Serum Lipids Profiles and Pattern of Hyperlipidaemias in a Semi-Urban Community in Northern Nigeria

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SUMMARY

Background: Little information is available about the distributions of blood lipid concentrations and prevalences of hyperlipidaemias in Nigeria. Data on mean levels and prevalences of hyperlipidaemias are scanty or at best fragmentary in Nigeria. The aim of this study was to determine the levels of lipids in a semi-urban settlement in northern Nigeria.

Methodology: This study was based in Dakace village, near Zaria in northern Nigeria. Cluster sampling method was used to select respondents. Two clusters (*Angwas*) were selected using simple random sampling. In each of the sampled cluster, all eligible respondents were identified by a house-to-house enumeration and this constituted the sampling frame. In all 199 subjects were selected using a systematic random sampling from the frame of the eligible respondents already prepared. The sub-sampled respondents for lipid analysis were asked to do an overnight fast of at least 14 hours following which, about 5mls of venous blood was taken and analyzed for various lipids fractions.

Results: There were 94 males (47.2%) and 105 females (52.8%) with a mean age of 39.9 years ± 15.6 years. Forty-two subjects (21.1%) had elevated cholesterol level of more than 5.17mmo/L; mean was 4.44 ± 1.27mmo/L, (95%CI: 4.27, 4.62). Mean of LDL cholesterol was 2.19± 1.02 mm/L (95%CI: 2.06, 2.34); twenty-one subjects (10.6%) had elevated LDL cholesterol of >3.36mmol/L. The mean serum level of HDL cholesterol was 1.02 ± 0.40mmol/L; (95%CI: 0.97, 1.08). Sixty-four subjects (32.2%) had decreased serum level of less than 0.91mmol/L.Only one person (0.5%), a male was found to have elevated serum triglyceride level of above 2.26mmol/L. The mean triglyceride level for the study population was 0.82 ± 0.64mmol/L, (95%CI: 0.73, 0.91).

Conclusion: This study demonstrates that dysperlipidaemias are prevalent in Nigeria and for that matter in a semi-urban settlement that is generally thought to be free of these risk factors. It is therefore necessary to undertake nationwide survey to assess the pattern of distributions of blood lipids profiles and prevalence of dysperlipidaemias in the general population.

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Introduction

Only fragmentary data is available about the distributions of blood lipid concentrations and prevalences of hyperlipidaemias in Nigeria, and by extension data on mean levels and prevalences of hyperlipidaemias are scanty in Nigeria. In the early 1990s a national survey carried out to assess the pattern of non-communicable disease risk factors (including cardiovascular disease) excluded measurements of blood lipids concentrations[1].

A recent study investigated apparently healthy Nigerian adults in urban city of Lagos and showed that mean blood lipids levels were within normal ranges but prevalences of hyperlipidaemias were not calculated[2]. However, an earlier study investigated a selected population (elderly Hausa-Fulani in northern Nigeria) and revealed prevalences of hyperlipidaemias ranging from 0.7% (triglyceride>3.0mmol/L) to 3.6% (cholesterol>6.2mmol/L) with mean serum concentration of cholesterol of 4.74mmol/L and that of triglyceride of 1.71mmol/L[3].

In planning for both the population and high risk strategies the prevalences of the major risk factors (in this case cardiovascular diseases, CVD) must be known. Opportunity presented itself during the national non-communicable survey in the early 1990s but was never utilised, hence the absence of nationally representative data on the distributions of serum concentrations of lipids. There is no scientific rationale in designing a strategy for prevention without an initial baseline assessment of the pattern of the disease (or its risk factors). This study was designed to provide baseline data on which evaluation of any programme of intervention of CVD can be based upon, if not for the entire country, at least for this part of Nigeria.

METHOD

This study was based in Dakace village, near Zaria in northern Nigeria. Dakace is a semi-urban settlement located about 10km along the new Zaria – Jos highway. Dakace is distinctly divided into two main settlements (i) Dakace village and (ii) Mangu Dakace. Hausa people whose roots are from the ancient city of Zaria are the predominant inhabitants of Dakace village. It is divided into five traditional Hausa *Angwa* or ward: Angwan *Kanawa, Angwan Kofan Gabas, Angwan Runji, Angwan Kofan Yamma* and *Angwan Ruga.* Mangu Dakace is the newly developed area where the population is of diverse ethnic groups but predominantly composes of the *Mangus* (from Jos Plateau), *Ikulus* and *Katafs* (all from Kaduna State). This section has three *Angwas* or wards bearing the tribal name of

the inhabitants i.e. *Angwan Ikulu, Angwan Mangu* and Angwan *Kataf*. Dakace village has projected population of 4100 while Mangu Dakace has 760 [4].

