Open Access

Original Article

Optimization of Blood Pressure in Adult Hypertensive Patients with Lifestyle Modifications

Altaf Hussain, Muhammad Hafeez, Muhammad Naveed, Syed Umer Shah, Muhammad Shahid Khan*, Muhammad Mehtab Shabir

Pak Emirates Military Hospital/National University of Medical Science (NUMS) Rawalpindi Pakistan, * HITEC Institute of Medical Science Texila/National University of Medical Science (NUMS) Rawalpindi Pakistan

ABSTRACT

Objective: To determine the impact of lifestyle on the optimization of blood pressure in adult hypertensive patients
Study Design: Quasi-experimental study.
Place and Duration of Study: Pak Emirates Military Hospital, Rawalpindi Pakistan, Aug 2019 to Jan 2020
Methodology: The study population comprised of 200 hypertension patients reporting for routine follow-up. Patients were divided into two groups. Group-A (controls) had the patients with the continuation of the routine anti-hypertensive medication. At the same time, Group-B (cases) received lifestyle modifications (salt restriction, quitting smoking and daily step count by using a pedometer) in addition to the routine anti-hypertension medication. Control of blood pressure among the groups was compared three months after the start of the study.
Results: Mean age of the patients was 46.50±3.56 years. The mean duration of hypertension in the study participants was 5.12±3.24 years. Optimal blood pressure was achieved in 103(51.5%), while this was not achieved in 97(48.5%). With the help of binary logistic regression analysis, we found a statistically significant difference in achieving optimal blood pressure control among the cases and controls. Gender was also statistically significant in achieving control of blood pressure (*p*-value<0.001).
Conclusion: This study showed a significant difference in optimizing the blood pressure of patients who received lifestyle modification in addition to conventional biological treatment than those who only received the routine anti-hypertensive medication. Females also had better control as compared to males.

Keywords: Anti-hypertensive medication, Blood pressure, Hypertension, Lifestyle.

How to Cite This Article: *Hussain A, Hafeez M, Naveed M, Shah SU, Khan MS, Shabir MM. Optimization of Blood Pressure in Adult Hypertensive Patients with Lifestyle Modifications. Pak Armed Forces Med J 2022; 72(6): 2010-2013. DOI: https://doi.org/10.51253/pafmj.v72i6.4545*

INTRODUCTION

Hypertension has been a major public health problem all around the world. It is one of the main contributing factors to the mortality and morbidity of humankind across the globe.[1,2] This disease cause continuous end-organ damage leading to chronic kidney disease, ischemic heart disease, retinopathies and increased risk for stroke.[3] Primary prevention has been the main aim for reducing the overall disability. However, it is usually not achievable, so management lies in pharmacological agents and non-pharmacological methods, depending upon the choice and resources of the patient and the available expertise.[4,5]

Various methods have been used to control hypertension for a long time. Biological treatment mainly revolves around various classes of oral and parenteral anti-hypertensives.[6,7] Excluding special circumstances and emergencies, it is usually various classes of oral anti-hypertensives used to optimize the patient's blood pressure.[8] Though all the guidelines and management plans involve lifestyle modifications and non-pharmacological methods as the first line of treatment and primary prevention but seldom practised, especially in a developing country where the literacy rate is compromised, and people are not inclined to long-term treatment or, if inclined, prefer pharmacological options.[9,10]

We planned this study with the design of a quasi-experimental study in order to determine the impact of lifestyle on the optimization of blood pressure in adult hypertensive patients managed at Pak Emirates Military hospital, (PEMH) Rawalpindi Pakistan.

METHODOLOGY

This quasi-experimental study was conducted at Pak Emirates Military Hospital, Rawalpindi Pakistan between August 2019 to January 2020 after ethical approval (via IREB letter number: A/124 EC 130). The sample size was calculated using the WHO sample size calculator using the population prevalence portion of control of HTN with lifestyle modifications as 80%.[11] Non-probability consecutive sampling technique was used.

