



Assessment of Plasma Glucose and Lipid Profile in children with Chronic Renal Failure Patients

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Abstract

Background: Renal failure (RF) have been recognized as significant medical problems, and also associated with metabolic syndrome.

Objectives: The objective of this study was to assess plasma lipid profile and glucose level among CRF children patients in Khartoum state.

Methodology: This analytical case control hospital based study include 100 subjects 50 were diagnosed with chronic renal failure and 50 was healthy controls, with matched age and sex, the age ranged from 8 to 17 years with their mean 12.3 years. Plasma lipid profile and glucose level were measured using fully Automated Chemistry Analyzer (Mindary BS 200). The data were analyzed using SPSS version (21).

Results: The (mean± SD) of duration of disease and BMI in study population were (2.720±1.98, 17.302±3.46), and also the (mean± SD) of plasma Total cholesterol, triacylglyceride and glucose level in CRF patients when compared vs healthy controls was significantly increased and it observed a high significant difference, (*p*-value: (0.003,0.000,0.000), respectively, whereas plasma LDL-C and HDL-C levels presented statistically insignificant relation at (*p*-value: 0.231, 0.451) respectively. However, the results showed positive correlation between cholesterol and glucose level, as well as between TG and Duration of the Disease, LDL and Glucose ($r = 0.280, p = 0.049$) ($r = 0.032, p = 0.049$) ($r = 0.377, p = 0.007$) respectively, However, no significant correlation was found between Age, BMI and change in serum lipid profile levels. **Conclusion:** The present study concluded that, the cholesterol, TG and glucose level of the CRF children are higher than control, while LDL, HDL were insignificantly differs from the control groups, However, no correlation was found between age, BMI and change in serum lipid profile levels.

Key words: Chronic Renal Failure, Lipid Profiles, Children.

Introduction

The liver plays a vital role in lipid metabolism and is the principal site of lipoprotein formation and clearance. Thus, in severe liver disease, lipid metabolism is profoundly disturbed (Ramcharran, 2011). The concentration of serum lipids and lipoproteins has been shown to increase during early childhood. By approximately

two years of age, these concentrations reach levels similar to those seen in young adults. Therefore, concentrations for patients younger than two years may not accurately predict values for subsequent years of childhood and adulthood. Differences in cholesterol concentrations are also related to sex and ethnicity (Horsley, 2009).

It has been recognized that glucose intolerance is a common finding in patients with chronic renal failure (CRF). Insulin resistance and impaired insulin secretion contribute to the pathogenesis of glucose intolerance. The resistance to insulin action is commonly observed in chronic renal failure and mainly due to impaired glucose uptake by muscle. It contrasts insulin secretion in response to hyperglycemia. Recent studies reported that high parathyroid hormone levels impaired insulin secretion from pancreatic islets. Mention the mechanism of glucose intolerance in chronic renal failure (Matsushita and Hara, 1996). Renal failure has been recognized as significant medical problems for most of the last 2 centuries and, until relatively recently, were uniformly fatal. Renal replacement treatment became a viable alternative for many people who may otherwise have perished thanks to advancements in science and technology. The impact of these medical advancements has been remarkable (Sanjeev, 2015). The associations between most measures of obesity and HDL or LDL were independent of gender and age, whereas, with a few exceptions, associations between measures of obesity and total cholesterol (Heitmann, 2009). The objective of this study was to assess of plasma lipids profile and glucose in Sudanese children with chronic renal failure.

Materials and Methods

Study Subjects: The analytical case-control hospital based study, 100 subjects were enrolled in this study, 50 children were diagnosed chronic renal failure children patients and 50 as parentally healthy

Results : Table 1. The concentration of plasma lipid profile and glucose in children patients with chronic renal failure versus Control Group.

Parameters	Patients (Mean±SD)	Control (Mean±SD)	P-Value
Cholesterol mg/dl	155.62±49.74	132.64±21.59	0.003
TGmg/dl	146.96±71.91	70.42±33.05	0.000
LDL mg/dl	58.92±32.02	52.45±20.32	0.231
HDL mg/dl	63.16±21.77	66.16±17.60	0.451
Glucosemg/dl	118.08±32.08	92.70±16.19	0.000

controls. The mean age of patients was 13.3 ± 2.3 years. This study was carried out in Omdurman Pediatric Hospital, Khartoum state, from December 2015 to February 2016, the plasma lipid profile and glucose were measured using fully Automated Mindray BS-200 Clinical Analyzer.

