Original Article

The Magnitude of Atherogenic Dyslipidaemia among Geriatric Nigerians with Systemic Hypertension in a Rural Hospital in Eastern Nigeria.

[1]ILOH GUP, MBBS, MPH, FMCFM, FWACP(FM), MPA; [2]OFOEDU JN, MBBS, FWACP(FM)
[3]AMADI AN, B.SC,M.SC,PH.D; [4]OBIKWU CE, B.SC,M.SC,PH.D

[1]Department of Family Medicine, Federal Medical Centre, Umuahia, Abia state, Nigeria and visiting Consultant Family Physician, St. Vincent De Paul Hospital, Amurie- Omanze,Imo state, Nigeria. [2]Department of Family Medicine, Federal Medical Centre, Umuahia, Abia state, Nigeria. [3]Department of Public Health Technology, Federal University of Technology, Owerri, Imo state, Nigeria. [4]Department of Microbiology, Imo state University. Owerri. Imo state, Nigeria.

ABSTRACT

BACKGROUND: The relevance of dyslipidaemia in the management of cardiovascular diseases especially hypertension is an important health care challenge that is increasing worldwide. Of great concern in Nigeria is that most geriatric hypertensives with dylipidaemia are not routinely diagnosed and therefore do not receive appropriate treatment.

OBJECTIVE: This study is aimed at describing the magnitude (prevalence and pattern) of atherogenic dyslipidaemia among geriatric Nigerians with systemic hypertension in a rural hospital in Eastern Nigeria.

METHODS: A descriptive hospital-based study was carried out from June 2008 to June 2011 on 122 consecutive geriatric patients with systemic hypertension who met the selection criteria at St Vincent De Paul hospital, Amurie-Omanze, a rural Mission General Hospital in Imo state. The fasting lipid profile was determined by enzymatic method. Dyslipidaemia was defined using the third report of National Cholesterol Education Panel in adult (ATP III). The data collected included age and sex.

RESULTS: Fifty-four (44.3%) out of 122 patients had at least one dyslipidaemia. The age of the patients ranged from 65 years to 91 years with mean age of 69±2.10 years. There were 51(41.8%) males and 71(58.2) females with male to female ratio of 1: 1.4. The commonest lipid abnormality was low high density lipoprotein-cholesterol (38.5%). Others included high low density cholesterol (23.8%), high total cholesterol (17.2%) and high triglyceride (14.8%).

CONCLUSION: This study has shown that dyslipidaemia exist among geriatric hypertensives in the study area with low HDL-C being the most frequent lipid abnormality suggesting that low HDL may be the major form of dyslipidaemia and a marker of dyslipidaemic cardiometabolic risk among them. Screening for dyslipidaemia should therefore form an important part of clinical care of geriatric hypertensives and those with dyslipidaemia should become target for lipid lowering treatment in addition to lifestyle modification.

KEY WORDS: Hypertension, Geriatrics, Dyslipidaemia, Prevalence, Pattern, Rural, Hospital, Nigeria.

INTRODUCTION

Hypertension is a major geriatric health problem from non-communicable diseases and magnifies the risk of cardiovascular disease morbidity and mortality[1]. As the prevalence of hypertension increases in urban[2] and rural[3] Nigeria, screening for its associated lipid changes remains relevant particularly in elderly hypertensive patients since blood pressure and lipid profile change with advancing age.

Research on ageing is currently on the front burner in the field of human science. The growing population of elderly people and their attendant health challenges probably motivates this trend. Although, there is no definite clinical marker of geriatric patients but World Health Organization (WHO) arbitrary fixed chronologic age of 65 years and above as geriatric age group[4]. Many studies have shown the clinical relevance of regarding patients who are 65 years and above as geriatric patients[4,5]. Ageing involves interplay of genetic, biological and socio-environmental factors[6].

Hypertension, dyslipidaemia and biologic factor of ageing relate to each other pathophysiologically and prognostically. Hypertension and dyslipaemia can co-exist in geriatric patients. However, hypertension may antedate the development of dyslipidaemia and vice versa and both conditions constitute a component defining factors or criteria for dysmetabolic syndrome[7].

