

FREQUENCY OF HYPERTENSION AND ITS RELATIONSHIP WITH PHYSICAL ACTIVITY AND EATING PATTERN AMONG ADULT POPULATION OF DISTRICT PESHAWAR

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ABSTRACT

Objective: Hypertension is a chronic illness and affecting approximately 22 to 42 % of the adult population of both developed and developing countries. This cross-sectional study was conducted to find the frequency and to estimate the relationship of hypertension with food patterns and physical activity.

Material & Methods: In this study, a total of 500 adults age 19 to 65 years were selected from July to December 2017; among the five selected union councils of District Peshawar. A detailed proforma was structured to assess the dietary pattern and physical activity from the respondents regarding the different determinants of hypertension. An individual was considered hypertensive on having blood pressure beyond 140/ 90 mmHg. MS Word and SPSS softwares were used for data management and presentation.

Results: Results showed that 30.80% of the studied population was hypertensive. Among the study participants; 61.40% were males while 38.60% were females; 54.80% were married; 60.20% had a monthly income of less than Rs.15000; 44.20% were literate. Moreover, among hypertensive individuals, 61.04% used table salt in food; 44.81% prefer a high caloric/ sugar diet; 60.39% prefer meat; only 42.21% prefer vegetables; 59.09% lived a sedentary life, and only 33.12% did regular physical exercise.

Conclusion: Hypertension showed high prevalence among adult participants and was strongly related to food pattern and physical activity. Community-related control and preventive measures and lifestyle modifications are required to prevent hypertension and its consequences.

Key words: Hypertension (MeSH), Adults (MeSH), Salt (MeSH), Meat (MeSH), Vegetables (MeSH), Exercise (MeSH).

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INTRODUCTION

Nearly 1.2 billion world population has been affected by hypertension and is a major determinant of chronic diseases¹. From 2000 to 2001, 6.9 million deaths worldwide deaths were attributed to high blood pressure or its associated complications i.e. strokes, ischemic heart disease, and other cardiovascular diseases². Cardiovas-

cular disease accounts for healthcare expenditure for the strategies of health education of communities, screening of populations, treatment, and prevention of complications of high blood pressure and if prevented and controlled then help in cost minimization of health sectors³. Hypertension is considered the most important and common chronic health concern as the leading contributor to worldwide mortality^{4, 5}. According to the 2017 statistics of Korea, the rate of occurrence of hypertension has raised from 23% to 28% among females and 25-35% among the male population during a single decade i.e. from 2006 to 2015; and is causing significant health care costs⁷.

Good eating behaviors help to acquire good health, physique, and development of mind and thus

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eventually prevent the occurrence of common food and nutrition-related problems and finally prevent the body against the development of chronic debilitating diseases and their complications⁸. Moreover, unhealthy eating behaviors, and their strong relationship with heart and blood diseases, results in high deaths and/ or their associated consequences⁹. Furthermore, the DASH diet is helpful and is effective in lowering both the systolic and diastolic blood pressure^{10,11}. The DASH diet revealed that due to the high content of whole foods, fish, grains, vegetables, nuts, and fruits help to reduce blood pressure both in hypertensive individuals as well as among normotensive individuals^{6,12}.

In a study conducted by Wang et al., in 2011; revealed that hypertension showed an indirect relationship with consumption of diet having fruits, vegetables, nuts, eggs, and pork, etc.¹³; whereas a diet rich in fats, high energy, meat, and refined grains showed a strong positive relation with blood pressure^{14,15,16}.

Dietary modifications are associated with clinically meaningful lowering of blood pressure. Many controlled trials found that changes in the dietary patterns help a lot in the reduction of both systolic and diastolic blood pressure³. Many international studies have revealed a significant reduction of cardiovascular deaths by controlling the blood pressure effectively with diet or medicines. Moreover, high blood pressure and its consequences were less observed among the individuals who follow the Mediterranean diets¹⁷.

Many national and international studies, found and revealed that hypertension incidence and prevalence rates were declining due to the changes in eating behavior of individuals i.e. consuming less salt and sugar, more fruits & vegetables, less dairy products, whole grains, and non-consumption of meat^{1,18}. Modifiable lifestyle preventive measures like avoiding a sedentary lifestyle, tobacco smoking, etc. are important in order to control hypertension¹⁹.