Inclusion criteria: patients with chronic renal failure.

Exclusion criteria: Patient who have other diseases.

Blood Sample: Venous blood sample (5 ml) were collected from each participant under a septic conditions and were divided into two parts, one (3 ml) was collected in heparin container for measurement of plasma lipid profile and the second (2ml) was collected in fluoride oxalate container for glucose assay. The data were collected by using data collecting sheet.

Ethical consideration: Approval was taken from Alneelain university review board and verbal was constant taken from all participants before collection the data.

Quality control: Control material was used at the normal and pathological levels and measured as sample ; Results (mean±SD) of the target values of the control sera were accepted.

Statistical Analysis: Statistical analysis was performed using statistical package for social science (SPSS) Software Version 21.0. Independent t-test was used for comparison between groups and Pearson, correlation test was done to determine the association between study variables. Mean frequency and χ^2 were calculated data, and ($p \leq 0.05$) value was considered significant.

- Result expressed as means \pm SD
- Significant difference at P -value \leq 0.05

Table 2. General clinical characteristics of children patients with chronic renal failure

Parameters	Minimum	Maximum	Mean	Std. Deviation
Glucosemg/dl	39.0	188	118.08	32.08
Age(years)	8.00	17.0	12.83	2.25
Duration(years)	1.00	8.00	2.7200	1.98
BMIkg/m2	11.6	26.0	17.302	3.46

Table 3. Concentration of plasma lipid profile and glucose in children patients with chronic renal failure classified to gender.

Parameters	Male (Mean \pm SD)(no 23)	Female (Mean \pm SD)(no 27)	P -Value
Cholesterolmg/dl	154.25 \pm 38.55	157.22 \pm 61.23	0.836
TGmg/dl	144.67 \pm 59.11	149.91 \pm 87.14	0.815
LDLmg/dl	61.10 \pm 35.11	56.36 \pm 28.51	0.601
HDLmg/dl	64.22 \pm 24.20	61.91 \pm 18.99	0.707
Glucosemg/dl	115.15 \pm 33.55	121.52 \pm 30.6	0.486

- Result expressed as means \pm SD
- Significant difference at P -value \leq 0.05

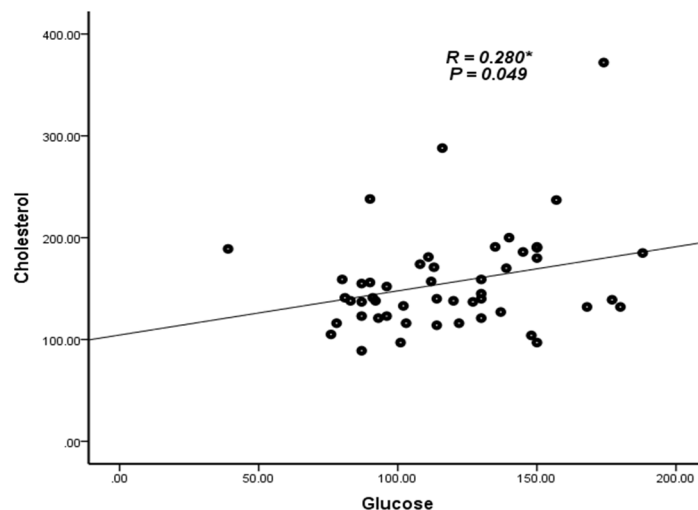


Fig 1: Correlation between cholesterol and glucose level among patients with chronic renal failure significant difference at p -value \leq 0.05