Ageing can lead to increase sedentary living, excessive food consumption, reduced cholesterol metabolism and thus increased accumulation of body lipids. While hypertensive patients are prone to dyslipidaemia, dyslipidaemic patients also appear to be prone to hypertension and dyslipidaemia is significantly greater in high risk patients such as hypertensive patients than their normotensive counterparts[8]. Several combinations of abnormal lipid profile have been reported in apparently healthy adult population in Asaba[9] and Port Harcourt[10]; elderly population in Benin, Edo state, Nigeria[11], and type 2 diabetic patients in Lagos[12]. However, several pattern and prevalence of abnormal lipid parameters have been reported in hypertensives[8,13-15]. The isolated and combined lipid abnormalities such as raised total cholesterol, low high density lipoprotein cholesterol and high low density cholesterol have also

been described to characterize hypertensive dyslipidaemia[8,13-15] and each of these abnormalities are independently atherogenic. It is likely that metabolic abnormality in hypertension and dyslipidamia interact and potentiate their individual impact on cardiovascular diseases. Hypertension accelerates the development of dyslipidaemic atherosclerotic diseases thus increasing cardiovascular events such as coronary heart disease (heart attack) and cerebrovascular accident (stroke).

Although not all geriatric hypertensives develop dyslipidaemia, but their chances are higher. More so, geriatric hypertensives who have dyslipidaemia have higher cardiovascular risk profile and would likely progress to the development of atherosclerotic cardiovascular end points. The management of hypertension in geriatric patients has variable outcomes, indicating the involvement of factors other than hypertension in the outcome and prognosis and dyslipidaemia is one of such factors. The additional dyslipidaemic factor in elderly hypertensives needs further attention especially in secondary health facilities in rural Nigeria. It is therefore pertinent to detect early the addition of dyslipidaemia on geriatric hypertension as early treatment may alter cardiovascular endpoints. Screening for lipid abnormalities in elderly hypertensives needs to be at diagnosis as the development and damage by dyslipidamia start even before the diagnosis is made[16]. The researchers therefore sought to study the magnitude (prevalence and pattern) of atherogenic dyslipidaemia in geriatric Nigerians with systemic hypertension in a rural hospital in Eastern Nigeria.

MATERIALS AND METHODS

This was a clinic-based descriptive study carried out on 122 geriatric patients with systemic hypertension from June 2008 to June 2011 who presented at St. Vincent De Paul hospital, Amurie-Omanze, a rural Mission General Hospital in Isu Local Government Area of Imo state, South-Eastern Nigeria. The hospital renders twenty four hours service daily including public holidays to the community and its environs.

The geriatric hypertensives patients who gave informed verbal consent and met the selection criteria (aged =65 years, treated hypertensives, newly diagnosed hypertensives who were not yet on antihypertensive medication) were consecutively screened for dyslipidaemia. Critically ill patients and diabetic hypertensives were excluded from the study.

Sample size estimation was determined using the formula[17] for estimating minimum sample size for descriptive studies when studying proportions with entire population size <10,000 using estimated population size of 100 geriatric patients based on the

previous annual geriatric patients hospital attendance records. The authors assumed that 50% of the geriatric hypertensives would have dyslipidaemia, at 95% confidence level and 5% margin of error. This gave a sample estimate of 80 patients. However, selected sample size of 122 geriatric hypertensive patients was used based on the duration of the study.

After overnight fast of at least 8 hours, fasting venous blood sample was drawn from the patient after adequate disinfection of the skin over the venepuncture site and was separated to obtain the plasma. Chemical analysis for the fasting lipid profile: total cholesterol, triglycerides and high density lipoprotein cholesterol were determined by enzymatic method according to the manufacturer's guide. The value of low density lipoprotein cholesterol (LDL-C) was calculated by using Friedwald's formula.

