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Original Article

ASSOCIATION OF TRIGLYCERIDES, HDL, AND WAIST CIRCUMFERENCE WITH EGFR IN PATIENTS IN PRIVATE PRACTICE

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Abstract:

***Background**: Chronic kidney disease (CKD) is one of the leading causes of mortality and morbidity all over the world. On the other hand, metabolic syndrome has been reported to be associated with adverse renal outcomes. Among the components of metabolic syndrome, diabetes and hypertension are established causes of renal impairment. However, the association of Triglycerides (TGs), High density lipoprotein (HDL), and Waist Circumference (WC) with renal function independently remains understudied.*

***Objectives:** The objective of this study was to determine the association of triglycerides, HDL, waist circumference with estimated glomeruar filtration rate (eGFR).*

***Materials and Methods**: This cross-sectional study enrolled 100 subjects attending as outpatient in Ibn Sina Diagnostic Centre, Uttara from July 2023 to December 2023. Renal impairment was measured by estimated glomerular filtration rate (eGFR). The eGFR was calculated using the modified modification of diet in renal disease (MDRD) equation. Statistical analyses were performed by using SPSS 25.0 (Statistical Package for Social Science, Inc., Chicago, IL, USA). Continuous variables were expressed as means±standard deviation, and categorical variables as frequencies and proportions. The relationships between renal function with triglycerides, HDL and WC were assessed by correlation coefficient. A p-value <0.05 was considered significant.*

***Results**: Among 100 subjects the overall incidence of renal impairment is 13 (13%). Waist Circumference (WC) and high Triglyceride (TG) have inverse relation with eGFR means significant association in developing renal impairment.*

***Conclusion:** This study suggests triglyceride and central obesity progress with renal impairment. Therefore, early monitoring and management of triglycerides and central obesity in CKD patients may help in decreasing the progression of the disease and, hence, mortality in CKD patients.*

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Introduction:

A rise in the incidence of CKD in recent years paralleled with an increasing prevalence of metabolic syndrome all over the world. Association of the metabolic syndrome with chronic kidney disease (CKD) has been studied in recent times. It is also well known that diabetes and hypertension are the two main causes of CKD. Most of the studies done earlier used eGFR with diabetes and hypertension as parameters to assess renal functions and did not include other

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components of metabolic syndrome (High TG, low HDL, and high WC). Dyslipidemia is one of the most common complications of chronic kidney disease reflected even in the early stages of CKD. The leading cause of mortality in CKD is due to cardiovascular disease[1]. On the other hand, dyslipidemia plays an important role in cardiovascular outcomes. Dyslipidemia, especially hypertriglyceridemia, is prevalent in CKD patients[2]. Several studies from different countries revealed that there is a significant relation with dyslipidemia and renal impairment[3]. It is also observed overweight and obesity are closely related to CKD[4]. However, only few studies have been done to see the relation with renal impairment with triglycerides and HDL. As a result, the aim of the study was to find out the association of triglycerides, HDL and waist circumference with eGFR so that early intervention of weight and triglyceride management can prevent deterioration of renal function.

Materials and methods:

This prospective cross-sectional study was conducted in out-patient practice of Ibn Sina Diagnostic Centre, Uttara, Dhaka, Bangladesh from July 2023 to Dec 2023.

The main objective of this study was to estimate relationship of TG, HDL and waist circumference with renal impairment. Patients of both sex and age more than 18 years. Consequetive sampling technique was used as per inclusion and exclusion criteria. The patients who were diagnosed or suspected cases of AKI, pregnant women, subjects with ascites and edema and age less than 18 years were excluded from the study. Total 100 subjects were enrolled in the study.

Anthropometric data, including height, body weight, BMI and waist circumference (WC) were measured according to standardized guidelines. Waist circumference was measured by locating top of right iliac crest then placed a measuring tape in a horizontal plane around the abdomen at level of iliac crest. WC was measured in tenths of a centimeter[5].

Lipid profile was done after a fasting period of at least 10 hours. Serum creatinine was also measured. The eGFR was calculated using the modified modification of diet in renal disease (MDRD) equation:

$186.3 \times [\text{serum creatinine}]^{-1.154} \times [\text{age}]^{-0.203}$ (×0.742, if female)

Decreased renal function was defined as an eGFR of <60 mL/ min/1.73 m^2.