Current research statistics showed that those individuals who used to take more salt had high chances to be affected by hypertension in near future or more probably after 50 years of age²⁰. Moreover, reduction of sodium intake from high to low quantity helps in lowering hypertension¹². Many international studies revealed that physical exercise of mild to moderate and hard exercise is an effective strategy for controlling or preventing the inci-

dence of hypertension^{11,21,22}; and thus showed an indirect association of hypertension with strenuous physical exercise^{23,24,25}. In Pakistan, being a third world country, all the important risk factors which showed a strong relationship with the non-communicable disease were prevalent i.e. high caloric food, fewer vegetables, high carbohydrates, high salt intake, strong family history, sedentary lifestyle, etc. This study was conducted to estimate the frequency and to estimate the relationship of hypertension with food patterns and physical activity among the adults, of Peshawar district.

MATERIAL & METHODS

A cross-sectional study among adults age 18 & above years was conducted by the Community Medicine, Department, Khyber Medical College, Peshawar, after ethical approval from the ethical review committee of the KTH/KMC; from July to December 2017.

A sample size of 500 adults both males and females were selected, through multistage probability sampling technique from the five union councils of district Peshawar i.e. Faqir Abad, Hassan Gari, Bhana Mari, Tehkal Payan-I, and Hayatabad-II; to estimate the prevalence of hypertension and its relationship with food patterns and physical activity. The questionnaire was used to collect information on direct and indirect determinants of hypertension.

The participant was considered hypertensive if the systolic and diastolic blood pressure was higher than 140 and 90 mmHg on assessment or if the subject was taking antihypertensive agents. MS Word and SPSS softwares were used for statistical purposes.

RESULTS

Among 500 participants, 31% were hypertensive, belonging to ages 18 and 70 years, and 307 were males and the rest female participants. Amongst male participants, hypertension was found in 2/3rd of participants as compared to female patients where it was found to be in 1/3rd. The results and major findings are shown in Tables 1, 2 and 3.

Table 1: Frequency & Percentage of Hypertension among the study participants

S. No	Findings	500	(%age)
1	Hypertension	154	30.80
2	No Hypertension	346	69.20
	Total	500	100

Table 2: Demographic Variables of Hypertension among the study participants

Demographics	Variables	HTN F (n=154) (%)	No HTN (n=346) (%)	Total F (n=500) (%)
Age Groups (in years)	18-27	15 (9.74)	86 (24.86)	101 (20.20)
	28-37	21 (13.64)	114 (32.95)	135 (27.0)
	38-47	47 (30.52)	64 (18.50)	111 (22.2)
	48-57	43 (27.92)	48 (13.87)	91 (18.20)
	48 & above	28 (18.18)	34 (9.83)	62 (12.40)
Gender Distribution	Male	113 (73.38)	194 (56.07)	307 (61.40)
	Female	41 (26.62)	152 (43.93)	193 (38.60)
Marital Status	Married	116 (75.32)	158 (45.66)	274 (54.80)
	Unmarried	38 (24.68)	188 (54.34)	226 (45.20)
Monthly Income	< 15000	58 (37.66)	243 (70.23)	301 (60.20)
	15000-30000	35 (22.73)	57 (16.47)	92 (18.40)
	30000-45000	32 (20.78)	27 (7.80)	59 (11.80)
	45000 & Above	29 (18.83)	19 (5.49)	48 (9.60)
Occupations	Labor	21 (13.64)	58 (16.76)	79 (15.80)
	Govt servants	48 (31.17)	38 (10.98)	86 (17.20)
	Housewife	53 (34.42)	90 (26.01)	143 (28.60)
	Students	14 (9.09)	81 (23.41)	95 (19)
	Others	18 (11.69)	79 (22.83)	97 (19.40)
Educational Status	Literate	96 (62.34)	125 (36.13)	221 (44.20)
	Illiterate	58 (37.66)	221 (63.87)	279 (55.80)
Nutritional Status	Underweight	42 (27.27)	65 (18.79)	107 (21.40)
	Normal	41 (26.62)	152 (43.93)	193 (38.60)