Inclusion Criteria: Patients of either gender, aged 25 to 60 years with essential hypertension were included in the study.

Correspondence: Dr Altaf Hussain, Department Resident Medicine PEMH Rawalpindi Pakistan
Received: 17 Jun 2020; revision received: 15 Jul 2020; accepted: 28 Jul 2020

Exclusion Criteria: Patients with secondary hypertension or those who suffered from hypertensive urgency or emergency in the past three months, patients with co-morbid DM, IHD, RA, autoimmune

illnesses, bleeding disorders, and haematological or solid malignancies were not included in this study. Patients on corticosteroids or those with severe infection or signs of any end organ damage were also not included in the study. Patients who were pregnant or had some limb injury or orthopaedic procedure in the past year or those using any illicit substance or suffering from a chronic psychiatric condition were also part of the exclusion criteria.

A consultant medical specialist or nephrologist makes essential hypertension diagnosis based on recent clinical guidelines. Blood pressure was measured in all the study participants in a sitting position with a standard mercury sphygmomanometer. All participants underwent blood pressure measurements using the same machine, and the same operator measured all the readings.

Physician-led lifestyle modifications included planning meals and restricting the salt in diet according to the routine guidelines.[12,13] Restriction of alcohol and smoking was also part of the dietary strategy briefed to the patients by the physician. In addition, a routine pedometer was used to count the steps. A minimum of 7000 steps per day were advised to the patients by the physician.[14] This combination of dietary modification and use of a pedometer was explained in detail by the physician to the group participants who practised these changes during the study in addition to the anti-hypertensive medicines.

Patients were provided with a detailed description of the study and were inducted into the study after written informed consent. Patients of essential hypertension were randomly divided into two equal groups via the lottery method. Subjects in Group-A were prescribed oral anti-hypertensive medications as per routine. In contrast, patients in Group-B were provided physician-led life modification, including dietary modification and physical activity, in addition to routine medications. The difference in the blood pressure of both groups was assessed with the help of relevant statistical tests explained in the statistical analysis section. In addition, socio-demographic variables were collected and entered in proforma especially designed for this quasi-experimental study.

All statistical analysis was performed using Statistics Package for Social Sciences version 24.0. Frequency and percentage were calculated for the gender of the patients participating in the study and patients with optimal control of hypertension and the presence of comorbidities. In addition, mean and standard deviation were calculated for the age of the patients and duration of hypertension.

Binary logistic regression analysis was used to see the association of various factors with the optimization of blood pressure, including the treatment given. The *p*-value was considered significant if less than or equal to 0.05.

RESULTS

We enrolled 200 patients in the study into Group-A (controls) and Group-B (cases). The mean age of the patients was 46.50±3.563) years. The mean duration of hypertension in the study participants was 5.12±3.24 years (Table). 81(40.5%) patients were male, while 119(59.5%) were female. Optimal blood pressure was achieved in 103(51.5%), while this was not achieved in 97(48.5%). The statistically significant difference was found in achieving optimal blood pressure control among the cases and controls. Gender was also statistically significant in achieving control of blood pressure (*p*-value<0.001).

Table: Demographic Details of the Patients Participating in Study (n=200)

Characteristics	n(%)
Age (years) Mean±SD	46.50±3.56 years
Range (min-max)	29 years - 60 years
Gender	
Male	81 (40.5%)
Female	119 (59.5%)
Duration of hypertension	5.12 (±3.2426) years
	12 months - 15 years
Optimal Control of Hypertension	
No	97 (48.5%)
Yes	103 (51.5%)
Presence of Comorbidities	
No	149 (74.5%)
Yes	51 (25.5%)

DISCUSSION

Pakistan is a developing country with limited resources. The health budget does not permit physicians to go for costly interventions for every patient. Hypertension is a lifelong condition which needs treatment or management in various ways for the whole life. Finding a suitable and cost-effective measurement has usually been the goal of physicians and researchers.[3,14,15] These interventions would benefit the patient and the health system. Lifestyle modifications or non-pharmacological methods have always been an

area of interest for researchers and policymakers because they provide a cost-effective management mode, especially for chronic diseases.[16] A local study concluded that very basic and simple techniques told by the health care workers in the community might lead to effective primary and secondary prevention of hypertension, especially among young adults.[12] We planned this study to generate baseline data regarding the difference in optimization of blood pressure in those taking pharmacological agents versus those receiving lifestyle modifications along with the medications.

