

Overweight, Obesity and Dyslipidemia - Predictors of Hypertension among Hypertensive Outpatients Visiting Tertiary Hospitals in Nigeria

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ABSTRACT

Hypertension continues to pose public health challenge in Nigeria, the most populous Black Country. The interplay of obesity, overweight and hyperlipidemia contribute to development of hypertension and other NCDs. This review includes studies published between 2010 and 2018. Google Scholar and PubMed were the search engines. Six studies were reviewed and each study comes from one of the geopolitical zones of Nigeria. Overweight, obesity and dyslipidemia were common among the Nigerian hypertensive patients. The relationship of overweight and obesity to hypertension was confirmed. The relationship between dyslipidemia and hypertension is uncertain in some parts of Nigeria. Overweight, obesity and dyslipidemia are predictors of hypertension among the hypertensive outpatients in Nigeria.

Keywords: Overweight, Obesity, Hyperlipidemia, Hypertension

INTRODUCTION

Hypertension continues to pose public health challenge in African countries where it is more prevalent than other continents in the World. It accounts for 20.8 million cases in Nigeria, the most populous black country among people aged 20 years and above in 2010 [1]. The interplay of obesity, overweight and hyperlipidemia with their contribution to hypertension and many other non-communicable diseases has been confirmed [2].

People with Obesity and high blood pressure are known to have more lipid abnormality than those with normal blood pressure [3]. Obese individuals are more likely to have elevated total cholesterol, triglycerides, low density lipoprotein (LDL) cholesterol and decreased high density lipoprotein (HDL) cholesterol [4]. This metabolic profile is most often seen in obese people with a high accumulation of intra-abdominal fat and has consistently been related to an increased risk of coronary heart disease (CHD) [5]. On the other hand, hypertension alters lipid metabolism by giving rise to abnormalities in serum lipid and lipoprotein levels, and hyperlipidemia substantially worsens the prognosis in hypertensive patients [5].

Black Africans have been reported to have lower serum total cholesterol and higher high-density lipoprotein cholesterol (HDL-C) than whites and other blacks in industrialized countries; however, as in Westernized countries, age, sex, socioeconomic status and diet also significantly affect lipid levels in healthy Africans [6]. In Nigeria, the incidence of

coronary artery disease and atherosclerosis is rising as atherosclerotic lesions of the aorta, coronary and cerebral arteries which result from dyslipidemia are being reported [7,8]. Cardiovascular disease (CVD) is associated with hypertension and increased blood levels of low-density lipoprotein (LDL), total cholesterol (TC), triglycerides (TG); and a low level of high density lipoprotein (HDL) is a risk factor for mortality from CVD.

Hypertension is now on the increase in Nigeria where adoption of western lifestyles and the stress of urbanization both of which are expected to increase the morbidity associated with unhealthy lifestyles are progressing [9]. According to some researchers, hypertension and dyslipidemia account for more than 80% of deaths and disability in low- and middle-income countries. The relationship between obesity and high blood pressure through the anthropometric indexes in both clinical and population studies have been confirmed among the Nigerian

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adults [10,11].

Framingham and other epidemiological surveys as well as experimental studies have shown that serum lipid abnormalities are not only associated with hypertension, it significantly increases the risk for cardiovascular disease and its complications. Fasae et al. [12] and Tekes-Manova et al. [13] reported that dyslipidemia is the second most prevalent cardiovascular risk factor. However, in order to address the menace of obesity and dyslipidemia which are the risk factors of hypertension in a country by appropriate policy studies from different regions of the country need to be examined. This review examines the extent that obesity and dyslipidemia influence on the prevalence of hypertension in Nigeria.

Table 1. The authors and locations of studies conducted on the hypertensive outpatients in six geopolitical zones of Nigeria.

Author(s)	Town and State	Geographical Region where study was conducted in Nigeria
Talle et al. [16]	Maiduguri, Borno	North East
Saidu et al. [20]	Kano, Kano	North West
Fasae et al. [12]	Ilorin, Kwara	North Central
Osuji et al. [6]	Nnewi, Anambra	South East
Maduka et al. [21]	Benin, Edo	South-South
Olaitan et al., 2018	Ibadan, Oyo State	South West

Obesity is defined as a body mass index (BMI) equal or greater than 30 kg/m² and overweight as BMI of 25 kg/m² and more but less than 30 kg/m² [14]. Serum lipid abnormalities were defined as elevated serum TC=5.2 mmol/l (=200 mg/dl); elevated serum LDL-c=3.37 mmol/l (130 mg/dl); elevated serum TG=1.7 mmol/l (=150 mg/dl); and low serum HDL-c<0.9 mmol/l (35 mg/dl) for males and <1.0 mmol/l (39 mg/dl) for females [10] Hypertension is defined by systolic blood pressure $\geq$ 140 mm Hg and diastolic blood pressure $\geq$ 90 mm Hg according to the European Society of Hypertension (ESH) and of the European Society of Cardiology (ESC) classification [15].

