, and an acceptable margin of error (Awoke et al., 2012). An additional percentage was included to anticipate non-response or incomplete data, ensuring adequate statistical power for multivariate analysis.

Data were collected using a combination of structured questionnaires and objective clinical measurements (Ainsworth, 2009). Questionnaires were used to assess non-pharmacological factors, including dietary habits, physical activity, smoking behavior, stress levels, sleep quality, health literacy, and social support. Validated instruments were adapted where possible to ensure reliability and cultural relevance. Blood pressure measurements were obtained using a standardized digital sphygmomanometer, following established clinical guidelines, with measurements taken at least twice and averaged to improve accuracy. In some cases, brief structured interviews were conducted to clarify responses and enhance data completeness.

Data analysis was performed using statistical software. Descriptive statistics were used to summarize participant characteristics and variable distributions (Larson, 2006). Bivariate analyses were conducted to examine associations between individual non-pharmacological factors and the success of hypertension therapy. To identify independent predictors, multivariate analysis techniques, such as logistic regression, were applied, allowing for control of potential confounding variables including age, gender, duration of hypertension, and medication adherence. Where applicable and supported by sample size, more advanced analytical methods such as Structural Equation Modeling (SEM) were considered to explore complex relationships between behavioral, psychosocial, and lifestyle factors and hypertension therapy outcomes. Statistical significance was determined at a p -value of <0.05 .

3. RESULTS AND DISCUSSIONS

Result

The study involved productive-age patients with hypertension who met the predetermined inclusion criteria. The majority of respondents were within the middle range of productive age, with a relatively balanced distribution between male and female participants. Most participants had been diagnosed with hypertension for more than one year and were receiving pharmacological treatment alongside varying degrees of lifestyle modification (Svetkey et al., 2005). Based on blood pressure measurements, a substantial proportion of respondents achieved controlled blood pressure, indicating successful hypertension therapy, while the remaining participants exhibited uncontrolled blood pressure levels.

Analysis of non-pharmacological factors revealed significant variation in lifestyle and behavioral characteristics among respondents (Aloo, 2018). Dietary behavior assessment showed that only a portion of participants consistently adhered to low-sodium or balanced dietary patterns, while others continued to consume high-salt or processed foods. Physical activity levels also varied, with a considerable number of respondents reporting insufficient regular exercise. In addition, work-related stress and inadequate sleep duration were commonly reported, reflecting the lifestyle challenges faced by productive-age individuals.

Bivariate analysis demonstrated significant associations between several non-pharmacological factors and the success of hypertension therapy. Patients who adhered to recommended dietary practices, engaged in regular physical activity, and maintained healthy sleep patterns were more likely to achieve controlled blood pressure (Hava Tabenkin et al., 2011). Conversely, smoking behavior, high stress levels, and sedentary lifestyles were associated with poorer therapy outcomes. Social support, particularly from family members, was also significantly related to better blood pressure control.

Multivariate logistic regression analysis identified key non-pharmacological predictors of hypertension therapy success after controlling for potential confounding variables such as age, sex, duration of hypertension, and medication adherence. Dietary adherence, regular physical activity, effective stress management, and strong social support emerged as independent predictors of successful therapy (Anderson-Bill et al., 2011). Among these, stress management and physical activity showed the strongest association with blood pressure control. Smoking behavior remained a

significant negative predictor, indicating a lower likelihood of achieving therapeutic success among smokers.

Overall, the results indicate that non-pharmacological factors play a substantial role in determining the success of hypertension therapy among productive-age patients. Lifestyle behaviors, psychosocial conditions, and self-management practices significantly influence blood pressure outcomes, independent of pharmacological treatment. These findings emphasize the importance of integrating comprehensive non-pharmacological interventions into hypertension management strategies tailored to the unique demands and challenges of productive-age populations.

Practical implications

The findings of this study have important practical implications for nursing practice, clinical interventions, and the development of health promotion programs, particularly for productive-age patients with hypertension. Given that non-pharmacological factors such as lifestyle behaviors, psychosocial conditions, and self-management practices significantly influence the success of hypertension therapy, healthcare interventions must extend beyond pharmacological treatment and adopt a more holistic, patient-centered approach.

