

The Determinants and Scope of Public Health Interventions to Tackle the Global Problem of Hypertension

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ABSTRACT

Background: Hypertension is a significant public health concern of world-wide distribution and is also the most common cardiovascular disease risk factor. Adequate control of blood pressure is a critical element in the prevention of hypertension induced-organ damage and life-threatening complications. Prevention of hypertension is possible and early detection and effective treatment can significantly reduce the incidence of adverse clinical outcomes.

Methods: An extensive search of all materials related to the topic was carried out in PubMed, Medline, World Health Organization website and Google Scholar search engines. Keywords used in the search included hypertension, cardiovascular disease, public health, life-style modifications and awareness. Overall 51 articles were selected and analyzed.

Results: Multiple socio-demographic and potential risk factors have been recognized in the causation and determining the long-term outcomes of the disease world-wide. As the natural history of hypertension is complex and etiology is multi-factorial the strategy to combat also should be multi-pronged based on the trends and magnitude of the disease in variable settings.

Conclusions: To conclude, although progress has been observed in the area of awareness, treatment and control, the need continues to be high for sustainable and cost-effective interventions that will ultimately halt and reverse the rising tide of hypertension prevalence. Population-based health education, dietary and life-style modification and pharmacological therapy are all effective measures to reduce the prevalence and increase the control rate of hypertension.

Keywords: Cardiovascular disease, hypertension, public health

INTRODUCTION

Cardiovascular diseases are caused due to abnormalities in the heart and blood vessels and mainly comprise of conditions such as coronary heart disease, stroke, hypertension, peripheral vascular disease, rheumatic heart disease and heart failure.^[1]

Recent global trends reveal that the incidence of coronary heart disease has gradually decreased in most of the developed nations, but the scenario remains quite grim in developing nations that account for more than 60% of the global burden.^[2]

Hypertension is a significant public health concern of world-wide distribution and is also the most common cardiovascular disease risk factor.^[3] According to the World Health Organization (WHO), recent estimates show that hypertension affects more than a third of adults aged 25 and above, accounting for about a billion people world-wide and contributes to nearly 9.4 million deaths from cardiovascular diseases each year.^[4] It is responsible for causation of 50% of coronary heart disease and almost two-thirds of strokes.^[5,6] Further, it has been estimated that by the year 2030, 23 million cardiovascular deaths are projected to be due to hypertension, of which about 85% cases will be from low-resource settings and developing nations.^[4]

Poorly managed hypertension results in a wide gamut of complications varying from atherosclerosis, damage to coronary arteries/heart/kidneys/visual system, heart failure, disability, poor quality of life and eventually death.^[2,7-9] Adequate control of blood pressure is a critical element in the prevention of hypertension-induced-organ damage and life-threatening complications. Prevention of hypertension is possible and early detection and effective treatment can significantly reduce the incidence of adverse clinical outcomes.^[10-13] Thus implementation of effective primary and secondary prevention measures should be the most important goals in planning of health policy measures.^[14]

General objective

The objective of the following study is to explore the magnitude of hypertension and its related complications world-wide.

Specific objectives

To identify the socio-demographic determinants and personal lifestyle related factors that can be attributed to the same.

To suggest feasible, cost-effective community-based and individual measures which, if implemented strategically, will reduce the burden of the disease.

METHODS

An extensive search of all materials related to the topic was carried out for the initial 15 days of October month in PubMed, Medline, WHO website and Google Scholar search engines. Relevant documents, reports, research articles focusing on the awareness, potential risk factors/determinants of hypertension and measures to combat the same published in the period 1997-2013 were included in the review.

Selection of studies

A total of 62 studies similar to current study objectives were identified initially, of which, 11 were excluded on account of irrelevance to the present study and due to the unavailability of the complete version of the articles. Overall 51 articles were selected based upon the suitability with the current review objectives and analyzed. A summary of articles with titles and various designs is shown in the Table 1. These identified articles were then re-grouped into different sections namely determinants, risk factors and factors hampering the utilization of health care services; Suggested interventions; Implications for practice and implications for research. Keywords used in the search include hypertension, cardiovascular disease, public health, life-style modifications and awareness.