Criteria for the inclusion of articles are as follows:

1. The study should only involve hypertensive adults in Nigeria.
2. It should cut across at all the six geographical zones in Nigeria.
3. The location of the study in Nigeria was stated.

METHODS

This review includes studies published between 2010 and April 23, 2018. The search terms used are nutritional status and lipid profile of hypertensive adults in Nigeria. Having the search to start from 2010 is to give allowance to cover all the studies done in the six regions of Nigeria. Six studies were reviewed and each study comes from each geopolitical zone of Nigeria (**Table 1**). In order to eliminate difficulty in analysis, only surveys which used BMI to measure the nutritional status and which conducted the lipid profile of the hypertensive adults were selected. Though there were studies which measured the waist circumference and waist-hip ratio but BMI is used as a reference for this review.

4. BMI was used to determine overweight and obesity
5. Stratification of overweight and obesity was clearly spelt out.
6. The survey should involve both males and females.
7. The study should involve hypertensive adults whose lipid profiles were assessed.

In instances where more than one survey was obtained from a city or state, only the most recent study was included in the present research.

RESULTS

The search on the nutritional status and lipid profile of the hypertensive adults in Nigeria was conducted on 20 abstracts but only six abstracts met the inclusion criteria and full survey were obtained from the internet with the use of Google Scholar and PubMed as search engines. The mean BMI of the hypertensive patients attending the tertiary health centres in Nigeria ranges from 26.55 $\pm$ 4.17 kg/m² in Kano to 32.00 $\pm$ 8.20 kg/m² in Benin (**Table 2**).

Table 2. Mean of age, BMI, blood pressure and lipid profile of the hypertensive patients in Nigeria.

Author (s)	Location	Ss	Age (years)	BMI (kg/m ²)	SBP (mm Hg)	DBP (mm Hg)	TC (mmol/L)	TG (mmol/L)	LDL-C (mmol/L)	HDL-C (mmol/L)
Talle et al. [16]	Maiduguri Borno	150	45.10 ± 6.36	27.46 ± 0.39	158.64 ± 17.82	103.04 ± 9.40	4.64 ± 1.02	1.4 ± 0.53	3.05 ± 1.02	1.06 ± 0.29
Osuji et al. [6]	Nnewi, Anambra	250	58.5 ± 12.4	28.8 ± 5.8	163.3 ± 18.9	99.1 ± 11.7	4.83 ± 0.95	1.23 ± 0.32	3.00 ± 0.82	1.25 ± 0.27
Maduka et al. [21]	Benin, Edo	172	Not stated	32.00 ± 8.20	157.00 ± 23.40	98.57 ± 10.36	4.65 ± 1.24	0.96 ± 0.46	3.07 ± 0.63	1.14 ± 0.24
Saidu et al. [20]	Kano, Kano	100	52.18 ± 13.3	26.55 ± 4.17	143.32 ± 14.97	86.76 ± 9.24	4.68 ± 0.11	1.72 ± 0.83	3.01 ± 1.48	1.36 ± 1.26
Fasae et al. [12]	Ilorin, Kwara	150	50.4 ± 12.3	27.2 ± 15.8	175.2 ± 24.00	106 ± 16.4	5.1 ± 1.1	1.2 ± 0.5	3.1 ± 1.1	1.5 ± 0.6
Olaitan et al. [29]	Ibadan, Oyo	55	56.7 ± 12.3	28.7 ± 26.12	144 ± 15.39	87.25 ± 10.22	189.09 ± 36.12	113.27 ± 65.18	118.09 ± 33.61	48.82 ± 14.98
							4.89 ± 0.93	2.93 ± 1.69	3.05 ± 0.87	1.26 ± 0.39
							mg/dl is divided by 38.67 to get mmol/L			

Ss: Sample size; SBP: Systolic Blood Pressure; DBP: Diastolic Blood Pressure; TC: Total Cholesterol; TG: Triglyceride; LDL-C: Low Density Lipoprotein Cholesterol; HDL: High Density Lipoprotein Cholesterol

