

Full Length Research Paper

A meta analysis of prevalence rate of hypertension in Nigerian populations

Obinna Ikechukwu Ekwunife and Cletus Nze Aguwa

Department of Clinical Pharmacy and Pharmacy Management, University of Nigeria, Nsukka 410001, Enugu State, Nigeria.

Accepted 3 November, 2011

This study aimed at synthesizing population-based studies on prevalence of hypertension in Nigeria from 1990 to 2009. General databases and subject-specific databases were searched for primary studies. Manuscripts of appropriate studies were retrieved. Based on some criteria, only eligible studies were included in the study. A total of 9 studies all from South-West region of Nigeria that fulfilled the inclusion criteria were retrieved. Prevalence of hypertension ranged from a minimum of 12.4% to a maximum of 34.8%. Combined prevalence rate of hypertension was 22% and with 95% confidence interval of 17 to 27%. There was also gender difference with respect to prevalence of hypertension as males had higher prevalence of hypertension compared to females. This study showed that prevalence of hypertension is high in Nigeria. There is a need to develop strategies to prevent, treat, and control hypertension effectively in Nigeria.

Key words: Hypertension, prevalence, epidemiology, meta analysis.

INTRODUCTION

Hypertension is regarded a major public health problem (Murray and Lopez, 1997) and it is an important threat to the health of adults in sub-Saharan Africa (Cappucio et al., 2004; 1997). Emerging evidence identifies hypertension as a major cause of morbidity and mortality globally including sub-Saharan Africa (Cappucio et al., 2004; 1997; Cooper et al., 1997; Olatunbuson et al., 2000; Rufus et al., 2008). There are indications that the burden of non-communicable diseases (NCDs) such as hypertension is increasing in epidemic proportions in Africa. According to the World Health Report (2001), NCDs accounted for 22% of the total deaths in the region in the year 2000; cardiovascular diseases alone accounted for 9.2% of the total deaths, killing even more than malaria (WHO, 2002). Indeed, it has already been projected that up to three quarters of the worlds hypertensive population will be in economically developing countries by the year 2025 (Kearney et al., 2005). With increased prevalence of hypertension and

the resultant greater economic and health burden, Nigeria will feel the impact mostly due to its population size.

Unfortunately, hypertension and other non communicable diseases are not yet considered a problem in Nigeria. This problem is further magnified by paucity of data which may lead to the understanding that these diseases are not in existence. Assembling evidence available on the prevalence of hypertension in Nigeria could stimulate increased effort by health policy makers to control the emerging health burden. Such data could also have impact on daily medical practice as the need for prevention and control of hypertension would be obvious. Therefore, this study aimed at synthesizing population-based studies on prevalence of hypertension in Nigeria from 1990 to 2009.

METHODS

Literature searches

Two systematic review databases, Cochrane library and PUBMED were searched to ensure that similar review has not been conducted. Search for primary studies was carried out and

*Corresponding author. E-mail: obinna.ekwunife@unn.edu.ng.
Tel: +234(0)8057284466.

Table 1. Summary of prevalence rates of hypertension in Nigeria (n = 9)

Article ID	Place of study	Design method	State	Sample size	Age bracket (y)	Prevalence of hypertension (%)		
						M	F	All
Kaufman et al. 1995	Urban and rural	Cross sectional	Oyo	598	45 and above	24.0	23.0	24.0
Cooper et al. 1997	Urban and rural	Cross sectional	National	2509	25 and above	14.7	14.3	14.5
Owoaje et al. 1997	Urban	Cross sectional	Ibadan	247	30 – 70	22.2	24.3	23.4
Kadiri et al. 1999	Urban	Cross sectional	Ibadan	917	15 and above	22.2	14.2	20.2*
Lawoyin et al. 2002	Urban	Cross sectional	Ibadan	2144	15 and above	12.1	12.7	12.4
NHF and FMOH, 2003	Urban and rural	Cross sectional	Lagos	1018	15 and above	36.2	33.5	34.8
NHF and FMOH, 2003	Rural	Cross sectional	Lagos	501	15 and above	27.0	23.1	25.0
Adedoyin, 2008	Rural	Cross sectional	Ile-Ife	2250	20 and above	15.5	21.0	18.7*
Ogbagbon et al. 2007	Urban	Cross sectional	Ilorin	281	15 and above	28.4	22.9	27.1

*Weighted average of both sexes if not presented in original paper.

appropriate studies were identified for retrieval. The search entailed querying general databases (PUBMED and WHO Global InfoBase) using 'or' and then 'and' operator to combine the individual search terms. In addition, bibliographies of retrieved papers were examined to identify published hypertension prevalence studies in Nigeria.