Table 3: Modifiable Variables of Hypertension among the study participants

Variables	Response	HTNF (n=154) (%)	No HTN (n=346) (%)	Percentage	P-Value
Use/ like table salt	Yes	94 (61.04)	217 (62.72)	331 (66.2)	0.3605**
	No	60 (38.96)	129 (37.28)	169 (33.8)	
Prefer too much salt	Yes	53 (34.42)	75 (21.68)	128 (25.6)	0.001 *
	No	101 (65.58)	271 (78.32)	372 (74.4)	
Use/ like sugar	Yes	69 (44.81)	207 (59.83)	276 (55.2)	0.0009 *
	No	85 (55.19)	139 (40.17)	224 (44.8)	
Prefer too much sugar/ High caloric food	Yes	51 (33.12)	64 (18.50)	115 (23)	0.00016 *
	No	103 (66.88)	282 (81.50)	385 (77)	
Prefer meat as food	Yes	93 (60.39)	161 (46.53)	254 (50.8)	0.002*
	No	61 (39.61)	185 (53.47)	246 (49.2)	
Prefer vegetables as food	Yes	65 (42.21)	93 (36.88)	158 (31.6)	0.0003 *
	No	89 (57.79)	253 (73.12)	342 (68.4)	
Living sedentary lifestyle	Yes	91 (59.09)	151 (43.64)	242 (48.4)	0.0007 *
	No	63 (40.91)	195 (56.36)	258 (51.6)	
Exercise regularly	Yes	51 (33.12)	75 (21.68)	126 (25.2)	0.0032*
	No	103 (66.88)	271 (78.32)	374 (74.8)	

DISCUSSION

In this study, the prevalence of hypertension estimated was approximately n=154 (30.80%), as was revealed and supported by international studies with 30%

and 31.1% prevalence among the population-based studies^{26, 27}. In our study approximately, 61.04% use table salt and 34.42% prefer too much salt; and too much salt preference showed significant results whereas table salt in the

diet showed no significant association with hypertensive individuals as was reported and supported by international studies of Sacks et al., 2001; Claas & Arnett, 2016; & Stamler et al., 2018; which showed that higher sodium chloride intake showed higher prevalence with hypertension^{11,12,20}.

Many international studies found and revealed an indirect association between vegetables and fruits intake and the incidence and prevalence of hypertension; as was supported and revealed by our study which also showed a significant relationship between vegetable intake and hypertension prevalence^{18,28}. Ndanaku et al., 2016; Grossman et al., 2017; & Song et al., 2018; studies conducted internationally showed a strong positive relationship between high meat consumption and hypertension prevalence as was confirmed by our study results which showed that among 60.39% of individuals had a positive history of meat prevalence^{1,6,29} (Table No. 3).

In our study, among the hypertensive individuals, approximately 44.81% had a history of high sugar and high caloric intake (33.12%) as compared to 55.19% who didn't prefer too much sugar or high caloric diet and showed a significant p-value of 0.0009 with 9.72 Chi-Square Test value. Thus our study results were consistent and supported the findings of international studies; which revealed a strong relationship between high caloric diet and DASH diet with hypertension prevalence^{3,10,24}. In our study, among the hypertensive individuals, approximately 33.12% did regular physical exercise and 66.88% had a sedentary lifestyle and thus supported the findings of various international studies conducted by Bakker et al., 2018; Kokkinos et al., 2019; & Narayan et al., 2019^{22,30,31}.

LIMITATIONS OF THE STUDY

Due to lack of resources a small sample size of 500 was collected from the communities of district Peshawar.

Time shortage, as students were present only for four months in field for data collection beside their busy schedule

CONCLUSIONS

It was concluded that the prevalence of hypertension showed moderate to high frequency among the study participants with range of one out of five individuals. The hypertension showed a significant relationship with pattern and type of food intake, preference for too much salt & sugar in food, and a sedentary lifestyle with less physical activity, and thus the population-based preventive strategies and lifestyle modifications strategies were needed to prevent and control hypertension and its consequences among the communities.