Sampling technique

Cluster sampling method was used to select respondents. Each of the eight *Angwas* that made up the study area was considered to be a cluster. Two *Angwas* from the original settlement (i.e. *Kanawa* and *Ruga*) and one *Angwa* from the newly developed area (i.e. *Kataf*) were selected using balloting based on proportional distribution of the population between the two settlements. In each of the sampled *Angwa*, all eligible respondents were identified by a house-to-house enumeration and this constituted the sampling frame. In all 492 eligible subjects were identified for the study. The identified eligible respondents were invited to participate in the study and at the end 424 participated. For reason of cost, 199 subjects were selected using a systematic random sampling from the frame of the eligible respondents already prepared. The systematic sampling employed every second eligible respondent on the register. This sub-sample constituted the population on which lipids profile analyses were conducted.

Venous blood collection

The sub-sampled respondents for lipid analysis were asked to do an overnight fast of at least 14 hours following which, about 5mls of venous blood was taken using a 5ml disposable syringe and emptied into a 5ml EDTA bottle. All the collected venous blood samples were taken to the Chemical Pathology Department, ABUTH, serum separated within two hours of collection. The sera were stored at 2-8^{o}C. A trained technologist analyzed the samples, thereafter.

Cholesterol and its fractions and triglyceride were measured colorimetrically following the methods described by the manufacturers of the test kits (BioSystem S.A. Costa Brava, 30, Barcelona, Spain) [5 -10]. The results of serum lipids measurements were part of a larger population-based study in the community to assess the prevalence of cardiovascular disease risk factors [11].

RESULTS

A total of 199 subjects participated in this segment of the study. There were 94 males (47.2%) and 105 females (52.8%). The overall mean age was 39.9 ± 15.6 years. The World Health Organization (WHO) and the American National Cholesterol Education Programme recommended blood lipid concentrations shown in table 1 as cut-off points for patient management. These cut-off points are used to classify subjects.

Serum cholesterol distribution

The distribution of serum cholesterol and its fractions is shown in table 2.

Serum total cholesterol

Forty-two subjects (21.1%) had elevated cholesterol level of more than 5.17mmo/L; mean was 4.44±1.27mmo/L. For males, the mean value was 4.45±1.18 Mmol/L while for females it was 4.54 ± 1.19mmol/L (Tables 2 and 3). The prevalence of hypercholesterolemia among males was 9.0% and among females was 12% (table 3).

Table 1: International classification of lipid profile [12, 13].

Classification	TC (mmol/L)	LDL (mmol/L)	HDL (mmol/L)	TG (mmol/L)	Glucose (mmol/L)
Desirable	<5.17	<3.36	>1.55	<2.26	<6.11
Borderline	5.17-6.18	3.36-4.11	0.91-1.53	2.26-4.50	6.11-6.94
High	>6.21	>4.14	-	>4.50	>6.94
Low	-	-	-	<0.91	-

Table 2: Mean serum concentration of cholesterol fractions among study population by sex.

Parameter	Sex		Total
	Male Mean±SD	Female Mean±SD	Mean±SD
Total Cholesterol	4.45 ±1.18	4.54 ±1.19	4.44 ± 1.27
Triglyceride	0.82 ± 0.65	0.81± 0.43	0.82 ± 0.64
HDL Cholesterol	1.03 ± 0.40	1.04 ± 0.36	1.02 ± 0.40
LDL Cholesterol	2.21±1.02	2.26 ± 1.00	2.19 ± 1.02

LDL cholesterol

The overall mean of LDL cholesterol was 2.19± 1.02 mm/L, among the males the mean was 2.21± 1.02 mm/L and 2.26± 1.00 mm/L among the females (Tables 2 and 3). Twenty-one subjects (10.6%) had elevated LDL of over 3.36mmol/L. Eight of them are males (4.0%) while thirteen are females (6.5%).