RESULTS

Hypertension: Determinants, risk factors and factors hampering the utilization of health care services

Multiple socio-demographic and potential risk factors such as older age;^[15-17] male gender;^[1,18,19] poor educational status;^[16,20,21] income;^[15] socioeconomic status;^[22,23] race;^[24] ethnic differences;^[25] role of heredity and genetics;^[26,27] urban-rural areas disparity;^[3] urbanization;^[25] poor awareness among the general population about the risk factors and compliance to treatment;^[28,29] presence of co-existing diseases like diabetes mellitus;^[15,16,22,30] stress;^[31] obesity/overweight/increased body mass index and waist circumference/hypercholesterolemia;^[16,29,32,33] dietary practices and more consumption of saturated fats;^[34-36] excessive salt consumption;^[37-39] alcohol;^[35,40] tobacco;^[41,42] physical inactivity;^[43] not undergoing regular screening activities;^[44] lack of trust on

Table 1: Some of the investigated studies in present article

Author	Publish year	Study design	Country	Number of subjects	Age of subjects	Main results
Damasceno <i>et al.</i> ^[3]	2009	Community-based cross-sectional study	Mozambique	3323 adult people from 25 randomly selected clusters	25-64	Immense need for strategies to improve prevention, correct diagnosis and access to effective treatment
Doğan <i>et al.</i> ^[15]	2012	Cross-sectional study	Turkey	2035 randomly selected subjects from different parts of city	23-68	Age, gender, diabetes, positive family history, BMI, pre-existing coronary heart disease and income levels were significant risk factors for hypertension development
Janus <i>et al.</i> ^[16]	2008	Cross-sectional surveys	Australia	3320 adult individuals	25-74	Suboptimal detection and treatment of hypertension, especially in men, in rural Australia
Cipullo <i>et al.</i> ^[17]	2010	Cross-sectional study	Brazil	1717 adult urban population	18-≥70	The prevalence of hypertension was 25.23% and it was significantly associated with increasing age and low educational level
Biino <i>et al.</i> ^[18]	2013	Cross sectional study	Sardinia	9845 inhabitants of villages of Ogliastra region	49.7	Genetic factors in men and co-morbidities and environmental factors in women were the main factors involved in the expression of blood pressure traits
Ma <i>et al.</i> ^[19]	2012	Cross sectional study	China	Representative sample of 13889 residents	≥20	The prevalence of awareness, treatment and control of hypertension is low and thus immediate strategies are needed to improve prevention, detection and treatment of hypertension
Nkondjock and Bizome ^[20]	2010	Cross sectional study	Cameroon	571 members of defense forces in military institutions	≥22	A diet rich in fruits, vegetables, tubers and legumes may have an important role in regulating blood pressure
Sempos <i>et al.</i> ^[21]	2003	Prospective cohort study	United States	2054 African American men	25-75	There is a need of a comprehensive alcohol policy incorporated within other health programs
Shillinglaw <i>et al.</i> ^[22]	2012	Web-based cross-sectional survey	United States	952 physicians	≥24	Majority of physicians in the study do not use risk assessments in practice

BMI=Body mass index

physicians;^[26] improper and incomplete management of hypertension;^[29] poor health care seeking behavior;^[45,46] and perceived barriers among people at community level such as limited resources – availability of trained manpower, access to the health system/cultural expectations and values;^[47-49] have been recognized in the causation and determining the long-term outcomes of the disease worldwide.

Suggested interventions

Although hypertension is a preventable condition, the asymptomatic nature of this disease renders it under-diagnosed and consequently undertreated, despite its very high prevalence. As

the natural history of hypertension is complex and its etiology being multi-factorial, the strategy to combat it also should be multi-pronged based on the trends and magnitude of the disease in variable settings.^[1] The need of the hour is to formulate a comprehensive and integrated approach to facilitate early detection in both high risk and the general population and thus minimize the incidence of complications.^[50] Implementation of other measures such as improving the socioeconomic/literacy status;^[16,20,23] creating an enabling environment for increasing awareness of community about risk factors;^[28,29] encouraging adults to get tested for blood pressure;^[1] advocating

regular screening activities;^[44] developing community-based interventions and strategies as a part of primary prevention measures;^[1,47,48,50,51] secondary prevention and targeted interventions towards high-risk groups;^[29] facilitating active involvement of health workers;^[1] orienting private practitioners through a health professional education program;^[52,53] fostering early detection of clinical cases and timely implementation of cost-effective secondary prevention measures to prevent long-term complications;^[31,51,52] involving voluntary organizations and multiple sectors;^[52] encouraging consumption of a diet rich in fruits, vegetables, tubers and legumes;^[34] advocating lifestyle modification measures like weight control, increased physical activity, limited alcohol intake, no tobacco use, and reduced dietary saturated fat and salt intake;^[11,35,37,40,54] universal adoption of WHO cardiovascular risk prediction charts;^[50] and therapeutic administration of bioactive natural constituents obtained from food sources;^[55] can be strategically planned according to the particular setting and prevailing cultural perceptions. The above suggested measures can be implemented in a comprehensive, yet flexible manner for the benefit of both the general population and those in high-risk group.