Study selection

Retrieved papers were printed in duplicate and were screened individually by the two authors of this study against criteria for inclusion. The inclusion criteria were: a population based study with participants being 15 years and above (Lawes et al., 2006); random sampling of a defined population or studies involving entire populations (Seedat, 2004); studies involving African participants living in Nigeria; standard methods of measuring blood pressure described (Chobanian et al., 2003); reported prevalence of hypertension (age adjusted or unadjusted) (WHO, 1978); and defined hypertension using the WHO/ISH criteria of systolic blood pressure (SBP) ≥ 140 mmHg and diastolic blood pressure (DBP) ≥ 90 mmHg (WHO/ISH, 2003). The authors selected appropriate studies individually. Studies that were contentious were resolved by consensus agreement.

Data extraction

Extracted data were collected using a data collection form designed for the review. Data extracted from each paper included place of study (rural or urban), state where study was conducted, study design method, sample size, age bracket of study population and reported prevalence rate.

Analysis

In the basic table, prevalence estimates (%) were presented. Forest plot was used to visualize the extent of heterogeneity among studies. Since heterogeneity was expected, a measure of the degree of inconsistency across studies was conducted using Cochran Q, moment-based estimate of between studies variance and I² measure. Analysis was conducted using StatsDirect Statistical Software (StatsDirect Ltd, Version 2.7.8).

RESULTS

A total of 9 studies that fulfilled the inclusion criteria were used for the meta analysis (Kaufman et al., 1996; Cooper et al., 1997; Kadiri et al., 1999;

Owoaje et al., 1997; Lawoyin et al., 2002; NHF, 2003; Adedoyin et al., 2008; Ogbagbon et al., 2008) as shown in Table 1. All the studies adopted a cross-sectional design method. In majority of the studies, blood pressure was measured in a single visit, while blood pressure was measured twice on different visits and the average reported in the other studies. Five articles used standard mercury sphygmomanometer to measure blood pressure, 3 articles used electronic sphygmomanometer, and one article used aneroid sphygmomanometer while no specific instrument was reported for the remaining two articles. All the studies used participants of greater than 15 years old. However, two studies used older population of greater than 45 years and 30 to 70 years (Kaufman et al., 1996; Owoaje et al., 1997).

Prevalence of hypertension varied extensively between studies, ranging from a minimum of 12.4% to a maximum of 34.8%. Except in three of the studies (Owoaje, 1997; Lawoyin, 2002; Adedoyin, 2008), prevalence rate of hypertension

