

Lipid profile abnormalities among Nigerian male renal failure patients on dialysis

Abstract

Background: There is a relationship between cardiovascular and renal disease. Dyslipidemia contribute to development of cardiovascular disease and renal failure progression. Dialysis is a good treatment measure for the management of chronic renal failure. This study was carried out to assess the lipid profile of Nigerian male patients with chronic renal failure (CRF) on dialysis treatment.

Materials and Method: A total of 120 adult Nigerian male subjects were involved in this study. 60 of them were chronic renal failure patients on dialysis treatment, while the rest 60 were healthy adult males (control group). Their Total cholesterol (TC), Triglyceride (TG), Very Low Density Lipoprotein-Cholesterol (VLDL-C), Low Density Lipoprotein-Cholesterol (LDL-C), and High Density Lipoprotein-Cholesterol were estimated by enzymatic method.

Result: It was observed statistically that the lipid profile of the patients significantly ($p < 0.05$) differ from that of the healthy subjects. TC, TG, VLDL-C, and LDL-C, were significantly higher ($p < 0.05$), while their HDL-C was significantly lower ($p < 0.05$) than that of the healthy subjects. Cardiovascular risk indices, TC/HDL-C and LDL-C/HDL-C ratios of the chronic renal failure patients were significantly higher ($p < 0.05$) than that of healthy subjects.

Conclusion: This result indicated that despite dialysis treatment on these Nigerian male patients, the renal failure still predisposes the patients to atherosclerosis as a result of abnormal lipid profile.

Keywords: atherosclerosis, lipid profile, dialysis, renal failure

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Introduction

Cardiovascular diseases are the leading cause of mortality and morbidity in developed countries and they are emerging as prominent public health problem in developing countries.¹ In this World Health Organization¹ report, it was stated that 80% of deaths from cardiovascular diseases and 87% of related disability currently occur in low and middle income countries. It was revealed in a study conducted in Nigeria by Adediorin and Adesoye² that men (60.8%) have higher incidence of cardiovascular disorders than women (39.2%). Shakaib et al.³ confirmed in their study the existence of ethnic differences in hypertension control, and in cardiovascular and renal outcomes, which they attributed to factors such as biological, cultural, social, healthcare system. There is an association between cardiovascular disease and renal failure, and dyslipidemia is said to contribute to development of cardiovascular disease and renal disease progression. Abrass⁴ in animal studies observed that hypercholesterolemia increases the rate of progression of kidney disease. A high-fat diet causes macrophage infiltration and foam cell formation in rats leading to glomerulosclerosis.⁵

Progressive renal failure, especially that associated with proteinuria, is accompanied by abnormalities of lipoprotein transport. Typically, the dyslipidemia is reflected predominantly in increased serum levels of triglyceride with high level of VLDL, apo B and pre-B HDL, and low levels of HDL and of apo A. Cholesterol levels may be very high in proteinuric patients.⁶ These abnormalities may be due to several pathogenic mechanisms which include upregulation of 3-hydroxy-3-methylglutaryl COA reductase with a consequent hypercholesterolemia,⁶ and due to deficiency of acquired lecithin-cholesterol acyltransferase enzyme deficiency.⁷ Increased serum TG level is predominantly due to impaired clearance of chylomicron

and VLDL. In a study carried out by Odenigbo et al.⁸ among healthy Nigerians, it showed that dyslipidaemia was highly prevalent, with low HDL-C being most frequent lipid abnormality. Male subjects were more victim of dyslipidaemia development. Akpa et al.⁹ observed a high mean total Cholesterol and LDL-C values among healthy adults in Port Harcourt, Nigeria. The dyslipidaemia in male subjects attributed to low/or lack of 17-beta-estradiol hormone which regulates lipid metabolism in adipocytes and hepatocytes.¹⁰ Sex steroid hormones are involved in the metabolism, accumulation, and distribution of adipose tissues. It is now known that estrogen receptors, progesterone receptors, and androgen receptors exist in adipose tissue. It was observed that testosterone inhibits TG uptake and lipoprotein lipase activity. Due to in-vivo hormonal effect on lipid metabolism, this study was carried out to assess lipid profile of Nigerian male patient with chronic renal failure on dialysis.

Material and methods

A total of 120 adult male subjects were used in this study. 60 of them were apparently healthy and were used as control, while the rest 60 were patients with chronic renal failure on dialysis treatment. 5ml of blood sample collected from each subject at fasting state (in the morning) was used to estimate the level of serum Total Cholesterol (TC), Triglyceride (TG), HDL-C, LDL-C, and VLDL-C using enzymatic method with Human Diagnostic test kit.¹¹ The blood sample was collected after obtaining informed consent from the participants and the hospital management.

