SERUM LIPID INDICES AND RENAL FUNCTION AMONG PERSONS WITH CHRONIC KIDNEY DISEASE IN JOS, NORTH CENTRAL NIGERIA

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ABSTRACT

Background: *Dyslipidaemia is a commonly associated comorbidity in patients with Chronic Kidney Disease. It has been shown to increase the risk of cardiovascular events in these patients. This study aims to highlight the relationship between different serum lipid indices and renal function as indicated by Glomerular Filtration Rate.*

Methodology: *this was a retrospective study which analyzed data from patients with chronic kidney disease who visited the Nephrology clinic of the Jos University Teaching Hospital from 1st October to 31st December 2013*

Results: *Out of the 110 patients studied, 61.8% were males. The mean age of the population was 55.2+/-16.6 years. 60% of subjects had dyslipidaemia. Estimated Glomerular Filtration Rate correlated with HDL cholesterol, but not with total cholesterol or triglyceride.*

Conclusion: *over half of the study population had some form of derangement in serum lipids. This was more prevalent among female subjects. Regular measurement of fasting serum lipids is essential in chronic kidney disease to detect abnormalities early as well as monitor progress of treatment.*

Key words: *Chronic kidney disease, Glomerular filtration rate, dyslipidaemia*

BACKGROUND

Chronic kidney disease is characterized by the presence of a marker of kidney damage for a duration of 3 months or longer and/or a glomerular filtration rate of less than 60ml/min/1.73m^2[1]. Markers of renal damage include abnormalities on urinalysis (such as proteinuria), radiology (such as reduced renal size) or histology. It is estimated that Chronic Kidney Disease affects over 50 million persons worldwide[2]. In Nigeria, it is reported that renal failure accounts for about 8% of hospital admissions[3]. The prevalence in the country ranges from as low as 19.9%[4] to as high as 45.5%[5] depending on the characteristics of the study population. The metabolic changes seen in Chronic Kidney Disease (CKD) include derangements in serum lipid parameters such as triglycerides, total cholesterol and High Density Lipoprotein (HDL) cholesterol. These changes are known to begin early in the progression of CKD[6], and dyslipidaemia in turn accelerates the progression of CKD. The commencement of dialysis may not necessarily lead to the correction of dyslipidaemia. It may even become more severe in those commencing peritoneal dialysis or in those who have had a renal transplant[7]. Dyslipidaemia associated with CKD is important because it further increases the risk of cardiovascular events like stroke and myocardial infarction[8]. In this study, we aim to determine the prevalence of dyslipidaemia among patients with CKD and also the relationship between Glomerular Filtration Rate (GFR) and the various serum lipid indices.

MATERIALS AND METHODS

The records of all patients with CKD seen at the Nephrology Clinic of the Jos University Teaching Hospital from 1st October 2013 to 31st December 2013 were reviewed. The Jos University Teaching Hospital is a tertiary health care facility located in Jos, capital of Plateau State, North Central Nigeria. Data obtained for each subject included age, gender, Body Mass Index (BMI), serum creatinine, treatment status with statins and fasting levels of serum total cholesterol, HDL cholesterol and triglycerides. CKD was defined as an estimated

GFR (eGFR) of less than 60ml/min/1.73m^2. eGFR was calculated from the age and creatinine levels using the Modification of Diet in Renal Disease (MDRD) formula[10].

eGFR = (32788)(Age$^{-0.203}$)(Creatinine$^{-1.154}$)(0.742 if female)(1.21)

Based on eGFR values, CKD was staged into Stages 3 (eGFR 59 to 30ml/min), 4 (29 to 15ml/min) and 5 or End Stage Renal Disease (eGFR < 15ml/min) according to the National Kidney Foundation Staging[11].

Dylipidaemia was defined as elevation of total cholesterol (> 6.5mmol/L) or triglyceride levels (>1.75mmol/L) , and/or a reduction in HDL cholesterol levels (< 1mmol/L men; <1.2mmol/L women). The reference values used here are those of the Chemical Pathology Lahoratory of the Jos University Teaching Hospital.

STATISTICAL ANALYSIS

This was done using the EPI Info statistical software (version 7.0). Quantitative variables (age, BMI, eGFR, lipid indices) were expressed as means±standard deviation while categorical variables (Gender, Stage of CKD, treatment with statins) were expressed as proportions. The t test and the Chi square test were used in the comparison of means and proportions respectively. The Pearson Correlation coefficient and Linear regression analysis was used to assess the relationship between eGFR and the different lipid indices. In all cases, p value < 0.05 was considered statistically significant.