Statistical analyses were performed by using SPSS 25.0 (Statistical Package for Social Science, Inc., Chicago, IL, USA). Continuous variables were expressed as means±standard deviation, and categorical variables as frequencies and proportions. The relationships between eGFR with TGs, HDL, and WC were assessed by correlation coefficient. A p-value <0.05 was considered significant.

Results:

The socio demographic variable of the study patients (Table 1) shows the age of the study patients was divided into six age groups. Majority number of patients 38(38.0%) belonged to 5th decade, followed by 4th decade 2 (25%). Male was found 56 (56.0%) and female was 44(44.0%). The mean BMI was 25.8±2.72 kg/m^2 with range from 18.0 to 33.8 kg/m^2.

Table I

Socio demographic variable of the study patients (n=100)

Age Group	Frequency	Percentage
18- 29 years	18	18
30-39 years	25	25
40-49 years	38	38
50-59 years	9	9
60 years and above	10	10
Total	100	100

Gender	Frequency	Percentage
Male	56	56.0
Female	44	44.0
Total	100	100.0

BMI (kg/m^2)		
Underweight	01	1.0
Normal	56	56.0
Overweight	32	32.0
Obesity	11	11.0
Mean±SD	25.8	±2.72
Range (min-max)	(18.0	-33.8)

Underweight <18.5 kg/m^2 Normal= 18.5-24.9 kg/m^2
Over weight =25.0-29.9 kg/m^2 Obesity= ≥ 30.0 kg/m^2

There was negative correlation with eGFR and TG that means increase triglycerides decrease eGFR, (p value = 0.001; R value 0.32) which was statiscally significant.

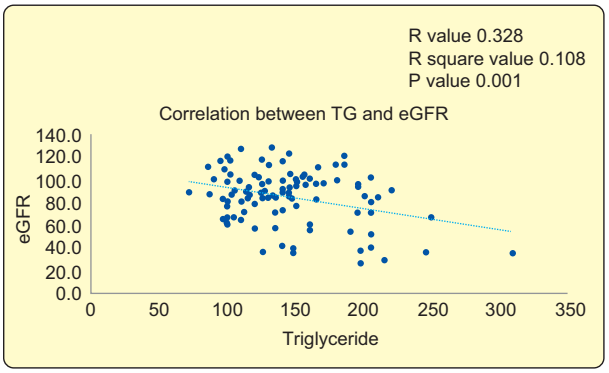

Figure 1: *Scatter plot showing significant negative correlation of eGFR with TG*

There was no significant correlation of low HDL levels with reduction in eGFR levels (p value = 0.006, R value 0.271).

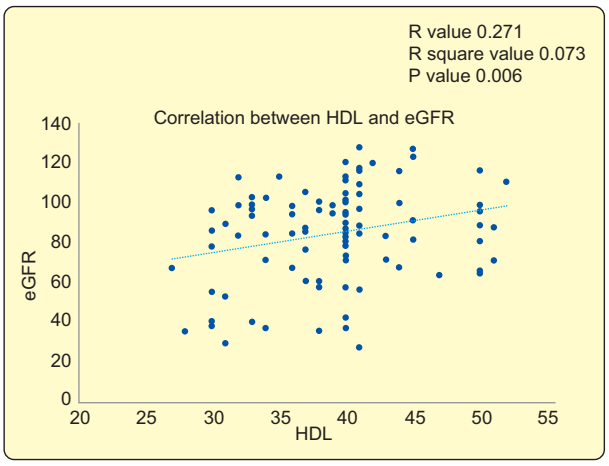

Figure 2: *Scatter plot shows relationship of HDL with eGFR*

High waist circumference was associated significantly with lower eGFR values among cases (P value = 0.089, R value was 0.171).

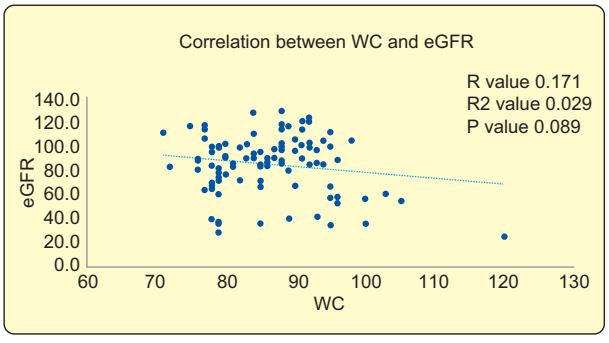

Figure 3: *Scatter plot shows association of WC with eGFR*

Discussion:

Chronic kidney disease results when a disease process irreversibly affects the structural or functional damage of the kidneys. Cardiovascular disease is a major cause of mortality in patients with CKD[7]. Dyslipidemia has been established as a well-known traditional risk factor for cardiovascular disease in general population and it is well known that patient with CKD exhibits significant alterations in lipoprotein metabolism, which, in their most advanced form, may result in the development of severe dyslipidemia. This study was done to identify the relation of triglycerides and HDL with eGFR. Obesity is also a great concern now a days. Since WC and BMI are related indicators of metabolic syndrome and WC is strongly correlated with visceral fat and an independent risk factor for cardiovascular events in CKD patients[8], this study evaluated the correlation between WC and eGFR.

