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## Lipid Profile Pattern in Patients with Different Disease Conditions in Kano, Northwest, Nigeria

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### Abstract

Lipid profile assay has become a prominent test menu in most Chemical Pathology laboratories in Sub-Saharan Africa. This is due to the well-established fact of the implication of lipid abnormalities in cardiovascular diseases (CVDs). There is paucity of data on the pattern of lipid and lipoprotein values in Kano and environs. The subjects were made up of 1472 patients attending Aminu Kano Teaching Hospital, Kano with various disease conditions and 100 apparently healthy controls. Seven hundred and twenty-two (722) of the patients were males while 750 were females. The study was retrospective evaluating lipid results on various diseases in patients attending AKTH, Kano that required investigations. Lipid and lipoprotein levels were determined using routine standard laboratory techniques. Mean values of all the analytes except HDL-C were significantly higher ( $p < 0.05$ ) in patient group than the controls. The frequency of hypercholesterolaemia was higher in patients with nephrotic syndrome while that of hypertriglyceridaemia was found to be higher in patients with chronic kidney disease (CKD). Combined hyperlipidaemia was higher in patients with diabetes mellitus (DM). The atherogenic index using TC/HDL-C reveals higher risk in patients with liver diseases while TG/HDL-C reveals higher risk in patients with CKD. Lipid and lipoprotein abnormalities are common in the patients evaluated in the current study. The assay of lipid profile on routine basis in patients at risk of developing cardiovascular complications is strongly suggested in this environment. The use of TG/HDL-C ratio as indicator of atherogenicity is recommended.

**Key words:** Lipid profile, Cardiovascular diseases, dyslipidaemia, Nephrotic syndrome, Northwest, Nigeria.

### Introduction

Lipid and lipoprotein abnormalities in various disease conditions are common in medical practice (Martin, 2012). Dyslipidaemia is one of the risk factors for cardiovascular disease (Nelson, 2013), Others are Diabetes Mellitus, hypertension, Obesity, smoking, e.t.c (Martín-Timón *et al.*, 2014; Sarat Chandra *et al.*, 2014). Presence of dyslipidaemia poses additional biochemical risk (Sanjiv and RaKhee, 2016). Thus, assay of lipid profile in some of these disease conditions could help minimize the frequency of morbidity and mortality in those patients (Mannu, *et al.*, 2013). Currently they are several lipids lowering drugs in the market (Pahan, 2006; Debra, 2015). Early detection of any of these lipid abnormalities could be of immense help to the patients (Thomas and Ross, 2014).

In the past, measurement of lipid and lipoproteins was not possible in many chemical pathology laboratories in the Northern part of Nigeria (Warnick, 2000). However, the situation is changing in many Laboratories in



the tertiary hospital are now providing services in this endeavors (Mosadeghrad, 2014). Kano is the largest commercial city in Northern Nigeria. Aminu Kano Teaching Hospital (AKTH), Kano provided lipid assay service in their chemical pathology laboratory, this has been in place for several years. The current study was in attempt to assess the pattern of results generated from the laboratory. This was aimed at encouraging the use of these services in Kano and environ to improve the health of the patients in need of the services.

### Materials and Methods

The study was a retrospective study evaluating lipid and lipoprotein results. The patients comprised of 1472 that were referred to AKTH laboratory, Kano for lipid profile assay. One hundred (100) apparently healthy volunteers were included as controls. Total cholesterol was measured by the enzymatic colorimetric method (Allain *et al.*, 1979), triglycerides by the glycerol phosphate oxidase method (Fi-Fletcher, 1969), High-density lipoprotein cholesterol (HDL-C) by the enzymatic colorimetric method (Lopes *et al.*, 1977) and Low-density lipoprotein cholesterol (LDL-C) was calculated using Friedewald formula (Friedewald, *et al.*, 1972). Atherogenic indices were defined by TC/HDL-c and TG/HDL-c. Statistical analysis

was performed using the SPSS version 16.0 software.

### Results

The results obtained from the current study are presented in tables 1, 2 and 3 respectively. Table 1 shows the pattern of lipid profile in various disease conditions and controls. The mean values of all the analytes except HDL-C were significantly higher ( $P < 0.05$ ) in the patient group than the controls. The atherogenic index using TC/HDL-C revealed higher risk in patients with liver diseases while that using TG/HDL-C revealed higher risk in patients with CKD. The distribution of patients according to gender is shown in table 2. Overall, the males had higher prevalence of CKD, liver diseases (LDs), CVD and nephritic syndrome (NS) than the females. On the other hand, the females had more of hypertension (HTN) and diabetes mellitus (DM) than the males. The males had higher frequency of dyslipidaemia than females. Table 3 shows abnormal lipid profile percentages in different disease conditions in Kano. The frequency of hypercholesterolaemia was higher in patients with NS while that of hypertriglyceridaemia was found to be higher in patients with CKD. Combined hyperlipidaemia was found to be higher in patients with DM.