Dyslipidaemia was defined according to The Third Report of the Expert Panel on Detection, Evaluation and Treatment of high blood cholesterol in adults (ATP III)[18] as follows: total serum cholesterol=200mg/dL(5.17mmol/L) and/or triglyceride=150mg/dL (1.7mmol/L) and/or low density lipoprotein cholesterol=100mg/dL(2.58mmol/L) and/or high density lipoprotein cholesterol<40mg/dL(<1.03mmol/L). Blood pressure readings were based on the JNC VII classification and guidelines[19]. Hypertension was defined as systolic and/or diastolic blood pressure=140/90 mmHg or documented use of antihypertensive medications in a previously diagnosed person with hypertension. Diagnosis of diabetes mellitus in new and old hypertensive patients was based on the diagnostic guideline according to American Diabetes Association. The diabetic hypertensives were excluded from the study. The basic demographic variables of the patients were also documented.

The researchers defined geriatric patients as those age 65 years and above[4]. Atherogenic profile refers to abnormal lipid fractions that can predispose and promote atheroma formation and include total cholesterol, triglyceride, low density lipoprotein cholesterol and high density lipoprotein cholesterol.

STATISTICS

The results generated were analysed using Statistical Package for Social Sciences version 13.0, Inc. Chicago, IL, USA for the calculation of mean, frequencies and percentages. Results were presented as frequencies and percentages for categorical variables and mean± standard deviation for continuous data. Independent t-test was used to compare means of two groups. The statistical significance was at p<0.05.

RESULTS

Fifty-four (44.3%) out of 122 patients had at least one abnormal lipid profile. The age of the geriatric hypertensive patients ranged from 65 years to 91 years with mean age of 69±2.10years. There were 51(41.8%) males and 71(58.2) females with male to female ratio of 1: 1.4. Majority of the geriatric hypertensives were widowed (72.9%), had primary education (43.4%) and peasant farmers (46.7%)(Table I).

The commonest lipid abnormality was low HDL-cholesterol (38.5%). Others included high LDL-cholesterol (23.8%), high total cholesterol (17.2%) and high triglyceride (14.8%)(Table II).

Table III shows the mean lipid profiles of the patients with and without dyslipidaemia. The difference in the mean HDL-cholesterol values between the two groups was statistically significant (p-value=0.03).

Table IV shows the mean lipid profiles of the patients based on sex. The differences in the mean total cholesterol, triglyceride, LDL-cholesterol and HDL-cholesterol between both sexes was not statistically significant.

Table I: Demographic characteristics of the study population

Parameter	Number(%)
Age(years)	
65-74	88(72.1)
75-84	24(19.7)
e85	10(8.2)
Total	122(100.0)
Sex	
Male	51(41.8)
Female	71(58.2)
Total	122(100.0)
Marital status	
Married	33(27.1)
Widowed	89(72.9)
Total	122(100.0)
Education	
No formal education	28(23.0)
Primary	53(43.4)
Post-primary	41(33.6)
Total	122(100.0)
Occupation	
Retired	33(27.0)
Farming	57(46.7)
Trading	24(19.7)
Clergy	8(6.6)
Total	122(100.0)

Table II: Distribution of the patients based on lipid profile

Parameter (mg/dL)	Number(%)
Total cholesterol	
<200	101(82.8)
e200	21(17.2)
Total	122(100.0)
Triglyceride	
<150	104(85.2)
e150	18(14.80
Total	122(100.0)
Low density lipoprotein cholesterol	
<100	93(76.2)
e100	29(23.8)
Total	122(100.0)
High density lipoprotein cholesterol	
<40	47(38.5)
e40	75(61.5)
Total	122(100.0)

Table III: Mean lipid profiles of patients with and without dyslipidaemia(mean±SD) in mmol/L

Lipid profile	Dyslipidaemia	No dyslipidaemia	P-value	Remarks
TC	5.22±0.49	4.96±0.34	0.075	NS
TG	1.35±0.36	1.26±0.38	0.190	NS
LDL-C	2.61±0.18	2.33±0.54	0.070	NS
HDL-C	0.90±0.44	1.41±0.63	0.03	S

Abbreviations: TC=Total cholesterol, TG=Triglyceride, LDL-C= Low density lipoprotein cholesterol, HDL-C=High density lipoprotein cholesterol, NS=Not significant, S=significant.