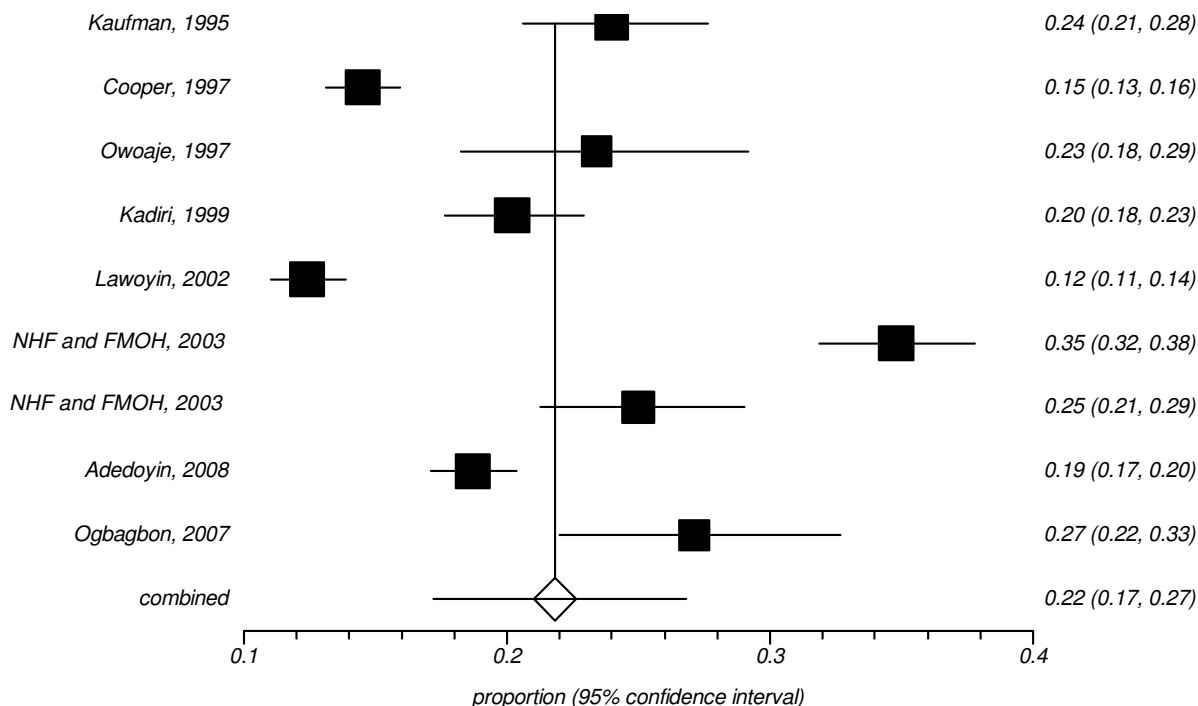


Figure 1. Forest plot of prevalence estimate and 95% confidence interval of selected studies (n = 9).

was higher in males compared to females. For the heterogeneity study conducted, the Q statistic was very large ($Q = 273.30$, $df = 8$, $p < 0.0001$; $I^2 = 97.1\%$), showing that there was a great deal of variation among studies. Thus, the random effect model was followed for data synthesis. Combined prevalence rate of hypertension was 22% and with 95% confidence interval of 17 to 27% as shown in Figure 1.

DISCUSSION

This study summarized prevalence of hypertension in populations of Nigeria for a twenty years period (1990 to 2009). Independently, two reviewers were used during the selection process so as to reduce bias as much as possible. The combined prevalence rate of hypertension was high. Due to the high variability in prevalence estimates of individual studies as described using Cochran Q, moment based estimate of between studies and I^2 , the random effects model for weighting individual studies was employed. Random effects model assumes that the study prevalence estimates follow a normal distribution, allowing for among-study variation (Whitehead and Whitehead, 1991). From the result of this study, the combined prevalence rate of hypertension was as high as those of developed countries (Kearney et al., 2005; Wolf-Maier et al., 2004). This could be explained in part by life-style changes as well as environmental and social factors typical of urbanized places which are taking place in Nigeria. High levels of obesity, increase in salt

and fat intake from consumption of processed foods and participating in jobs with minimal physical activities are likely explanations.

Prevalence of high blood pressure was slightly higher in males compared to females. This observation is similar to another review that pooled data from different populations of the world. In this review, it was reported that men had a slightly higher prevalence of 26.6% [26.0 to 27.2] compared to 26.1% of women [25.5 to 26.6%] (Kearney et al., 2005). However, in the same report, it was projected that by 2025, women will have a 0.5% higher prevalence compared to men (Kearney et al., 2005).

It has been stated that cardiovascular diseases is now endemic not just in developed countries, but also in developing countries (WHO, 2002; Ezzati et al., 2002). Cardiovascular diseases are known to cause a third of all deaths in middle-income countries (WHO, 2002). With high prevalence of hypertension, which is a risk factor for cardiovascular events, the burden cardiovascular diseases in Nigeria will increase. The obvious corollary is that with increasing prevalence and poorer control of hypertension, many people will be predisposed to cardiovascular events such as coronary heart disease and stroke. Such cardiovascular events will place a big economic burden on Nigeria since they are expensive to manage. This study highlights the need to develop strategies to prevent, treat, and control hypertension effectively in Nigeria.

There were some difficulties encountered during this study. Assessment of the quality of retrieved studies showed that the published studies used varying methods

in their individual studies. Some studies did not carry out sample size calculation so as to ensure the use of representative sample. Response rates were not also included in some studies. Most studies defined hypertension on the basis of single blood pressure measurement which is not in accord with the accepted method of measuring blood pressure. This highlights the need for Nigerian researchers to follow more rigorous and generally accepted methods in order to aid comparability of results. One limitation of this meta analysis is that all the available studies included in the study were from states located in South-Western part of Nigeria. This places some question on the generalizability of this study to the whole country.

ACKNOWLEDGEMENT

The authors wish to thank Mr. Cyril Ifeanyi Ugwoke for his help in the search and retrieval of studies used in the systematic review and meta analysis.