Implications for practice

The findings of the current review clearly reflect the necessity for a comprehensive national program for non-communicable diseases well backed by intensive health awareness campaigns to spread information about the potential risk factors and the sequel of inadequately managed cases of hypertension. Specific guidelines should be formulated and implemented for management of hypertensive patients depending on their blood pressure levels. All the physicians from the public health sector and the private sector including practitioners from other disciplines who are treating hypertensive patients should be trained in the appropriate and adequate management of hypertension. The outreach health workers should also be trained and empowered in different aspects of life-style modifications with special emphasis on the conceptual understanding of each of them so that they can spread the message to each and every household during their routine home visits. Strong political will is desired for establishing a

network between of international agencies and national agencies for to ensuring ensure external supervision and monitoring.

Implications for research

The need of the hour is to deepen community-based qualitative and quantitative studies to further estimate the level of awareness, knowledge and practices among the general population regarding potential risk factors and importance of life-style modifications in different settings. In each of such studies a conscious attempt should be made by the researchers to identify the perceived gaps or the barriers that are restricting community members from availing routine screening services. Research should also be conducted to explore the role of dietary factors and physical inactivity in the causation of hypertension. This has to be followed-up with designing of a comprehensive diet and exercise schedules for people with different needs.

CONCLUSIONS

Although progress has been observed in the area of awareness, treatment and control, the need continues to be high for sustainable and cost-effective interventions that will ultimately halt and reverse the rising tide of hypertension prevalence. Population-based health education, dietary and life-style modification and pharmacological therapy are all effective measures to reduce the prevalence and increase the control rate of hypertension. Government should advocate the implementation of comprehensive strategies for raising awareness about potential risk factors in the general population, maintaining optimal body weight, dietary modifications, abstaining from smoking and drinking and implementing aggressive antihypertensive interventions in the elderly.

REFERENCES

1. World Health Organization. Cardiovascular diseases-Fact sheet N°317, 2013. Available from: <http://www.who.int/mediacentre/factsheets/fs317/en/>. [Last accessed on 2013 Nov 19].
2. Mackay J, Mensah GA. The atlas of heart disease and stroke, World Health Organization and Center for Disease Control and Prevention. Available from: http://www.who.int/cardiovascular_diseases/resources/atlas/en/. [Last accessed on 2013 Oct 22].