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REFERENCES

1. Ndanuko RN, Tapsell LC, Charlton KE, Neale EP, Batterham MJ. Dietary patterns and blood pressure in adults: a systematic review and meta-analysis of randomized controlled trials. *Advances in Nutrition*. 2016 Jan 7;7(1):76-89.
2. Lawes CM, Vander Hoorn S, Rodgers A. Global burden of blood-pressure-related disease, 2001. *The Lancet*. 2008 May 3;371(9623):1513-8.
3. Gay HC, Rao SG, Vaccarino V, Ali MK. Effects of different dietary interventions on blood pressure: systematic review and meta-analysis of randomized controlled trials. *Hypertension*. 2016 Apr;67(4):733-9.
4. Lim SS, Vos T, Flaxman AD, et al. A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and risk factor clusters in 21 regions, 1990-2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet*. 2012; 380:2224-2260. DOI: 10.1016/S0140-6736(12)61766-8.
5. GBD 2013 Mortality and Causes of Death Collaborators. Global, regional, and national age-sex specific all-cause and cause-specific mortality for 240 causes of death, 1990-2013: a systematic analysis for the global burden of disease study 2013. *Lancet*. 2015; 385:117-171
6. Song S, Kim J, Kim J. Gender differences in the association between dietary pattern and the incidence of hypertension in middle-aged and older adults. *Nutrients*. 2018;10(2):252.
7. MacDonald HV, Pescatello LS. Exercise prescription for hypertension: new advances for optimizing blood pressure benefits. In *Lifestyle in Heart Health and Disease* 2018 Jan 1 (pp. 115-136). Academic Press.
8. Schwingshackl L, Hoffmann G. Diet quality as assessed by the Healthy Eating Index, the Alternate Healthy Eating Index, the Dietary Approaches to Stop Hypertension score, and health outcomes: a systematic review and meta-analysis of cohort studies. *Journal of the Academy of Nutrition and Dietetics*. 2015 May 1;115(5):780-800.
9. Murray CJ, Atkinson C, Bhalla K, et al.; U.S. Burden of Disease Collaborators. The state of US health, 1990-2010: the burden of diseases, injuries, and risk factors. *JAMA*. 2013; 310:591-608. DOI: 10.1001/jama.2013.13805.
10. Buendia JR, Li Y, Hu FB, Cabral HJ, Bradlee ML, Quatrotoni PA, Singer MR, Curhan GC, Moore LL. Long-term yogurt consumption and risk of incident hypertension in adults. *Journal of hypertension*. 2018 Aug 1;36(8):1671-9.
11. Claas SA, Arnett DK. The role of a healthy lifestyle in the primordial prevention of cardiovascular disease. *Current cardiology reports*. 2016 Jun 1;18(6):56.
12. Sacks FM, Svetkey LP, Vollmer WM, Appel LJ, Bray GA, Harsha D, Obarzanek E, Conlin PR, Miller ER, Simons-Morton DG, Karanja N. Effects on blood pressure of reduced dietary sodium and the Dietary Approaches