REFERENCES

- Adedoyin RA, Mbada CE, Balogun MO, Martins T, Adebayo RA, Akintomide A (2008). Prevalence and pattern of hypertension in a semi-urban community in Nigeria. *Eur. J. Cardiovasc. Prev. Rehab.*, 15(6): 683-687.
- Cappuccio FP, Micah FB, Emmeth L, Kerry SM (2004). Prevalence, detection, management and control of hypertension in Ashanti, West Africa. *Hypertens.*, 43: 10-17.
- Cappuccio FP, Cook DG, Atkinson RW, Stuzzullo P (1997). Prevalence, detection, and management of cardiovascular risk factors in different ethnic groups in South London. *Health*, 78: 555-563.
- Chobanian AV, Bakris JL, Black HR, Cushman WC, Green LA, Izzo JL (2003). Seventh report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure: the JNC 7 report. *JAMA*, 289: 2560.
- Cooper R, Rotimi C, Ataman S, McGee D, Osotimehin B, Kadiri S, Muna W, Kingue S, Fraser H, Forrester T, Bennett F, Wilks R (1997). The prevalence of hypertension in seven populations of West African origin. *Am. J. Public Health*, 87(2): 160-168.
- Cooper R, Rotimi c, Ataman S, McGee P, Osotmehim B, Kadiri S (1997). The prevalence of hypertension in seven populations of West African origin. *Am. J. Public Health*, 87: 160-168.
- Ezzati M, Lopez AD, Rodgers A, Vander Hoorn S, Murray CJL (2002). Comparative Risk Assessment Collaborating Group. Selected major risk factors and global and regional burden of disease. *Lancet*, 360: 1347-1360.
- Kadiri S, Walker O, Salako BL, Akinkugbe O (1999). Blood pressure, hypertension and correlates in urbanized workers in Ibadan, Nigeria: a revisit. *J. Hum. Hypertens.*, 13: 23-27.
- Kaufman JS, Owoaje EE, James SA, Rotimi CN, Cooper RS (1996). Determinants of hypertension in West Africa: Contribution of anthropometric and dietary factors to urban-rural socioeconomic gradients. *Am. J. Epidemiol.*, 143: 12.
- Kearney PM, Whelton M, Reynolds K, Muntner P, Whelton PK (2005). Global burden of hypertension: analysis of worldwide data *Lancet*; 365: 217-23.
- Lawes CM, Vander Hoorn S, Law MR, Elliott P, MacMahon S, Rodgers A (2006). Blood pressure and the global burden of disease 2000. Part II: estimates of attributable burden. *J. Hypertens.*, 24: 423-430.
- Lawoyin TO, Asuzu MC, Kaufman J, Rotimi C, Owoaje E, Johnson L, Cooper R (2002). Prevalence of cardiovascular risk factors in an African, urban inner city community. *West Afr. J. Med.*, 21: 208-211.
- Murray CJ, Lopez AD (1997). Mortality by cause for eight regions of the world. *Global burden of disease. Lancet*, 349: 1269-1276.
- Nigerian Heart Foundation (2003). Federal Ministry of Health and Social Services. Health behaviour monitor among Nigerian adult population. [Online]. [Cited 2008 March]. Available from: URL:http://www.who.int/chp/steps/2003_STEPS_Report_Nigeria.pdf
- Ogbagbon EK, Okesina AB, Biliaminu SA (2008). Prevalence of hypertension and associated variables in paid workers in Ilorin, Nigeria. *Niger. J. Clin. Pract.*, 11(4): 342-346.
- Olatunbuson ST, Kaufman JS, Cooper RS, Bella AF (2000). Hypertension in a black population: Prevalence and biosocial determinants of high blood pressure in a group of urban Nigerians. *J. Hum. Hypertens.*, 14: 249-257.
- Owoaje EE, Rotimi CN, Kaufman JS, Tracy J, Cooper RS (1997). Prevalence of adult diabetes in Ibadan, Nigeria. *East. Afr. Med. J.*, 74: 299-302.
- Seedat YK (2004). Recommendations for hypertension in sub-Saharan Africa. *Cardiovasc. J. S. Afr.*, 15: 157-158.
- Whitehead A, Whitehead J (1991). A general parametric approach to the meta-analysis of randomized clinical trials. *Stat. Med.*, 10: 1665-77.
- WHO (2002). The World Health Report: reducing risks, promoting healthy life. Geneva: World Health Organization, [Cited 2008 March]. Available from: URL: http://www.who.int/entity/whr/2002/en/whr02_en.pdf.
- WHO/ISH (2003). World Health Organisation (WHO)/ International Society of Hypertension (ISH) statement on management of hypertension. *J. Hypertens.*, 21: 1983-1992.
- Wolf-Maier K, Cooper RS, Kramer H, Banegas JR, Giampaoli S, Jottres MR (2004). Hypertension treatment and control in five European Countries, Canada and the United States. *Hypertens.*, 43: 10-14.
- World health Organization (1978). WHO Expert Committee. Arterial Hypertension (Technical report Series No. 628). Geneva.
- World Health Report (2002). Reducing risks, promoting healthy life. Geneva, Switzerland: World Health Organization. [Online] 2002. [Cited 2008 Jan]. Available from: URL:http://www.who.int/whr/2002/en/whr02_en.pdf.