Table IV: Mean lipid profile based on sex (mean±SD) in mmol/L

Lipid profile	Male	Female	P-value	Remarks
TC	4.91±0.95	5.19±0.79	0.090	NS
TG	1.28±0.27	1.30±0.44	0.182	NS
LDL-C	2.59±0.11	2.61±0.46	0.090	NS
HDL-C	1.01±0.34	1.11±0.53	0.070	NS

Abbreviations: TC=Total cholesterol, TG=Triglyceride, LDL-C= Low density lipoprotein cholesterol, HDL-C=High density lipoprotein cholesterol, NS=Not significant.

DISCUSSION

The prevalence of dyslipidaemia in this study is higher than 27.6% reported in urban elderly population in Benin, Edo state, Nigeria[11]. However, studies have shown that the prevalence of dyslipidaemia in Nigeria varies in rural and urban settings[8-11]; in apparently healthy population[9,10] and patients with metabolic disorder such as hypertension[8,20]; diabetics and concurrent diabetic hypertensives[15,21]. The relatively high prevalence in this study could be attributed to the underlying hypertensive condition of the study subjects in addition to the ageing process. Hypertension has been shown to be associated with abnormal lipid profiles[8,20]. This may be related to insulin resistance which has characterized hypertensive dyslipidaemia[22]. Ageing can also lead to physical inactivity and excessive food intake which are associated with reduced cholesterol metabolism and thus increased accumulation of body lipids. Ageing, hypertension and dyslipidaemia have untoward effects on arterial wall thus magnifying the atherogenic potential and burden on elderly hypertensives. The strategies to reduce the risk of geriatric cardiovascular diseases in rural Nigeria should therefore focus on control of hypertension and dyslipidaemia which are modifiable. Management of dyslipidaemia in elderly hypertensive in rural Nigeria is therefore generally necessary.

This study has shown that the patterns of dyslipidaemia among the study population were different from that reported among elderly population in Benin, Edo state, Nigeria[11] and sub-sample of patients aged =60 years in Lagos, Nigeria[13]. Although, pattern of dyslipidaemia varies with the population studied and definition of dyslipidaemia. However, the findings of this study have buttressed the documentation that several combinations of abnormal lipid parameters exist among hypertensive patients[8,13-15]. The results of this research are also in consonant with the reports that dyslipidaemia is becoming an important medical problem among hypertensive patients and are associated with hypertension in a clustering of medical condition or metabolic risk factors referred to as dysmetabolic syndrome[7]. With increasing age, there is progressive decline in fibre intake with an increase intake of carbohydrate and caloric dense foods and is also associated with reduction in muscle and bone mass with relative increase in fat mass[23]. A decrease in muscle mass may result in simultaneous decrease in lipid metabolism. Furthermore, there is progressive redistribution of the fat stores more to the intra-abdominal(visceral) region. This accumulated visceral fat is highly lipolytic and has been shown to be a major clinical parameter contributing to geriatric dyslipidaemia. Although, not all geriatric hypertensive patients do develop dyslipidaemia, but their chances of developing dyslipidaemia are high. This may be promoted and enhanced by other constitutional and non-constitutional risk factors of hypertension[19]. While age is a non-modifiable risk factor of hypertension, dyslipidaemia is a modifiable risk factor. Epidemiological data have demonstrated that each of the abnormal lipid fractions is independently atherogenic and hypertension associated with dyslipidaemia increases the risk of atherosclerotic plaques in coronary arteries and other arterial beds[24]. Early detection of dyslipidaemia in elderly hypertensive patients and subsequent effective treatment will beneficially alter the course of the disease and thus improve hypertensive patient management outcome. The screening for abnormal lipid profile in geriatric hypertensives therefore holds the key to prevention of its associated complication and will enable clinicians ensures that their geriatric hypertensive patients receive the life saving benefits of lipid lowering therapy.