The underlying mechanisms of renal impairment by dyslipidemia and central obesity are still not completely understood but include insulin resistance itself, inflammation, renal endothelial dysfunction, oxidative stress, altered renal hemodynamics, activation of the renin angiotensin-aldosterone system (RAAS) and sympathetic nervous system (SNS), and dietary factors play the role[9].

Regarding the socio demographic parameters, it was observed in this current study that almost one third (33.0%) of the patients were in 5th decade. In one study showed the mean age was 44.3±14.7 years in their study patients, which is comparable with the current study[10].

In our study,13% patients had eGFR <60 ml/min/ 1.73m^2 and 87.0% had eGFR e"60 ml/min/1.73m^2. In Bangladesh, the prevalence of Chronic Kidney Disease was 9.9% among health care providers[11]. A study conducted at rural area of Bangladesh by Hasan et al. found that prevalence of CKD was 19.5% by MDRD equation[12].

In this study there is negative relation of triglycerides with eGFR which is very significant. eGFR declines with the progress of eGFR. R^2 value is 0.108 and P value is <0.001. This result is in concordance with the work done Patil et al in which they demonstrated significant increase in triglycerides among CKD patients[13].

Some studies have also shown an association between high TGs levels and a higher rate of CKD

progression[12]. Our data are in agreement with prior studies showing an association between hypertriglyceridemia and ESRD[14]. However, few studies such as Rahman M et al. not appreciate TGs as a predictor of CKD incidence and progression independent of other metabolic risk factors. The findings of our study results are also supported by a Mendelian randomization showing TGs as the only lipid factor associated with incident CKD[15].

There are some possible mechanisms of kidney injury by hypertriglyceridemia. A cross-sectional study[16] in Shanghai and reported a positive association between the TG index and a higher risk of nephric microvascular damage, which included CKD and microalbuminuria. One thought is that TG increase oxidative stress leading to vessel injury which accelerates the rate of glomerulosclerosis[17].

In our study HDL is not significantly associated with eGFR, R^2 value 0.073, P value 0.006. Bowe et al. conducted a retrospective cohort study and found that low HDL-C was significantly associated with the risk of incident kidney disease and its progression. Previous epidemiologic studies of HDL-C and the risk of kidney disease, including 3 Mendelian Randomization studies, reported inconsistent results[18].Experimental studies and human data indicate that there is a complex relation between higher HDL-C levels and vascular dysfunction, atherosclerosis, and kidney dysfunction[19]. In the kidneys, both HDL-C deficiency and HDL-C dysfunction have been linked to vascular atherosclerosis and tubulointerstitial injury in experimental studies[20].

For central obesity, although several Asian cross-sectional studies observed positive associations between WC and the prevalence of CKD[21]. In our study, higher BMI and waist circumference are significantly associated with low eGFR. Similarly, in one study[22] showed body mass index was inversely related to risk for end-stage renal disease. One study[23] suggested that WC and visceral obesity are closely related in CKD patients, with a correlation coefficient of 0.75 for men and 0.81 for women. Few Asian prospective studies examined WC and incidence of CKD. In Southeast Asian cohort study followed for 12 years, WC was not significantly associated with risk of incident CKD[24].

Conclusion:

This cross-sectional study was conducted to assess association of triglycerides with renal function (eGFR). In our study it reveals that TG and WC have significant association with eGFR. The rise of TG and increased WC are associated with decreased eGFR. However, in this study, no significant association is found between HDL and eGFR. In previous studies there is inconsistent association of WC & HDL with eGFR. Thus, this study warrants further studies in a large-scale regarding relation of HDL and WC with eGFR. We also recommend to screen and manage triglyceride and central obesity in CKD patients to decrease the progression of the disease and, hence, mortality in CKD patients.

Conflict of Interest: None to Disclose

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