The mean SBP of the hypertensive patients ranges from 143.32 ± 14.97 mm Hg in Kano to 163.3 ± 18.9 mm Hg in Nnewi. The mean DBP of the hypertensive patients ranges from 86.76 ± 9.24 mm Hg in Kano to 106 ± 16.4 mm Hg in Ilorin. The mean elevated Total Cholesterol ranges from 4.64 ± 1.02 mmol/L in Maiduguri to 4.89 ± 0.93 mmol/L in Ibadan. The mean elevated Triglyceride ranges from 0.96 ± 0.46 mmol/L in Benin to 2.93 ± 1.69 mmol/L in Ibadan. The mean elevated Low density lipoprotein ranges 3.00 ± 0.82 mmol/L in Nnewi to 3.1 ± 1.1 mmol/L in Kwara. The mean low High density lipoprotein ranges 1.06 ± 0.29 mmol/L in Maiduguri to 1.36 ± 1.26 mmol/L in Kano (**Table 3**).

On the association of lipid profile and hypertension, all hypertensive outpatients in the reviewed studies demonstrated elevated mean serum total cholesterol except

the patients in Benin. Positive correlation was observed between raised blood pressure and elevated serum total cholesterol and lower high density lipoprotein in the cross sectional study conducted among hypertensive outpatients in Ibadan. Significant higher LDL-C was observed only among hypertensive patients in Ilorin, Nnewi, Kano and Benin. Elevated serum TG was found to be significantly higher among the hypertensive patients in Nnewi, Kano and Benin. Lower serum HDL-C was found to be prevalent among the hypertensive patients in Ibadan, Kano, Maiduguri and Kano. Only and Osuji et al. [6] and Talle et al. [16] reported a positive correlation between BMI and all lipid profile variables except HDL-C. Certain researchers found no correlation between BMI and any of the lipid profile variables. But, other studies did not observe the association between BMI and lipid profile variables.

Table 3. The prevalence of lipid profile variables of hypertensive outpatients in Nigeria.

Lipid Profile variables	Talle et al. [16]	Osuji et al. [6]	Saidu et al. [20]	Fasae et al. [12]	Maduka et al. [21]	Olaitan et al., 2018
Elevated TC	36%	35.6%	40%	38.7%	Not stated	36.4%
Elevated LDL	37.4%	28.4%	30%	34.7%	Not stated	9.1%
Elevated TG	40%	6.4%	5%	13.3%	Not stated	14.5%
Low HDL	62%	21.6%	33%	11.3%	Not stated	30.9%
BMI						
Overweight	51%	Not stated	Not stated	Not stated	Not stated	36.4%
Obesity	17%	Not stated	Not stated	Not stated	Not stated	34.5%

BMI: Body Mass Index; TC: Total Cholesterol; TG: Triglyceride; LDL-c: Low Density Lipoprotein Cholesterol; HDL-c: High Density Lipoprotein Cholesterol

Discussion

This review studied the nutritional status (based on Body Mass Index) and lipid profile of hypertensive patients attending the tertiary hospitals in Nigeria. Previous systematic review conducted by Chukwuonye et al. [17] reported the prevalence of overweight and obesity among Nigerian adults to be 20.3%-35.1% for overweight and 8.1%-22.2% for obesity. This review found prevalence of overweight among the hypertensive patients to be within 36.4%-51% and obesity to range from 17.0%-34.5%. It was observed that mean BMI among hypertensive outpatients in Nigeria ranges from 26.55 ± 4.17 kg/m² to 32.00 ± 8.20 kg/m². This confirms the reports of previous studies that many of the hypertensive patients attending Nigeria tertiary hospitals are still overweight and obese [10,18,19]. Prevalence of overweight and obesity among the hypertensive patients in Nigeria reveals that majority of them are suffering from diabetes and other metabolic disorders.

Positive correlation between hypertension and BMI was observed in the studies conducted by Osuji et al. [6] and Saidu et al. [20] in Nnewi and Kano. Maduka et al. [21] reported high prevalence of obesity among hypertensive patients in Maiduguri, whereas, others reported high prevalence of overweight among the hypertensive patients in Ibadan. In contrast, no correlation was found between hypertension and BMI among hypertensive patients in Benin and Ilorin [12,21]. This review shows that relationship of hypertension with overweight and obesity is uncertain in South-south and North Central of Nigeria. Although, Idemudia [22] had earlier reported significant high BMI among the hypertensive patients compared to normotensive individuals. Study conducted by Gudlavalleti et al. [23] across different ethnic groups in Nigeria also affirmed that hypertension increased with BMI but BMI is independently

associated with hypertension at $p < 0.001$ and south-south had significant higher odds ratio of hypertension than other geopolitical zones in Nigeria.