HDL cholesterol

The mean serum concentration of HDL cholesterol was 1.02 ± 0.40mmol/L. Among the males it was 1.03 ± 0.40mmol/L while among the females it was 1.04 0.36mmol/L. Decreased level of HDL cholesterol values less than 0.91mmol/L was considered as a risk factor for CVD. There were 64 subjects with decreased serum HDL cholesterol giving an overall prevalence of decreased HDL cholesterol of 32.2%. The prevalence among males was 15.1% and among females was 17.1% (Table 3).

Triglyceride

Only one person (0.5%), a male was found to have elevated serum triglyceride level of above 2.26mmol/L. The mean triglyceride level for the study population was 0.82 ± 0.64mmol/L (Tables 2 and 3).

Table 3. Percentage of subjects with abnormal levels of plasma lipid fractions by sex.

Risk Factor	Male (%)	Female (%)	Total (%)
Elevated LDL	8(4.1)	13(6.5)	21 (10.6)
Decreased HDL	30(15.1)	34(17.1)	64(32.2)
Elevated Total Cholesterol	18(9.0)	24(12.1)	42(21.1)
Elevated Triglyceride	1(0.5)	0(0.0)	1(0.5)
Elevated TC/HDL ratio	51(25.6)	71(35.7)	122(61.3)

DISCUSSION

To the best of our knowledge limited information is available about the distributions of blood lipid levels and prevalences of dysperlipidaemias in Nigeria. The study that gave an insight into distributions of lipid components were reported among elderly Hausa-Fulani aged 65 years and above[3]. The studies by Jarikre *et al*[14], Oparinde *et al*[15], and Ukoh and Okonofuo[16] were among select population-hypertensive patients. Meludu and colleagues[17], studied lipids fractions among college students aged between 20 and 25 years. Essiene[18] studied lipids among patients with diagnosed hypertension and diabetes mellitus; and from those who are obese and alcoholics. Perhaps, only Adedeji *et al*[19] studied serum lipids profiles among apparently healthy Nigerians while Akuyam *et al*[20] carried out his study among pediatric age group attending pediatric out-patient department. Therefore, the present study provides new information on the distribution and prevalences of dysperlipidaemias and serves as a baseline against which future changes can be assessed; at least for a semi-urban settlement in northern Nigeria. Medical literature has established the relationship between increasing levels of both total and LDL cholesterol and the risk of CHD[21]. It has been demonstrated that for every 10mg/dL increase in total or LDL cholesterol there is 10% increase in risk of CVD (especially coronary heart disease); and for each 5mg/dL increase in HDL cholesterol there is corresponding 10% reduction in the risk of CVD[22]. It has also been documented that, total serum cholesterol generally increases with age up to 50-60 years in men and then starts to decline, while in females, increase may continue until 70 years[23].

The prevalence of hypercholesterolemia in this study was 9.0%, 4.0% in men and 5.0% in women. This is higher than the level of 3.6% reported elderly Hausa-Fulani aged 65 years and above[3]. While the values in this study are comparable to that documented among rural men and women in Gambia, it is much lower than the urban rates[24]. This result, again, corroborate the fact that the study location cannot totally be described as rural putting into consideration to its close proximity to an urban city and the people enjoy virtually all the infrastructure found in urban settlements. The triglyceride prevalence of 0.5% (only one male) is also comparable to rural and urban women of Gambia[24]. A very striking feature of this result is that 35 subjects (17.6%) had depressed levels HDL cholesterol and 46 (23.1%) had elevated HDL cholesterol. The protective effect of HDL cholesterol against CHD risk has been established, the higher the value of HDL cholesterol the less the risk[21, 23].

The study demonstrates that dysperlipidaemias are prevalent in Nigeria and for that matter in a semi-urban settlement that is generally thought to be free of these risk factors indicating the commencement of epidemiologic transition in this settlement[25]. Lifestyle factors such excessive dietary intake of fatty food; sedentary living, cigarette smoking and alcohol consumption could provide explanation for this high prevalence of dysperlipidaemias though prevalences of cigarette smoking and alcohol consumption are rather low, (10% are current smokers and 3.5% take alcohol). It then means that it is necessary to undertake nationwide survey to assess the pattern of distributions of blood lipids profiles and prevalence of hyperlipidaemias in the population. Further, healthy lifestyle intervention should be carried out by state ministries of health coordinated by the federal ministry of health. Healthy lifestyle intervention should include information about healthy eating i.e. reducing dietary fat intake, quitting smoking, reduce alcohol intake and engaging in regular physical exercise.

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