RESULTS

The study population comprised 110 subjects. 61.8% were males. The mean ages of males and females were 56±16.7 and 53±16.5 years respectively. There was no statistically significant difference between the two values (p=0.388). 66.4% of the population were greater than 50 years of age. Majority of subjects had stage 3 CKD (71.8%). Mean BMI was 25.8±2.2kg/m^2 for males and 27.0±2.9kg/m^2 for females. The difference was statistically significant (p =0.024). Dyslipidaemia was present in 54.4% of males and 69.1% of females (X^2 =2.32; df =1; p=0.128)

Table 1: Frequency distribution of the different stages of CKD

Stage of CKD	Frequency	Percentage %
3	79	71.8
4	10	9.1
5	21	19.1

Table 2: Two by two table of gender versus lipid status

	Dyslipidaemia	No dyslipidaemia	TOTAL
Males	37 (33.6%)	31 (28.1%)	68
Females	29 (26.3%)	13 (11.8%)	42
	66 (60%)	44 (40%)	110

OR = 1.87; X^2 = 2.32; df =1; p =0.128

A positive correlation was observed between eGFR and HDL (r = 0.49; F test = 10.63; p=0.0015). There was no correlation between eGFR and total cholesterol (r = -0.008; F = 0.0072; p=0.932). There was also no correlation between eGFR and triglyceride (r = -0.06; F=0.38; p=0.534). In both instances, the absence of correlation persisted even after adjusting for age, BMI and statin use.

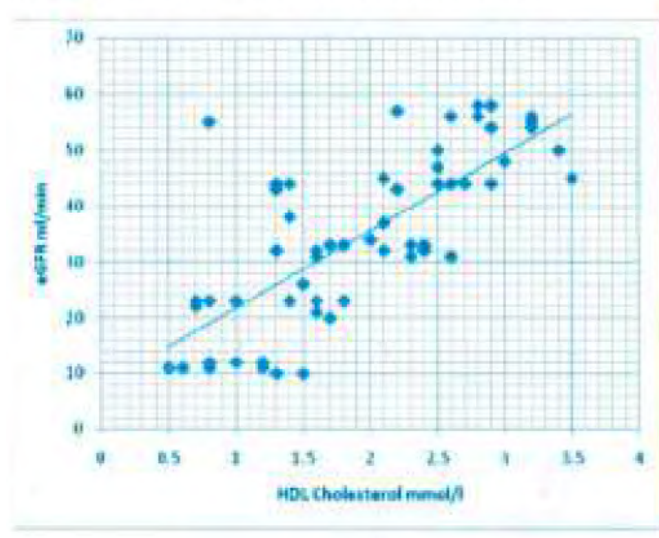

Figure 1: scatterplot of eGFR versus HDL –Cholesterol (r = 0.49)

DISCUSSION

The majority of our study population were males (61.8%). Some studies have reported that Chronic Kidney Disesase is more prevalent in men than women[12] while other studies report the reverse[13]. This depends on factors such as the stage of CKD being considered and the underlying aetiology of the disease. The mean ages of males and females in our study population were similar to findings elsewhere[14]. Other reports however give a relatively lower mean age for patients with CKD[15], including some studies in Nigeria[16,17,18] .The relatively higher

age in this study could be explained by the fact that majority (66.4%) of the subjects were above 50 years of age. This is considering the fact that the risk of developing CKD increases with advancing age due to the expected decline in renal function[16]. The prevalence of dyslipidaemia was higher among female subjects. Interestingly, the female subjects had a significantly higher mean BMI ($27.0+/-2.9kg/m^2$) compared with males ($25.8+/-2.2kg/m^2$). Whether or not this comparatively greater degree of adiposity among female subjects is responsible for their higher prevalence of dyslipidaemia is not clear, as there may be a complex interaction of other factors.

We found out that HDL showed significant positive correlation with eGFR. This was the finding of some other workers[19,20]. This relationship between HDL and eGFR was maintained even after adjusting for confounders such as age, BMI and use of statins. Krikken et al[21] reported a negative correlation between HDL and eGFR. The study however differed from ours as it was done among persons without CKD (GFR>60ml/min) who were not on lipid lowering agents. There was no correlation between total cholesterol, triglycerides and eGFR in the study population. This finding is similar to that made by Agaba et al[17] who found no significant difference between total cholesterol and triglyceride levels among individuals with End Stage Renal Disease compared with healthy controls. Bulum et al[22] and Seidullah et al[23] were able to demonstrate a significant correlation between total cholesterol and GFR. They studied only individuals with diabetic nephropathy (our study included CKD from different aetiologies).

CONCLUSION

Abnormalities in serum lipid indices are common in patients with Chronic Kidney Disease. If left untreated, they can increase the risk of cardiovascular events and worsen the overall prognosis in such patients. Regular screening and early commencement of therapy is essential.