Previous systematic review conducted revealed that the prevalence of hypertension among adults in Nigeria ranges from 43.6% to 50.8%. This study found uncontrolled systolic blood pressure to range from Grade 1 hypertension (143.32 ± 14.97 mm Hg) to Grade 2 systolic hypertension (163.3 ± 18.9 mm Hg) and diastolic blood pressure ranges from high normal (86.76 ± 9.24 mm Hg) to Grade 3 diastolic blood pressure (106 ± 16.4 mm Hg) according to the classification of European Society of Hypertension and the European Society of Cardiology (ESH/ESC). Although, the mean systolic BP among the Nigerian hypertensive patients is lower than those in India, the mean diastolic BP of Nigerian hypertensive patients is higher than theirs [24].

Having hypertensive patients with significant high lipid profile in the reviewed studies confirms the result of previous studies conducted both in Nigeria and abroad which reported close association between raised blood pressure and dyslipidemia [25-27] show that Total cholesterol and the mean of serum LDL level were significantly higher in the hypertensive patients in Iran. Pyadala et al. [28] also reported a significantly higher TC, TG, LDL and very LDL in hypertensive subjects that visited teaching hospital in Sanga Reddy, India. However, hypertensive patients who have hyperlipidemia are at risk of developing diabetes and kidney disease [2].

LIMITATIONS OF THE STUDY

This review has limitations in some areas. Many of the studies reviewed used small sample size. Not all the studies measure the association between BMI and lipid profile, BMI and hypertension and lipid and hypertension. Many of the studies did not measure dietary intake and lifestyles which

could be the risk factors of dyslipidemia, overweight, obesity and hypertension. These limitations could affect the generalizability of this review to the condition of hypertensive outpatients in Nigeria.

CONCLUSION

It becomes evident that hypertensive outpatients in Nigeria still demonstrate hypertension up to the isolated systolic hypertension. Overweight, obesity and dyslipidemia are the predictors of the high blood pressure in Nigeria. The association between hypertension and dyslipidemia is uncertain in some parts of Nigeria. Many of the hypertensive outpatients in Nigeria are suffering from other metabolic disorders along with hypertension which could be diabetes, renal diseases or both. The patients shows the tendency of suffering from cardiovascular diseases such as atherosclerosis, heart diseases and stroke later in future if appropriate measure is not put in place.

RECOMMENDATION

The physicians are encouraged to assess the obesity and dyslipidemia among their hypertensive patients, monitor the patients to weight loss and direct them to registered dietitians for dietary regime to monitor their dietary intake which could predispose them to hyperlipidemia. Government at all levels is encouraged to provide financial support in the diagnostic procedures of hypertension which could be costly for some hypertensive patients to do on their own.