This study has shown that the commonest lipid abnormality was low high density lipoprotein cholesterol. This finding could be a reflection of the burden of this specific lipid fraction among the study population as dyslipidaemia is a documented risk factor of numerous chronic metabolic medical conditions such as hypertension. The low high density lipoprotein cholesterol among the study population may be attributed to the interacting age factor and behavioural risk factors such as diet and decreased physical activity among the elderly patients. This ageing process is largely characterized by change in dietary pattern and lower physical activity including personal, instrumental and domestic activities of daily living. Despite the publication of cholesterol-related guidelines and major clinical trials[18,19] actual lifestyle and cholesterol management measures remains disproportionately low among geriatric Nigerians with systemic hypertension. These interventional strategies to increase high density lipoprotein cholesterol should focus on controlling hypertension and lifestyle modifications. Identifying this low high density lipoprotein risk factor of hypertension therefore avails greater opportunities for appropriate health information, education, promotion and communication with the geriatric hypertensives.

This study has shown variations in the lipid profiles of male and female geriatric hypertensives. These relative and marginal differences were not statistically significant. This finding is at variance with the reports in adult population in Port Harcourt[10], elderly population in Benin, Edo state[11] and Lagos[14]. Although, the mechanism involved in the development of sex-related lipid variations have been elucidated but several factors including age, genetics and socio-environmental factors probably influence the variations[13,25].

STUDY IMPLICATIONS

There is increasing interest in the effects of atherogenic lipids on hypertension. In the elderly hypertensive

patients who have dyslipidaemia, the outcome and prognosis worsens compared with those who have hypertension alone and this increases the cost of care. Studies have shown that management of dyslipidaemia may reduce cardiovascular events from atherogenic lipids among geriatric hypertensives. Screening for these dyslipidaemia at diagnosis of hypertension in elderly patients and knowledge of this fact is important when attending to the geriatric hypertension and should be considered in the diagnosis of geriatric hypertension. This study therefore envisaged the challenges of healthcare delivery to the elderly hypertensive patients in a rural Nigeria secondary health institution with implications for quality improvement.

STUDY LIMITATIONS
The limitations imposed by the descriptive nature of the study are recognized by the researchers. However, this study stimulates the need for analytical and longitudinal studies in this area. This would enable a quasi cause-effect relationship to be drawn and also for a reliable and valid conclusion to be ascertained. The sample size was comparatively small, but this was more than the minimum estimated sample size for the study and was the number of patients seen within the study period. Although, plasma lipid profile should be evaluated not only for their absolute values but also for their mutual ratios as overall expression of plasma lipid homeostasis. However, the expert panel on cholesterol education recommended testing for total lipid profile including triglyceride, HDL-cholesterol, LDL-cholesterol instead of measuring only total cholesterol as total cholesterol alone misses specific lipid and blood proteins that are independently atherogenic. This study is therefore on atherogenic dyslidaemia not on mutual ratios such as cardiac risk ratio, atherogenic index and atherogenic coefficient which are predictive of coronary heart disease. The findings of this study therefore gave some useful insight into the magnitude of atherogenic dyslipidaemia among the study population for consultation and comparative purposes. This study thus provides useful baseline information on which subsequent interventions in the study area could be based and evaluated.

CONCLUSION
This study has shown that dyslipidaemia exist among geriatric hypertensives in the study area with low HDL cholesterol being the most frequent lipid abnormality suggesting that low HDL may be the major form of dyslipidaemia and a marker of dyslipidaemic cardiometabolic risk among them. Screening for dyslipidaemia should therefore form an important part of clinical care of geriatric hypertensives and those without dyslipidaemia should be counselled on lifestyle modification while those that have dyslipidaemia should become target for lipid lowering treatment in addition to lifestyle modification. It is advocated that treatment of

hypertension and dyslipidaemia should be made available, accessible and affordable to geriatric hypertensive who are living in resource-poor rural Nigerian communities.

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