Statistical analysis

The data collated after biochemical analysis were subjected to statistical calculation using statistical software (Megastat). The mean,

standard deviation/standard error of mean (s.e), F-distribution test were obtained. Critical value or test of probability less than 0.05($p < 0.05$) was regarded significant.

Result

The results obtained were represented in the tables below. The

Table 1 The comparative means \pm s.e lipid profile of the healthy males and chronic renal failure patients on dialysis

Groups	'n'	TCmmol/l	TGmmol/l	HDL-Cmmol/l	LDL-Cmmol/l	VLDL-Cmmol/l
Healthy males	60	4.16 \pm 0.18	1.14 \pm 0.03	1.71 \pm 0.46	1.99 \pm 0.6	0.57 \pm 0.2
CRF patients	60	6.25 \pm 0.79	1.97 \pm 0.09	1.44 \pm 0.05	3.95 \pm 0.16	0.76 \pm 0.03
P-value	$p < 0.05$	$p < 0.05$	$p < 0.05$	$p < 0.05$	$p < 0.05$	$p < 0.05$

Table 2 The Cardiovascular risk indices (TC/HDL-C and LDL-C/HDL-C) of the male subjects

Groups	'n'	TC/HDL-C	LDL-C/HDL-C
Healthy males	60	2.40 \pm 0.08	1.15 \pm 0.07
CRF patients	60	4.49 \pm 0.20	2.86 \pm 0.15
P-value	$p < 0.05$	$p < 0.05$	$p < 0.05$

Discussion

In Nigeria, Adedorin & Adesonye² observed that men have higher incidence (60.8%) of cardiovascular disorders than women (39.2%). This cardiovascular disorder is mainly as a result of abnormality in lipid metabolism. Irrespective of dialysis treatment, this study revealed abnormality in lipid parameters estimated in chronic renal failure patients. There were significant higher levels of TC, TG, LDL-C and VLDL-C, and significant lower level of HDL-C in renal failure patients on dialysis than healthy adult males. The significant higher levels of TC/HDL-C and LDL-/HDL-C ratios strongly indicated development atherosclerosis among these patients. This dyslipidemia observed may accelerate the rate of progression of renal failure. Abrass⁴ reported that variety of animal model studies have shown that hypercholesterolemia accelerates the rate of progression of kidney disease. High cholesterol and TG plasma levels have been demonstrated to be independent risk factors for progression of renal failure. Hattori et al.,⁵ also stated that dyslipidemia causes glomerulosclerosis due to macrophage infiltration and foam cell formation. Muntner et al.,¹² showed that people with low HDL-C and hypertriglyceridemia at baseline, have a high risk for having a loss of renal function. These abnormalities in lipid profile could be as a result of impaired clearance of chylomicron and VLDL-C and down regulation of lipoprotein lipase enzyme thereby increasing the serum levels of triglyceride-rich lipoprotein.⁷

Hormone influence on lipid metabolism should be put into consideration. In the study carried out by Jockenhovel et al.¹³ androgen is found to increase TC, TG, and LDL-C, and also decreases HDL-C in males with hypogonadism. In Nigeria, dyslipidemia is frequently observed among men, with low HDL-C being most frequent lipid abnormality.^{8,9} These abnormalities could be attributed to low/or lack of 17-beta-estradiol hormone among male.¹⁰ Male sex hormone steroid, testosterone is observed to inhibit TG uptake and lipoprotein lipase enzyme activity. There is a growing evidence that hyperlipidemia contributes not only to cardiovascular disease but also to renal disease progression. These lipid profile abnormalities in male renal failure patients on dialysis treatment showed that atherosclerosis is bound to develop and this development could be hormonally induced and also

lipid profiles of the chronic renal failure patients, as shown in Table 1 were significantly ($p < 0.05$) altered when compared with those of the healthy subjects. The cardiovascular risk indices, TC/HDL-C and LDL-C/HDL-C, of the chronic renal failure patients as shown in Table 2 were significantly higher ($p < 0.05$) than those of the healthy subjects.

as a result of impaired clearance of lipoproteins and down regulation of some necessary enzymes involved in lipid metabolism.

Conclusion

In conclusion, irrespective of dialysis treatment on these male patients with renal disease, there was evidence of development of atherosclerosis depicted by the abnormalities in lipid profile.

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None.

Conflict of interest

Author declares that there is no conflict of interest.

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