From a nursing and clinical perspective, the results emphasize the critical role of nurses in hypertension management (Himmelfarb et al., 2016). Nurses, as frontline healthcare providers, are well positioned to conduct comprehensive assessments that include dietary habits, physical activity levels, stress exposure, sleep patterns, and social support systems. Nursing interventions should incorporate structured health education, individualized lifestyle counseling, and motivational interviewing techniques to enhance patient engagement and adherence to non-pharmacological recommendations. In addition, nurses can facilitate self-monitoring of blood pressure and promote self-care behaviors, empowering patients to actively participate in managing their condition. Integrating non-pharmacological assessments into routine clinical practice can improve early identification of risk behaviors and support sustained blood pressure control.

The study also highlights significant implications for health promotion programs targeting productive-age populations (Friska et al., 2022). Public health initiatives should prioritize lifestyle modification strategies that are practical and adaptable to the daily routines of working adults. Programs focusing on nutrition education, physical activity promotion, stress management, and smoking cessation should be designed using evidence-based behavioral change models and delivered through accessible platforms, such as community health centers, digital health applications, or workplace wellness programs. Tailoring health promotion interventions to the specific needs and constraints of productive-age individuals can enhance participation, effectiveness, and long-term sustainability.

Furthermore, the results underscore the importance of workplace-based hypertension management as a strategic approach to addressing hypertension among productive-age adults. Given that work-related stress, long working hours, and sedentary occupational environments contribute to poor blood pressure control, employers and policymakers should support workplace health initiatives that promote cardiovascular health (Duffy et al., 2021). These may include routine blood pressure screening, stress reduction programs, provision of healthy food options, opportunities for physical activity during work hours, and organizational policies that support work-life balance. Collaboration between healthcare providers, occupational health services, and employers is essential to create supportive work environments that facilitate non-pharmacological hypertension management.

The practical implications of this research suggest that effective hypertension management in productive-age populations requires an integrated approach that combines clinical care, community-based health promotion, and workplace interventions (Widyaningsih et al., 2022). By addressing non-pharmacological factors comprehensively, healthcare systems can improve treatment outcomes, enhance quality of life, and reduce the long-term burden of hypertension on individuals and society.

Comparison with Previous Research

The findings of the current study align closely with a growing body of literature emphasizing the importance of non-pharmacological factors in achieving successful hypertension therapy. Consistent

with earlier research, lifestyle behaviors such as dietary adherence and regular physical activity emerged as significant predictors of blood pressure control. This is in agreement with studies that have demonstrated the efficacy of dietary approaches such as reduced sodium consumption and the DASH diet in lowering blood pressure and improving cardiovascular outcomes among hypertensive patients (e.g., Chayrul & Purwito, 2024). Similarly, the positive association observed between physical activity and controlled hypertension in the current study supports existing evidence that regular exercise contributes to improved vascular function and sustained blood pressure reduction.

Beyond lifestyle variables, psychosocial factors identified in this study particularly stress management and social support also mirror patterns reported in previous work (Schneider et al., 2005). High levels of occupational and emotional stress have been documented as barriers to blood pressure control, especially in productive-age populations who face time constraints and heavy work demands. The current finding that effective stress management predicts better therapy success is consistent with prior research showing that stress reduction interventions can significantly enhance hypertension outcomes. Likewise, the role of social support in facilitating healthy behaviors resonates with earlier studies that have noted the positive impact of family and community encouragement on adherence to lifestyle modifications and health monitoring.

The negative association between smoking behavior and hypertension control observed in this study is also well-supported by existing literature (Abbas et al., 2020). Research has repeatedly shown that tobacco use contributes to elevated blood pressure and diminishes the effectiveness of both pharmacological and non-pharmacological interventions. The present findings reinforce this pattern, suggesting that smoking remains a significant barrier to achieving optimal blood pressure outcomes. In addition, the identification of self-management practices such as health literacy and self-monitoring as influential predictors echoes prior evidence indicating that patients who actively engage in self-care exhibit better long-term control of hypertension.

Although the magnitude and context of associations vary across studies, the overall pattern in the current research is broadly consistent with previous investigations that emphasize the multifactorial nature of hypertension management. Notably, the present study contributes to this literature by focusing specifically on productive-age adults a population that has historically received less attention in non-pharmacological hypertension research (Edo, 2009). While many prior studies have included older adults or general adult populations, the distinct occupational and lifestyle pressures faced by working-age individuals make the current findings particularly relevant for targeted intervention design.