Although treatment with different options in both groups, overall, 103(51.5%) patients achieved the optimal control in our study. A study done in our neighbouring country Iran by Eghbali *et al*. concluded that around 17.8% of the patients did not achieve the HTN control, and out of these, more than 30 percent were unaware of the problem and were not ready to receive the pharmacological treatment as well as adopting lifestyle modifications.[17] This highlight the gap of knowledge in the population that exists regarding routine health care problems.

A community-based RCT done in India by Subramanian *et al*. found that young patients with hypertension or prehypertension respond very well to various lifestyle modifications, including changes in dietary habits and increasing physical activity.[18] This study was very similar to ours as it involved more than one non-pharmacological measure, including salt reduction and physical exercise. In addition, our study has similar findings as binary logistic regression analysis revealed considerable differences between the two groups regarding the optimization of blood pressure.

In a study conducted by Okura *et al*. around 69 patients with hypertension were included and divided into two groups. The group with lifestyle modification by pedometer had significantly lowered blood pressure compared to those who did not participate in pedometer-related modification.[19] We also used the pedometer technique to ensure compliance with physical activity and make it the same for all the patients.

Gao *et al*.mentioned that patients who have been smoking have an increased risk of many healthcare problems, including hypertension, respiratory tract disease and heart problems. This risk increase with the age of the patient and years of smoking.[20] Smoking was included as part of lifestyle modifications in our study, and results showed that the patients with lifestyle modifications had a better outcome than those with only medications.

LIMITATIONS OF STUDY

A few limitations hinder the generalizability of the results of our study. First, the effect of all lifestyle modifications was not considered separately, so we could not conclude which measure was most effective.

CONCLUSION

This study showed a significant difference in optimizing the blood pressure of patients who received lifestyle modification in addition to conventional biological treatment than those who only received the routine anti-hypertensive medication. Females also had better control as compared to males.

Conflict of Interest: None.

Author's Contribution

Following authors have made substantial contributions to the manuscript as under:

AH & MH: Study design, drafting the manuscript, data interpretation, critical review, approval of the final version to be published.

MN & SUS: Concept, data acquisition, data analysis, data interpretation, critical review, approval of the final version to be published.

MSK & MMS: Data acquisition, critical review, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

REFERENCES

1. Singh S, Shankar R, Singh GP. Prevalence and Associated Risk Factors of Hypertension: A Cross-Sectional Study in Urban Varanasi. Int J Hypertens 2017; 2017(1): 5491838. doi:10.1155/2017/5491838
2. Zhou D, Xi B, Zhao M, Wang L, Veeranki SP. Uncontrolled hypertension increases risk of all-cause and cardiovascular disease mortality in US adults: the NHANES III Linked Mortality Study. Sci Rep 2018; 8(1): 9418. doi:10.1038/s41598-018-27377-2.
3. Ali A, Abu Zar M, Kamal A, Faquih AE, Bhan C, Iftikhar W et al. American Heart Association High Blood Pressure Protocol 2017: A Literature Review. Cureus 2018; 10(8): e3230.
4. Aronow WS. Antihypertensive drug therapy. Ann Transl Med 2018; 6(7): 123. doi:10.21037/atm.2018.01.26.
5. Guerrero-García C, Rubio-Guerra AF. Combination therapy in the treatment of hypertension. Drugs Context 2018; 7(3): 212531. doi:10.7573/dic.212531.
6. Buda ES, Hanfore LK, Fite RO, Buda AS. Lifestyle modification practice and associated factors among diagnosed hypertensive patients in selected hospitals, South Ethiopia. Clin Hypertens 2017; 23(4): 26. doi:10.1186/s40885-017-0081-1.
7. Alefan Q, Huwari D, Alshogran OY, Jarrah MI. Factors affecting hypertensive patients' compliance with healthy lifestyle. Patient Prefer Adherence 2019; 13(2): 577–585. doi:10.2147/PPA.S198446.
8. Kimani S, Mirie W, Chege M, Okube OT, Muniu S. Association of lifestyle modification and pharmacological adherence on blood pressure control among patients with hypertension at Kenyatta National Hospital, Kenya: a cross-sectional study. BMJ Open 2019; 9(1): e023995. doi:10.1136/bmjopen-2018-023995.