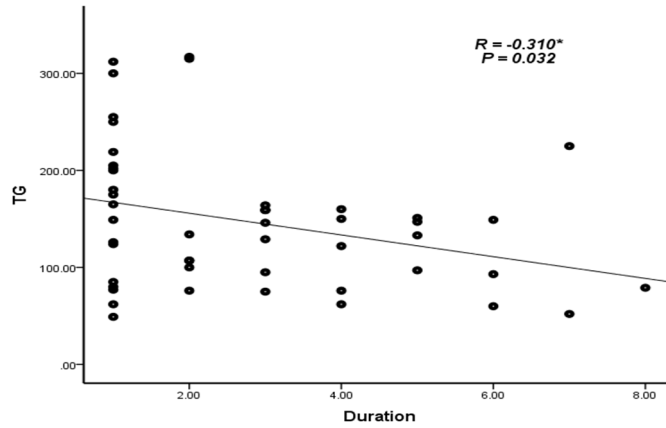


Fig 2: Correlation between TG and duration of disease among patients with chronic renal failure
Significant difference at $p\text{-value} \leq 0.05$

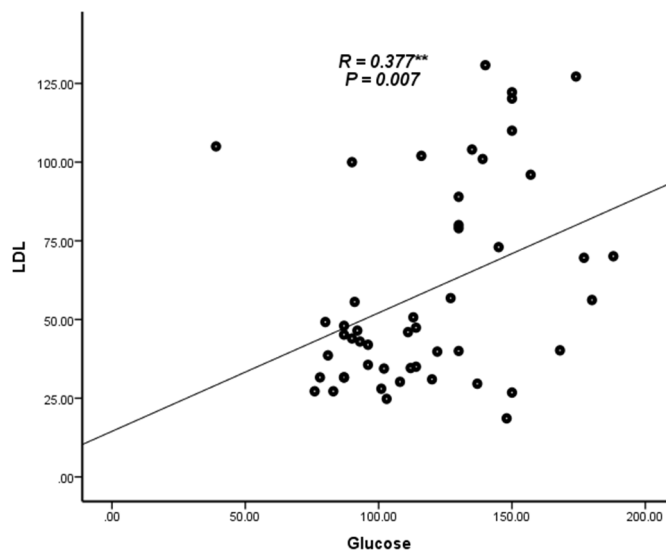


Fig 3: Correlation between LDL and glucose level among patients with chronic renal failure
significant difference at $P\text{-value} \leq 0.05$

Discussion

Recent years have showed a considerable amount of available published data on children with chronic renal failure, nevertheless, there is still only limited research done in CRF in children. In this study there was no significant difference in mean levels of serum lipid profile (Cholesterol, TG, LDL-C, HDL-C) and glucose of patients according to gender when compared with the control group. It is clear that uremic patients were exposed to

multitude of atherogenic risk factors mainly hypertension and abnormal lipid metabolism, in addition to diabetes mellitus and hyperparathyroidism (Prichard, 2003). The present study found mean of total cholesterol, TG and glucose levels in children patients when compared with means of control group observed a highly significant differences, respectively, whereas LDL and HDL concentrations revealed insignificantly different, respectively.

Previously (Mohamed and Amany, 2007) found a significant reduction in the mean of total cholesterol, LDL and HDL levels of patients comparable with that of control group, and a significant increase in triglycerides as well, in addition (Asayama *et al.*, 1984) found an increased in triglycerides levels and low levels of HDL in different groups of children with chronic renal failure, and were attributed to defective removal of triglyceride as reduced activity of lipoproteins lipase. Another study reported by (Querfeld, 1993), demonstrated hypertriglyceridemia, low HDL levels, high cholesterol, LDL, VLDL and apo-lipoprotein B are characteristic of uremic children with chronic renal failure. Furthermore in many circumstances some researchers had demonstrated abnormal lipid metabolism in adult with hemodialysis patients characterized by hypertriglyceridemia, reduced HDL (Kasiske and Keane, 1991) and LDL level usually not elevated (Keane, 1994). In other occasion, (SuhadFalih, 2015) demonstrated insignificant levels of lipid profile total cholesterol, triglyceride, LDL and HDL among the Iraqi patients. Concerning Correlation studies, revealed positive correlations between Cholesterol and glucose levels ($r = 0.280$, $p = 0.049$), and negative correlations between TG level and duration of the disease ($r = 0.310$, $p = 0.032$) and between LDL and glucose levels also observed positive one ($r = 0.377$, $p = 0.007$), These results were similar to (Mohamed and Amany, 2007), who found that there was negative correlation between TRG and GFR, and positive correlations between cholesterol, LDL, and HDL.

Conclusion: Hypercholesterolemia and hypertriglyceridemia are characteristic and features of uremic children under hemodialysis

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