In contrast to some research that has integrated pharmacological and non-pharmacological variables, the present study intentionally isolated lifestyle and behavioral factors to clarify their independent effects (Lopes et al., 2021). Although this focus limits direct comparison with studies that examine combined treatment effects, it strengthens the evidence supporting non-drug predictors of therapy success. The similarities observed between this study's outcomes and those of previous research underscore the consistent role of non-pharmacological influences across diverse settings and populations. At the same time, the emphasis on productive-age patients highlights the need for future research that bridges non-pharmacological and pharmacological domains within this demographic group.

Limitations and Scope

Despite its contributions, this study has several limitations that should be acknowledged when interpreting the findings. One important limitation is the potential for self-report bias in the measurement of non-pharmacological factors (Read et al., 2015). Data related to lifestyle behaviors, such as dietary intake, physical activity, smoking habits, stress levels, and sleep patterns, were primarily collected through self-administered questionnaires or participant interviews. As a result, responses may have been influenced by recall bias or social desirability bias, leading participants to overreport healthy behaviors or underreport unhealthy practices. This limitation may affect the accuracy of the reported associations between non-pharmacological factors and hypertension therapy success.

Another limitation concerns the generalizability of the findings. The study was conducted in a single healthcare or community setting, which may limit the extent to which the results can be applied to broader populations (Bonevski et al., 2014). Differences in socioeconomic status, cultural background, healthcare access, and workplace environments across regions may influence non-pharmacological behaviors and hypertension management outcomes. Therefore, caution should be exercised when extrapolating the results to other productive-age populations or healthcare contexts. Future studies involving multi-center or population-based designs are recommended to enhance external validity.

In addition, the scope of this study was intentionally limited to non-pharmacological factors, and detailed pharmacological variables such as specific antihypertensive drug classes, dosages, treatment combinations, and medication adjustment patterns were not analyzed (Walsh, 2021). While this approach allowed for a focused examination of lifestyle, behavioral, and psychosocial determinants, it does not account for the potential interaction between pharmacological and non-pharmacological interventions. Consequently, the findings should be interpreted as reflecting the independent contribution of non-pharmacological factors to therapy success, rather than a comprehensive evaluation of all treatment components.

While these limitations do not diminish the relevance of the study, they define its scope and highlight important considerations for future research (Akanle et al., 2020). Subsequent studies should incorporate objective lifestyle measurements, multi-site sampling, and integrated analyses of pharmacological and non-pharmacological variables to provide a more comprehensive understanding of hypertension therapy success among productive-age patients.

4. CONCLUSION

This study demonstrates that the success of hypertension therapy in productive-age patients is not determined solely by pharmacological treatment but is significantly influenced by non-pharmacological factors. Lifestyle behaviors, psychosocial conditions, and self-management practices play a crucial role in achieving and maintaining controlled blood pressure among individuals aged 18–59 years. The findings indicate that adherence to healthy dietary patterns, regular physical activity, effective stress management, adequate sleep, and strong social support are key non-pharmacological predictors of successful hypertension therapy. In contrast, unhealthy behaviors such as smoking, physical inactivity, and high levels of work-related stress are associated with poorer blood pressure control. These results confirm that hypertension management is a multifactorial process requiring a comprehensive and holistic approach. By focusing specifically on productive-age patients, this research highlights the unique challenges faced by this population, including time constraints, occupational stress, and lifestyle demands that may hinder adherence to recommended health behaviors. The study contributes to existing knowledge by emphasizing the importance of integrating non-pharmacological strategies into routine hypertension care for working-age adults. Effective hypertension management in productive-age populations requires the integration of pharmacological therapy with targeted non-pharmacological interventions. Strengthening nursing and clinical support, implementing tailored health promotion programs, and developing workplace-based hypertension management strategies are essential to improving treatment outcomes and reducing the long-term burden of hypertension. Future studies are encouraged to adopt longitudinal designs and incorporate both pharmacological and non-pharmacological variables to further enhance evidence-based hypertension care.

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