3. Damasceno A, Azevedo A, Silva-Matos C, Prista A, Diogo D, Lunet N. Hypertension prevalence, awareness, treatment, and control in mozambique: Urban/rural gap during epidemiological transition. *Hypertension* 2009;54:77-83.
4. World Health Organization. World Health Day 2013: Calls for intensified efforts to prevent and control hypertension. Available from: <http://www.who.int/workforcealliance/media/news/2013/whd2013story/en/index.html>. [Last accessed on 2013 Nov 14].
5. Cutler JA, Sorlie PD, Wolz M, Thom T, Fields LE, Roccella EJ. Trends in hypertension prevalence, awareness, treatment, and control rates in United States adults between 1988-1994 and 1999-2004. *Hypertension* 2008;52:818-27.
6. Kearney PM, Whelton M, Reynolds K, Muntner P, Whelton PK, He J. Global burden of hypertension: Analysis of worldwide data. *Lancet* 2005;365:217-23.
7. Georgiopoulou VV, Kalogeropoulos AP, Butler J. Heart failure in hypertension: Prevention and treatment. *Drugs* 2012;72:1373-98.
8. Barylski M, Małyszko J, Rysz J, Myśliwiec M, Banach M. Lipids, blood pressure, kidney-what was new in 2011? *Arch Med Sci* 2011;7:1055-66.
9. Bielecka-Dabrowa A, Aronow WS, Rysz J, Banach M. The Rise and Fall of Hypertension: Lessons Learned from Eastern Europe. *Curr Cardiovasc Risk Rep* 2011;5:174-9.
10. Israili ZH, Hernández-Hernández R, Valasco M. The future of antihypertensive treatment. *Am J Ther* 2007;14:121-34.
11. Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo JL Jr, *et al.* Seventh report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. *Hypertension* 2003;42:1206-52.
12. Lewington S, Clarke R, Qizilbash N, Peto R, Collins R, Prospective Studies Collaboration. Age-specific relevance of usual blood pressure to vascular mortality: A meta-analysis of individual data for one million adults in 61 prospective studies. *Lancet* 2002;360:1903-13.
13. Szczech LA, Lazar IL. Projecting the United States ESRD population: Issues regarding treatment of patients with ESRD. *Kidney Int* 2004;90:S3-7.
14. Erdine S, Aran SN. Current status of hypertension control around the world. *Clin Exp Hypertens* 2004;26:731-8.
15. Doğan N, Toprak D, Demir S. Hypertension prevalence and risk factors among adult population in Afyonkarahisar region: A cross-sectional research. *Anadolu Kardiyol Derg* 2012;12:47-52.
16. Jaddou HY, Batieha AM, Khader YS, Kanaan AH, El-Khateeb MS, Ajlouni KM. Hypertension prevalence, awareness, treatment and control, and associated factors: Results from a national survey, Jordan. *Int J Hypertens* 2011;2011:828797.
17. Al-Nozha MM, Abdullah M, Arafah MR, Khalil MZ, Khan NB, Al-Mazrou YY, *et al.* Hypertension in Saudi Arabia. *Saudi Med J* 2007;28:77-84.
18. Janus ED, Bunker SJ, Kilkkinen A, McNamara K, Philpot B, Tideman P, *et al.* Prevalence, detection and drug treatment of hypertension in a rural Australian population: the greater green triangle risk factor study 2004-2006. *Intern Med J* 2008;38:879-86.
19. Jo I, Ahn Y, Lee J, Shin KR, Lee HK, Shin C. Prevalence, awareness, treatment, control and risk factors of hypertension in Korea: The Ansan study. *J Hypertens* 2001;19:1523-32.
20. Huisman M, Kunst AE, Bopp M, Borgan JK, Borrell C, Costa G, *et al.* Educational inequalities in cause-specific mortality in middle-aged and older men and women in eight western European populations. *Lancet* 2005;365:493-500.
21. Cipullo JP, Martin JF, Ciorlia LA, Godoy MR, Caçao JC, Loureiro AA, *et al.* Hypertension prevalence and risk factors in a Brazilian urban population. *Arq Bras Cardiol* 2010;94:519-26.
22. Min H, Chang J, Balkrishnan R. Socio-demographic risk factors of diabetes and hypertension prevalence in republic of Korea. *Int J Hypertens* 2010;2010:410794.
23. Kanjilal S, Gregg EW, Cheng YJ, Zhang P, Nelson DE, Mensah G, *et al.* Socioeconomic status and trends in disparities in 4 major risk factors for cardiovascular disease among US adults, 1971-2002. *Arch Intern Med* 2006;166:2348-55.
24. Cooper R, Rotimi C, Ataman S, McGee D, Osotimehin B, Kadiri S, *et al.* The prevalence of hypertension in seven populations of West African origin. *Am J Public Health* 1997;87:160-8.
25. Bharati VM, Ajayi KS. Hypertension in the developing world: challenges and opportunities. *American Journal of Kidney Diseases* 2010;55:590-8.
26. Peters RM, Aroian KJ, Flack JM. African American culture and hypertension prevention. *West J Nurs Res* 2006;28:831-54.
27. Biino G, Parati G, Concas MP, Adamo M, Angius A, Vaccargiu S, *et al.* Environmental and genetic contribution to hypertension prevalence: data from an epidemiological survey on Sardinian genetic isolates. *PLoS One* 2013;8:e59612.
28. Ma WJ, Tang JL, Zhang YH, Xu YJ, Lin JY, Li JS, *et al.* Hypertension prevalence, awareness, treatment, control, and associated factors in adults in southern China. *Am J Hypertens* 2012;25:590-6.
29. Zhao Y, Lu F, Sun H, Liu Z, Zhao Y, Sun S, *et al.* Trends in hypertension prevalence, awareness, treatment, and