REFERENCES

1. Levey A.S., Eckhardt K.U., Tsukamoto Y., Levin A., Coresh J., Rossert J., Definition and classification of CKD – position statement from the Kidney Disease Improving Global Outcome *Kidney Int 2005;6:2089-2100*
2. Josef C., Brad C.A., Tom G., Garabed E., Andrew S.L., Prevalence of Chronic kidney Disease and reduced renal function in U.S. population *Am J Kidney Diseases 2004;41:1-12*
3. Akinsola A., Odesanmi W.O., Oguniyi J.O., Ladipo G.O.A., Diseases causing chronic renal failure in Nigeria- a prospective study of 100cases *Afr J Med Sci 1999;6(5):198-201*
4. Abioye-kuteyi E.A., Akinsola A., Ezeoma I.T., Renal disease: the need for community based screening in rural Nigeria *Afr J Med Pract 1999;6:198-201*
5. Nwankwo E.A., Nwankwo B., Mubi B., Prevalence of impaired renal function in hospitalized hypertensive patients in Maiduguri Nigeria *The Internet Journal of Medicine 2006;6:1*
6. Fliser D., Pacini G., Engelleiker R., Kautzy W.A., Prager R., Insulin resistance and hyperinsulinaemia are already present in patients with incipient renal disease *Kidney Int 1998;53:1343-1347*
7. Fried L.F., Orchard J.J., Kasiske B.L., Effects of lipid reduction on progression of renal disease-a meta analysis *Kidney Int 2001;59(1):260-269*
8. Attmen P.O., Samuelsson O.G., Moberly J., Johansson A.C., Ljongmen S., Apo B containing lipoproteins in renal failure: the relation to mode of dialysis *Kidney Int 1999;55:1536-1595*
9. London G.M., Drueke T.B., Atheriosclerosis and Arteriosclerosis in chronic renal failure *Kidney Int 1997;51:1678-1695*
10. Kilbride K.S., Stevens P.E., Eaglestone G., Knight S., Carter J.L., Delaney M.P., Accuracy of the Modification of Diet in Renal Disease study and the chronic kidney disease epidemiology equations for estimation of glomerular filtration rate in the elderly *Am J Kid Dis 2013;61:57-66*
11. Levey A.S., Coresh J., Balk E., Kausz A.T., Levin A., Steffes M.W., National Kidney Foundation practice guidelines for chronic kidney disease: evaluation, classification and stratification *Ann Intern Med 2003;139:137—147*
12. Glassock R.J., Winearls C., An epidemic of chronic kidney disease: fact or fiction? *Nephrol Dial Tranplant 2008;23:1117-1171*
13. Yu M.K., Lyles C.R. Bentshaw L.A., Young B.A., Risk factors, age and sex differences in chronic kidney disease prevalence in a diabetic cohort: the pathway study *Am J N ephrol 2012;36:245-251*

14. Anupama Y.J., Uma G., Prevalence of chronic kidney disease among adults in a rural community in South India: results from the Kidney Disease Screening (KIDS) project *Indian J Nephrol 2013; e-publication* http://www.indianjnephrol.org/preprintarticles

15. Gooneratne L.K., Ranaweera A.KP., Liyanarachchi N.P., Gunawardane N., Lanerolle R.D., Epidemiology of chronic kidney disease in a Sri Lankan population *Int J Diabetes Dev Ctries 2008; 28:60-64*

16. Ulasi I.I., Ijoma C.K., The Enormity of chronic kidney disease in Nigeria. The situation in a Tertiary Hospital in South East Nigeria *J Trop Med 2010; Article ID 501957:6*

17. Ijoma C., Ulasi I., Ijoma U., Ifebunandu N., High prevalence of anaemia in predialysis patients in Enugu Nigeria *Nephrology Review 2012;2*

18. Shittu A.O., Chijoke A., Biliaminu S.A., Makusidi A.M., Sanni M.A., Abdulrahman M.B., Haematologic profile in patients with chronic kidney disease in Nigeria *JNRT 2013;5:2-10*

19. Lewis D., Haynes R., Landrey M.J., Lipids in chronic kidney disease *Ren Care 2010;36:27-33*

20. Wang F., Zheng J., Ye P., Luo L., Bai Y., Sheng L., Association of HDL with estimated glomerular filtration rate in a community based population *Plos One 2013;8(11):e79736*

21. Krikken J.A., Gansevoort R.T., Dullaart R.P., Lower HDL -C and Apolipoprotein A1 are related to higher glomerular filtration rate in subjects without kidney disease *J lipid Res 2010;5:1982-1990*

22. Agaba E.I., Duguru M., Agaba P.A., Angbazo D., serum lipid profile of Nigerian diabetics with end stage renal disease *West Afri med J 2005;24:305-308*

23. Bulum T., Kolaric B., Prkacin I., Duvnjak L., Total and LDL cholesterol are associated with glomerular filtration rate in normoalbuminuric Type 1 diabetics *Coll Antropol 2013;37:771-776*

24. Seidullah M., Rahman M.R., Begum S., Hayat S., Khan A.S., Association between HDL and renal function in Type 2 diabetes mellitus subjects in a Bangladeshi Population *J Enam Med Col 2012;2:15-19*