Original Article

Assessment of increased risk of incident kidney stone formation in dyslipidemia

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Abstract

Background: Nephrolithiasis is a worldwide disease that affects almost all ethnicities and populations. The present study was conducted to assessed increased risk of incident kidney stone formation in dyslipidemia.

Materials & Methods: 82 cases of nephrolithiasis and 50 healthy controls of both genders were enrolled. Parameters such as height, weight, and blood pressure and BMI was recorded. About 5 mL fasting venous blood sample was drawn for measurement of total cholesterol (TC), triglycerides (TG), high-density lipoprotein cholesterol (HDL-C), and low-density lipoprotein cholesterol (LDL-C).

Results: Group I had 48 males and 34 females and group II had 27 males and 23 females. The mean TC level (mg/dl) in group I was 171.3 and in group II was 184.2, TG was 132.5 and 115.6, HDL- C was 43.1 and 54.9 and LDL- C was 94.1 and 102.8 in group I and II respectively. Hypercholesterolemia was common in group II (29%) than group I (22%), hypertriglyceridemia was common in group I (30%) than group II (23%), low HDL-cholesterolemiamia was common in group I (54%) than group II (14%) and high LDL-cholesterolemia was more common in group II (16%) than group I (8%).

Conclusion: Dyslipidemia was associated with an increased risk of stone disease.

Keywords: Nephrolithiasis, lipoprotein cholesterol, Lipidaemia

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INTRODUCTION

Nephrolithiasis is a worldwide disease that affects almost all ethnicities and populations. The prevalence of kidney stones has increased in recent years and range from 4 to 20% in developed countries. There are several types of kidney stones, such as calcium oxalate (CaOx), which includes calcium oxalatemonohydrate and calcium oxalate dehydrate, calcium phosphate (CaP), uric acid, and struvite stones.1

Dyslipidemia (DLD) has also begun to receive attention and may have an association with stone disease.2 Dyslipidemia is a well-established risk factor for cardiovascular diseases, including cerebrovascular accident and coronary heart disease. A study regarding the association between dyslipidemia and KSD reported a higher prevalence of dyslipidemia in patients with stone formation compared to those without stones.3 Among the medical conditions, metabolic syndrome has been associated with an increased risk of nephrolithiasis. Moreover, each component of metabolic syndrome including elevated body mass index (BMI), dyslipidemia, diabetes and hypertension has also been associated with an increased risk of KSD.4 The complications of KSD include urinary obstruction, hydronephrosis, and pyelonephritis, which can lead to urosepsis, the leading cause of KSD-related mortality. KSD is also associated with many comorbidities and increased risks of metabolic bone disease, chronic kidney disease, and cardiovascular events.5 Hence, determining the risk factors for KSD is vital so that clinicians can optimally manage patients and prevent these complications.6,7 The present study was conducted to assessed increased risk of incident kidney stone formation in dyslipidemia.

Materials & Methods

The present study comprised of 82 cases of nephrolithiasis and 50 healthy controls of both genders. All agreed to participate in the study.

Data such as name, age, gender etc. was recorded. Parameters such as height, weight, and blood pressure and BMI was recorded. About 5 mL fasting venous blood sample was drawn for measurement of total cholesterol (TC), triglycerides (TG), high-density lipoprotein cholesterol (HDL-C), and low-density lipoprotein cholesterol (LDL-C). Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

Results

Table I: Distribution of patients

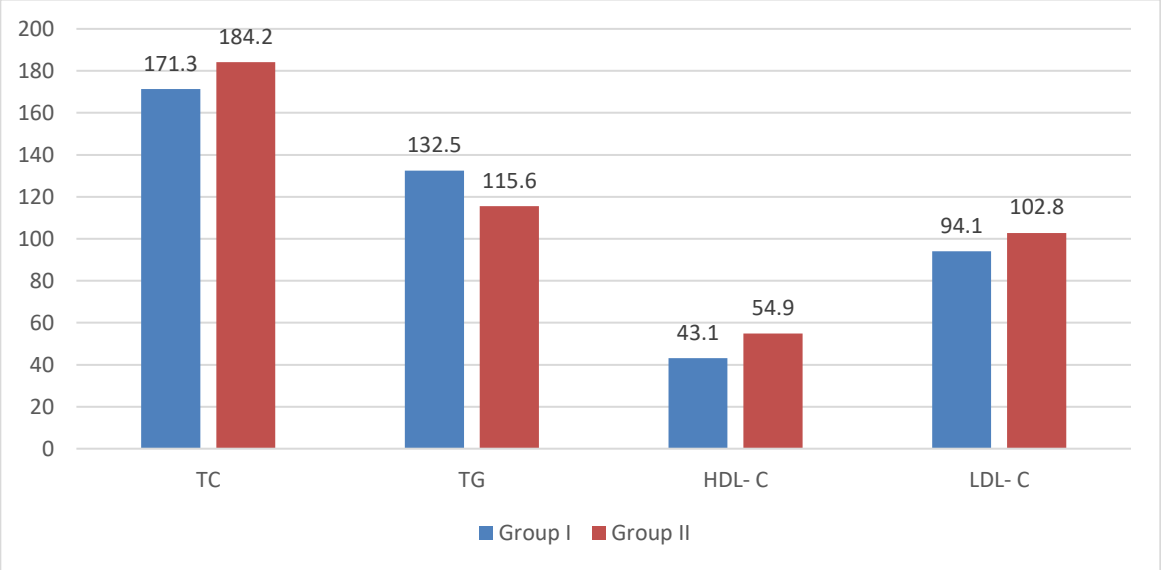
Groups	Group I	Group II
Status	Cases	Control
M:F	48:34	27:23