REFERENCES

- Adeloye D, Basquill C, Adewale A, Thompson YJ, et al. (2014) An estimate of the prevalence of hypertension in Nigeria. *J Hypertens* 33: 230-242.
- Behradmanesh S, Nasri P (2012) Serum cholesterol and LDL-C in association with level of diastolic blood pressure in type 2 diabetic patients. *J Renal Inj Prev* 1: 23-26.
- Abubakar A, Mambuok MAM, Gerie AB, Dikko AU, Aliyu S, et al. (2009) Relation of body mass index with lipid profile and blood pressure in healthy female of lower socioeconomic group, in Kaduna Northern Nigeria. *Asian J Med Sci* 1: 94-96.
- Yasein N, Ahmad M, Matrook F, Nasir L, Froelicher ES (2010) Metabolic syndrome in patients with hypertension attending a family practice clinic in Jordan. *East Mediterr Health J* 16: 37580.
- The European Food Information Council (2006) Obesity and overweight. Available from: <http://www.eufic.org/article/en/expid/basics-obesityoverweight/>
- Osuji CU, Omejua EG, Onwubuya EI, Ahaneku GI (2012) Serum lipid profile of newly diagnosed hypertensive patients in Nnewi, South-East Nigeria. *Int J Hypertens* 12: 1-7.
- Ferrara LA, Guida L, Iannuzzi R, Celentano A, Lionello F (2002) Serum cholesterol affects blood pressure regulation. *J Hum Hypertens* 16: 337-343.
- Aboyans V, Lacroix P, Criqui MH (2007) Large and small vessels atherosclerosis: Similarities and differences. *Prog Cardiovasc Dis* 50: 112-125.
- FMOH (2009) Ministerial Press briefing. Available at: <http://www.fmoh.org.ng>
- Adedoyin RA, Mbada CE, Bisiriyu LA, Adebayo RA, Balogun MO, et al. (2008) Relationship of anthropometric indicators with blood pressure levels and the risk of hypertension in Nigerian adults. *Int J Gen Med* 2008: 133-140.
- Iloh GUP, Amadi AN, Nwankwo BO, Ugwu VC (2011) Obesity in adult Nigerians: A study of its pattern and common primary co-morbidities in a rural Mission General Hospital in Imo state, south-eastern Nigeria. *Nig J Clin Pract* 14: 212-218.
- Fasae AJ, Busari OA, Opadijo OG, Omotoso AB (2015) Hyperuricaemia and its relations with serum lipid abnormalities in untreated, newly diagnosed adult Nigerian hypertensive patients. *Br J Med Med Res* 7: 779-788
- Tekes-Manova D, Israeli E, Shochat T, Swartzon M, Gordon S, et al. (2006) The prevalence of reversible cardiovascular risk factors in Israelis aged 25-55 years. *IMAJ* 8: 527-531.
- World Health Organization (1995) Technical Report Series. Geneva, Switzerland: World Health Organization.
- Mancia G, Fagard R, Narkiewicz K, Redón J, Zanchetti A (2013) ESH/ESC Guidelines for the management of arterial hypertension: The Task Force for the management of arterial hypertension of the European Society of Hypertension (ESH) and of the European Society of Cardiology (ESC). *J Hypertens* 31: 1281-1357.
- Talle MA, Enyikwola O, Delaiye AA, Yusuf H, Baba MM, et al. (2010). Disorders of lipids among newly diagnosed hypertensive patients in Maiduguri, northeastern Nigeria. *Borno Med J* 1: 10-14.
- Chukwuonye II, Chuku A, Collins J, Arinze KO, Imoh ME, et al. (2013) Prevalence of overweight and obesity in adult Nigerians – A systematic review. *Diabetes Metab Syndr Obes* 6: 43-47.
- Akuyam SA, Aghogho UB, Aliyu IS, Bakari AG (2009) Serum total cholesterol in hypertensive northern Nigerians. *Int J Med Med Sci* 1: 73-78.

19. Aliyu SU, Oyeyemi AY, Udoh DG, Oyeyemi AL (2014) Prevalence of overweight/obesity and undiagnosed hypertension among military personnel in Maiduguri, Nigeria. *J Nov Physiother* 5: 237.
20. Saidu H, Karaye KM, Okeahialam BN (2014) Plasma lipid profile in Nigerians with high-normal blood pressure. *BioMed Central Res Notes* 7: 930.
21. Maduka IC, Osunbor JO, Osunbor AO, Egwu MC (2018) Evaluation of thyroid function and lipid profile of hypertensive subjects. *J Med Med Sci* 6: 160-164.
22. Idemudia JO (2014). Dyslipidaemia in hypertensive in south-south Nigeria. *Br J Med Med Res* 4: 4742-4750.
23. Gudlavalleti VSM, Samantha F, Selvaraj S, Clare EG, Abdull MM, et al. (2013). Prevalence and risk factors for hypertension and association with ethnicity in Nigeria: Results from A National Survey. *Cardiovasc J Afr* 24: 344-350.
24. Pooja, Mittal Y, Mathur A (2013) Evaluation of lipid profile of north indian hypertensive subjects. *Asian J Biomed Pharm Sci* 3: 38-41.
25. Nwosu ZC, Edeogu OC (2011) Increased lipid profile in hypertensive Nigerian males: A possible risk for atherosclerosis. *Pak J Med Sci* 27: 269-272.
26. Choudhury KN, Mainuddin AKM, Wahiduzzaman, Shariful SM (2014) Serum lipid profile and its association with hypertension in Bangladesh. *Vasc Health Risk Manag* 10: 327-332.
27. Ghooshchi G, Masoomian M, Sarafraz Yazdi M, Pour Ramezan M (2014) Evaluation of the lipid profile of hypertensive patients compared to non-hypertensive individuals. *Patient Saf Qual Improv* 2: 120-122.
28. Pyadala N, Bobbiti RR, Borugadda R, Bitinti S, Maity SN, et al. (2017) Assessment of lipid profile among hypertensive patients attending to a rural teaching hospital, Sangareddy. *Int J Med Sci Public Health* 6: 71-74.
29. Olaitan OO, Fadupin GT, Adebisi AA (2018) Dietary pattern, lifestyle and nutritional status of hypertensive outpatients attending University College Hospital, Ibadan, Nigeria. *Afr J Biomed Res* 21: 29-36.