9. Yang MH, Kang SY, Lee JA, Kim YS, Sung EJ, Lee KY, et al. The Effect of Lifestyle Changes on Blood Pressure Control among Hypertensive Patients. Korean J Fam Med 2017 ; 38(4): 173-180. doi: 10.4082/kjfm.2017.38.4.173. Erratum in: Korean J Fam Med 2017;38(5):311-312.
10. Lopes S, Mesquita-Bastos J, Alves AJ, Ribeiro F. Exercise as a tool for hypertension and resistant hypertension management: current insights. Integr Blood Press Control 2018; 11 (5): 65–71. doi:10.2147/IBPC.S136028
11. Karppanen H, Mervaala E. Sodium intake and hypertension. Prog Cardiovasc Dis 2006; 49(1): 59–75.
12. Jafar TH, Islam M, Juanita H, Hashmi S, Bux R, Khan A et al. Community based lifestyle intervention for blood pressure reduction in children and young adults in developing country: cluster randomised controlled trial. BMJ 2010; 340 (3): 2641-2645.
13. Kitt J, Fox R, Tucker KL, McManus RJ. New Approaches in Hypertension Management: a Review of Current and Developing Technologies and Their Potential Impact on Hypertension Care. Curr Hypertens Rep 2019; 21(6): 44-48. doi:10.1007/s11906-019-0949-4.
14. Ogedegbe G, Pickering T. Principles and techniques of blood pressure measurement. Cardiol Clin 2010; 28(4): 571–586. doi:10.1016/j.ccl.2010.07.006.
15. Ha SK. Dietary salt intake and hypertension. Electrolyte Blood Press 2014; 12(1): 7–18. doi:10.5049/EBP.2014.12.1.7
16. Korkiakangas EE, Alahuhta MA, Husman PM, Keinänen-Kiukaanniemi S, Taanila AM, Laitinen JH. Pedometer use among adults at high risk of type 2 diabetes, Finland, 2007-2008. Prev Chronic Dis 2010; 7(2): A37.
17. Eghbali M, Khosravi A, Feizi A, Mansouri A, Mahaki B, Sarrafzadegan N. Prevalence, awareness, treatment, control, and risk factors of hypertension among adults: a cross-sectional study in Iran. Epidemiol Health 2018; 40(3): e2018020. doi:10.4178/epih.e2018020
18. Subramanian H, Soudarssanane MB, Jayalakshmy R, Thiruselvakumar D, Navasakthi D, Sahai A, et al. Non-pharmacological Interventions in Hypertension: A Community-based Cross-over Randomized Controlled Trial. Indian J Community Med 2011; 36(3): 191–196. doi:10.4103/0970-0218.86519.
19. Okura T, Enomoto D, Miyoshi KI, Nagao T, Kukida M, Tanino A, et al. The Importance of Walking for Control of Blood Pressure: Proof Using a Telemedicine System. Telemed J E Health 2016; 22(12): 1019-1023.
20. Gao K, Shi X, Wang W. The life-course impact of smoking on hypertension, myocardial infarction and respiratory diseases. Sci Rep 2017; 7(1): 4330. 28. doi:10.1038/s41598-017-04552-5.

.....