**Table: Lipid profile pattern (Mean ±SEM) in different disease conditions attending AKTH, Kano**

Disease	N	T. Chol (mmol/L)	TG (mmol/L)	HDL-C (mmol/L)	LDL-C (mmol/L)	T.Chol/ HDL	TRG/ HDL
CKD	99	5.04±0.15	1.77±0.14	0.99±0.4 4*	3.25±0. 14	5.09±0.03	1.77±0.0 3
HTN	46 8	5.29±0.05	1.11±0.02	1.24±0.0 2	3.49±0. 05	4.27±0.12	0.90±0.0 5
DM	40 6	5.38±0.08	1.40±0.05	1.19±0.0 3	3.80±0. 07	4.52±0.13	1.18±0.0 8
CVD	24 0	5.19±0.14	1.33±0.05	1.04±0.0 4	3.60±0. 13	4.99±0.17	1.28±0.0 8
L Ds	64	5.64±0.79	1.23±0.16	0.94±0.1 0*	4.12±0. 68	6.00±0.99	1.31±0.2 0
N/S	56	7.24±0.20	1.38±0.16	1.42±0.0 6	5.10±0. 41	5.10±0.45	0.97±0.3 6
Hyperlipadaemia	64	5.73±0.20	1.45±0.15	1.28±0.1 0	3.82±0. 27	4.48±0.25	1.13±0.1 9
Others	74	5.11±0.17	1.16±0.10	1.30±0.0 8	3.82±0. 16	3.93±0.24	0.89±0.1 5
Controls	10 0	3.02±0.15	0.86±0.03	1.31±0.0 8	1.81±0. 08	2.31±0.19	0.48±0.0 4

*p* ≤ 0.05 (significant) for patient Vs Control for Analysis \*; AKTH= Aminu Kano Teaching Hospital; n=Number of Subject; T. Chol=Total cholesterol; TG= Triglyceride; HDL-C= High Density Lipoprotein Cholesterol; LDL-C= Low density lipoprotein cholesterol; CKD= Chronic Kidney Disease; HTN= Hypertension; DM= Diabetes Mellitus; CVD= Cardiovascular Disease; LDs = Liver Disease; N/S= Nephrotic syndrome; Others (Obesity, Rheumatoid Factor and gout, Thyroid disease, Cancer, Cushing syndrome).

**Table2: Distribution of patients according to gender**

Diseases	N	Male%	Female%
CKD	99	60.6(60%)	39.4(39.4%)
HTN	468	197(42%)	272(58%)
DM	406	170(41.9%)	236(58.1%)
CVD	240	127(52.9%)	113(47.1%)
L Ds	64	44(68.8%)	20(31.2%)
N/S	56	40(71.4%)	16(28.6%)
Hyperlipadaemia	64	40(62.5%)	24(37.5%)
Others	74	44(60%)	30(40%)
Total	1472	722(49%)	750(51%)

*%= Percentage; n=Number of Subject; CKD= Chronic Kidney Disease; HTN= Hypertension; DM= Diabetes Mellitus; CVD= Cardiovascular Disease; LDs = Liver Disease; N/S= Nephrotic syndrome; Others (Obesity, Rheumatoid Factor and gout, Thyroid disease, Cancer, Cushing syndrome).*

**Table3: Abnormal lipid percentages in different disease conditions in Kano**

Diseases	N	T. Chol ≥6.4 (mmol/l)	TG (≥2.5mmol/l)	Total
CKD	99	19(19.2%)	14(14.1%)	33 (9.4%)
HTN	468	76(16.2%)	5(1.1%)	81 (23.1%)
DM	406	68(16.8%)	16(3.9%)	84 (24%)
CVD	240	48(20%)	10(4.2%)	58 (16.6%)
LDs	64	24(37.5%)	4(6.3%)	28 (18%)
N/S	56	28(50%)	2(3.6%)	30 (8.6%)
Hyperlipadaemia	64	16(25%)	4(6.3%)	20 (5.7%)
Others	74	12(16.2%)	4(5.4%)	16 (4.6%)
Total	1472	291(19.8%)	59(4.0%)	350 (23.8%)

*Legend: %= Percentage; n=Number of Subject; ≥ Greater than or equal to; T. Chol=Total cholesterol; T.G.= Triglyceride; CKD= Chronic Kidney Disease; HTN= Hypertension; DM= Diabetes Mellitus; CVD= Cardiovascular Disease; LDs = Liver Disease; N/S= Nephrotic syndrome; Others (Obesity, Rheumatoid Factor and gout, Thyroid disease, Cancer, Cushing syndrome).*

### Discussion

There is paucity of data on lipid profile pattern in the Northern part of Nigeria. The present study focused on Kano as the largest commercial and most populous city in the north. Our results showed that lipid abnormalities are common findings among Kano population and environs. In most clinical chemistry

laboratories, the commonest indications for lipid profile assay are DM, CVD, HTN, CKD, etc (Tsimihodimos *et al.*, 2011). Our observations are in agreement with this report. Lipid profile assay is usually requested by clinicians managing these groups of patients to enable them rule out the risk of CVD or CHD (Appleton *et al.*, 2007). The mean values of all

the analytes considered were significantly higher ( $P < 0.05$ ) in the patient groups than in the controls. These observations are in agreement with previous report by Ghadir *et al.*, (2010). The explanations for this difference vary from one disease condition to another. Basically, abnormal lipids or lipoproteins could result from either reduced clearance or increased production. The males had higher prevalence of CKD, LDs, CVD and NS compared to the females. This may indicate that males are at higher risk arising from abnormal lipid profile pattern. Our results tend to confirm this as the males had higher frequency of dyslipidaemia than females. This is in agreement with the report of Akuyan *et al.*, (2010). Kidney diseases seemed to contribute to the major abnormalities of cholesterol and TG in this population.

This group of patients required close monitoring with lipid profile assay. Combined hyperlipidaemia was found in DM. This also reveals that patients with DM need regular lipid profile assay as part of the test menu. These investigations may help the clinicians in the management of these patients especially those that may require lipid lowering drugs (Pahan, 2006). Using TC/HDL-C and TG/HDL-C as atherogenic indices revealed higher risk for different disease conditions. This observation requires further evaluation as TG/HDL-C has not been previously employed as indicator of atherogenicity in this environment.

Overall, the current study reveals that lipid abnormality is prevalent in Kano and the need for periodic assessment.

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