- to Stop Hypertension (DASH) diet. *New England journal of medicine*. 2001 Jan 4;344(1):3-10.
13. Wang, D.; He, Y.; Li, Y.; Luan, D.; Yang, X.; Zhai, F.; Ma, G. Dietary patterns and hypertension among Chinese adults: A nationally representative cross-sectional study. *BMC Public Health* 2011, 11.
 14. Centritto, F.; Iacoviello, L.; di Giuseppe, R.; De Curtis, A.; Costanzo, S.; Zito, F.; Grioni, S.; Sieri, S.; Donati, M.B.; de Gaetano, G.; et al. Dietary patterns, cardiovascular risk factors and c-reactive protein in a healthy Italian population. *Nutr. Metab. Cardiovasc. Dis.* 2009, 19, 697–706.
 15. Khaledi, S.; Sharma, S.; Irwin, C.; Sun, J. Dietary patterns, nutrition knowledge, and lifestyle: Associations with blood pressure in a sample of Australian adults (the Food BP study). *J. Hum. Hypertens.* 2016, 30, 581–590.
 16. Sauvageot, N.; Leite, S.; Alkerwi, A.; Sisanni, L.; Zannad, F.; Saverio, S.; Donneau, A.F.; Albert, A.; Guillaume, M. Association of empirically derived dietary patterns with cardiovascular risk factors: A comparison of PCA and RRR methods. *PLoS ONE* 2016, 11, e0161298.
 17. Estruch R, Ros E, Salas-Salvadó J, et al.; PREDIMED Study Investigators. Primary prevention of cardiovascular disease with a Mediterranean diet. *N Engl J Med*. 2013; 368:1279–1290. doi: 10.1056/NEJMoa1200303.
 18. Bendinelli B, Masala G, Bruno RM, Caini S, Saieva C, Boninsegni A, Ungar A, Ghiadoni L, Palli D. A priori dietary patterns and blood pressure in the EPIC Florence cohort: A cross-sectional study. *European journal of nutrition*. 2019 Feb 1;58(1):455-66.
 19. Blumenthal JA, Sherwood A, Gullette EC, Babyak M, Waugh R, Georgiades A, Craighead LW, Tweedy D, Feinglos M, Appelbaum M, Hayano J. Exercise and weight loss reduce blood pressure in men and women with mild hypertension: effects on cardiovascular, metabolic, and hemodynamic functioning. *Archives of internal medicine*. 2000 Jul 10;160(13):1947-58.
 20. Stamler J, Chan Q, Daviglus ML, Dyer AR, Van Horn L, Garside DB, Miura K, Wu Y, Ueshima H, Zhao L, Elliott P. Relation of dietary sodium (salt) to blood pressure and its possible modulation by other dietary factors: the INTERMAP study. *Hypertension*. 2018 Apr;71(4):631-7.
 21. Leggio M, Fusco A, Limongelli G, Sgorbini L. Exercise training in patients with pulmonary and systemic hypertension: A unique therapy for two different diseases. *European journal of internal medicine*. 2018 Jan 1;47:17-24.
 22. Bakker EA, Sui X, Brelenthin AG, Lee DC. Physical activity and fitness for the prevention of hypertension. *Current opinion in cardiology*. 2018 Jul 1;33(4):394-401.
 23. Swift DL, McGee JE, Earnest CP, Carlisle E, Nygard M, Johannsen NM. The effects of exercise and physical activity on weight loss and maintenance. *Progress in cardiovascular diseases*. 2018 Jul 1;61(2):206-13.
 24. Bacon SL, Sherwood A, Hinderliter A, Blumenthal JA. Effects of exercise, diet, and weight loss on high blood pressure. *Sports Medicine*. 2004 Apr 1;34(5):307-16.
 25. Larsen MK, Matchkov VV. Hypertension and physical exercise: the role of oxidative stress. *Medicine*. 2016;52(1):19-27.
 26. Neuhauser HK, Adler C, Rosario AS, Diederichs C, Ellert U. Hypertension prevalence, awareness, treatment, and control in Germany 1998 and 2008–11. *Journal of human hypertension*. 2015 Apr;29(4):247.
 27. Mills KT, Bundy JD, Kelly TN, Reed JE, Kearney PM, Reynolds K, Chen J, He J. Global Disparities of Hypertension Prevalence and Control Clinical Perspective: A Systematic Analysis of Population-Based Studies From 90 Countries. *Circulation*. 2016 Aug 9;134(6):441-50.
 28. Appleby PN, Davey GK, Key TJ. Hypertension and blood pressure among meat eaters, fish eaters, vegetarians, and vegans in EPIC-Oxford. *Public health nutrition*. 2002 Dec;5(5):645-54.
 29. Grossman DC, Bibbins-Domingo K, Curry SJ, Barry MJ, Davidson KW, Doubeni CA, Epling JW, Kemper AR, Krist AH, Kurth AE, Landefeld CS. Behavioral counseling to promote a healthful diet and physical activity for cardiovascular disease prevention in adults without cardiovascular risk factors: US Preventive Services Task Force recommendation statement. *Jama*. 2017 Jul 11;318(2):167-74.
 30. Kokkinos P, Narayan P, Pittaras A. Physical Activity, Blood Pressure, and Cardiac Structure and Function. In *Cardiorespiratory Fitness in Cardio-metabolic Diseases 2019* (pp. 181-190). Springer, Cham.
 31. Narayan P, Kumar A. Role of Physical Activity, Exercise, and Cardiorespiratory Fitness in the Management of Resistant Hypertension. In *Cardiorespiratory Fitness in Cardio-metabolic Diseases 2019* (pp. 169-179). Springer, Cham.

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Following authors have made substantial contributions to the manuscript as under

- Ishtiaq M:** Principal Investigator; Concept; Data Analysis; and Manuscript Writing
- Naeem M:** Data collection; Data Entry; & Critical Analysis
- Hussain A:** Initial & Final Manuscript Drafting
- Ijaz B:** Review and data collection
- Irfan M:** Review and data collection
- Mustafa A:** Bibliography; Data collection & Data Entry
- Imranullah:** Proof reading & Critical Analysis
- Iftikhar B:** Proof reading & Critical Analysis

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.