- control rates in Shandong Province of China. *J Clin Hypertens* (Greenwich) 2012;14:637-43.
30. Perez-Fernandez R, Marino AF, Cadarso-Suarez C, Botana MA, Tome MA, Solache I, *et al.* Prevalence, awareness, treatment and control of hypertension in Galicia (Spain) and association with related diseases. *J Hum Hypertens* 2007;21:366-73.
 31. Krzysztozek J, Wierzejska E, Paczkowska A, Ratajczak P. Health-related behaviours and hypertension prevention in Poland, An environmental study. *Arch Med Sci* 2013;9:218-29.
 32. Zhou B, Wu Y, Yang J, Li Y, Zhang H, Zhao L. Overweight is an independent risk factor for cardiovascular disease in Chinese populations. *Obes Rev* 2002;3:147-56.
 33. Liu L, Ikeda K, Chen M, Yin W, Mizushima S, Miki T, *et al.* Obesity, emerging risk in China: Trend of increasing prevalence of obesity and its association with hypertension and hypercholesterolaemia among the Chinese. *Clin Exp Pharmacol Physiol* 2004;31:S8-10.
 34. Nkondjock A, Bizome E. Dietary patterns associated with hypertension prevalence in the Cameroon defence forces. *Eur J Clin Nutr* 2010;64:1014-21.
 35. Whelton PK, He J, Appel LJ, Cutler JA, Havas S, Kotchen TA, *et al.* National high blood pressure education program coordinating committee, Primary prevention of hypertension: clinical and public health advisory from the national high blood pressure education program. *JAMA* 2002;288:1882-8.
 36. Grynberg A. Hypertension prevention: From nutrients to (fortified) foods to dietary patterns Focus on fatty acids. *J Hum Hypertens* 2005;19:S25-33.
 37. Horky K. Reducing food salt content: A neglected approach to hypertension prevention and treatment in the population. *Vnitr Lek* 2009;55:797-801.
 38. Stamler J. The INTERSALT Study: Background, methods, findings, and implications. *Am J Clin Nutr* 1997;65:S626-42.
 39. Peters RM, Flack JM. Salt-sensitivity and hypertension in African Americans: Implications for cardiovascular nurses. *Progress in Cardiovascular Nursing* 2001;15:138-44.
 40. Campbell NR, Burgess E, Choi BC, Taylor G, Wilson E, Cleroux J, *et al.* Lifestyle modifications to prevent and control hypertension I Methods and an overview of the Canadian recommendations Canadian hypertension society, Canadian coalition for high blood pressure prevention and control, laboratory centre for disease control at health Canada, heart and stroke foundation of Canada. *CMAJ* 1999;160:S1-6.
 41. Sempos CT, Rehm J, Wu T, Crespo CJ, Trevisan M. Average volume of alcohol consumption and all-cause mortality in African Americans: The NHEFS cohort. *Alcohol Clin Exp Res* 2003;27:88-92.
 42. Centers for Disease Control. Cigarette smoking among adults - United States, 2002. *MMWR* 2004;53:427-31.
 43. Crespo CJ, Smith E, Andersen RE, Carter-Pokras O, Ainsworth BE. Race/ethnicity, social class and their relation to physical inactivity during leisure time: Results from the third national health and nutrition examination survey, 1988-1994. *American Journal of Preventive Medicine* 2000;18:46-53.
 44. Levy PD, Flack JM. Should African-Americans with elevated blood pressure be routinely screened for hypertensive heart disease? *Expert Rev Cardiovasc Ther* 2012;10:1201-4.
 45. Peters RM. Racism and hypertension among African Americans. *West J Nurs Res* 2004;26:612-31.
 46. Benkert R, Peters RM. African American women's coping with health care prejudice. *West J Nurs Res* 2005;27:863-89.
 47. Plescia M, Groblewski M. A community-oriented primary care demonstration project: refining interventions for cardiovascular disease and diabetes. *Ann Fam Med* 2004;2:103-9.
 48. Gettleman L, Winkleby MA. Using focus groups to develop a heart disease prevention program for ethnically diverse, low-income women. *J Community Health* 2000;25:439-53.
 49. Aroian KJ, Peters RM, Rudner N, Waser L. Hypertension prevention beliefs of Hispanics. *J Transcult Nurs* 2012;23:134-42.
 50. World Health Organization. Prevention of cardiovascular disease: Guidelines for assessment and management of cardiovascular risk. WHO Press: Geneva, 2007.
 51. Prabhakaran D, Singh K. Premature coronary heart disease risk factors & reducing the CHD burden in India. *Indian J Med Res* 2011;134:8-9.
 52. Shillinglaw B, Viera AJ, Edwards T, Simpson R, Sheridan SL. Use of global coronary heart disease risk assessment in practice: A cross-sectional survey of a sample of US physicians. *BMC Health Serv Res* 2012;12:20.
 53. Campbell NR. Hypertension prevention and control in Canada. *J Am Soc Hypertens* 2008;2:97-105.
 54. Neter JE, Stam BE, Kok FJ, Grobbee DE, Geleijnse JM. Influence of weight reduction on blood pressure: A meta-analysis of randomized controlled trials. *Hypertension* 2003;42:878-84.
 55. Huang WY, Davidge ST, Wu J. Bioactive natural constituents from food sources-potential use in hypertension prevention and treatment. *Crit Rev Food Sci Nutr* 2013;53:615-30.

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