Table I shows that group I had 48 males and 34 females and group II had 27 males and 23 females.

Table II Lipid levels in both groups

Parameters (mg/dl)	Group I	Group II	P value
TC	171.3	184.2	0.05
TG	132.5	115.6	0.01
HDL- C	43.1	54.9	0.02
LDL- C	94.1	102.8	0.04

Table II, graph I shows that mean TC level (mg/dl) in group I was 171.3 and in group II was 184.2, TG was 132.5 and 115.6, HDL- C was 43.1 and 54.9 and LDL- C was 94.1 and 102.8 in group I and II respectively. The difference was significant (P< 0.05).



Graph I: Lipid levels in both groups

Table III: Dyslipidemia and their associations with nephrolithiasis risk

Parameters (mg/dl)	Group I	Group II	P value	Adjusted OR
Hypercholesterolemia	22%	29%	0.05	0.61
Hypertriglyceridemia	30%	23%	0.03	1.32
Low HDL-cholesterolemiamia	54%	14%	0.01	7.42
High LDL-cholesterolemia	8%	16%	0.04	0.62

Table III shows that hypercholesterolemia was common in group II (29%) than group I (22%), hypertriglyceridemia was common in group I (30%) than group II (23%), low HDL-cholesterolemiamia was common in group I (54%) than group II (14%) and high LDL-cholesterolemia was more common in group II (16%) than group I (8%).

Discussion

The components of Metabolic syndrome (MetS), which including insulin resistance, obesity, dyslipidemia, and hypertension have been found to be associated with an increased prevalence of nephrolithiasis in epidemiological studies and several researches have indicated that MetS contribute to the origin of kidney stones.8,9 Studies have revealed that elevated body mass index (BMI), dyslipidemia, diabetes, coronary artery diseases and hypertension was directly related to an increased risk of nephrolithiasis.10,11 The present study was conducted to assessed increased risk of incident kidney stone formation in dyslipidemia.

We found that group I had 48 males and 34 females and group II had 27 males and 23 females. Masterson et al12 investigated a possible association of DLD with nephrolithiasis. The average age was 31.0 ± 15.2 years. On univariate analysis, DLD was associated with nephrolithiasis with a hazard ratio (HR) of 2.2 and on multivariate analysis HR = 1.2 (1.0–1.5; p = 0.033). Low-density lipoprotein and triglycerides had no association with stone disease. Patients with high-density lipoprotein (HDL) values.

We observed that mean TC level (mg/dl) in group I was 171.3 and in group II was 184.2, TG was 132.5 and 115.6, HDL- C was 43.1 and 54.9 and LDL- C was 94.1 and 102.8 in group I and II respectively. Hung et al13 investigated the association between lipid profile with baseline and incident KSD. A total of 27,002 people enrolled were followed for a median of 4 years and classified into two groups according to whether they had (n = 1813; 6.7%) or did not have (n = 25,189; 93.3%) KSD at baseline. Patients were classified into two groups consisting of those who had (n = 640; 2.5%) or did not have (n = 24,549; 97.5%) incident KSD. After multivariable analysis, compared to quartile 1 of lipid profile, the participants in quartile 4 of triglycerides, quartiles 3 and 4 of high-density lipoprotein cholesterol (HDL-C), and quartile 4 of total cholesterol (Chol)/HDL-C ratio were significantly associated with baseline KSD. In the follow-up study, the participants in quartiles 2, 3, and 4 of triglycerides; quartile 2 of Chol; quartile 4 of HDL-C; quartile 3 of LDL-C; and quartiles 3 and 4 of Chol/HDL-C ratio were significantly associated with incident KSD. Results showed that hypertriglyceridemia (67–93 mg/dL) was associated with a 1.463-fold increased risk of incident KSD and that low HDL-C (>63 mg/dL) protected against incident KSD formation. In addition, a Chol/HDL-C ratio larger than 3.64 was associated with a 1.381-fold increased risk of incident KSD. Our findings may imply that the optimal management of dyslipidemia may be associated with a lower risk of developing kidney stones.

We found that hypercholesterolemia was common in group II (29%) than group I (22%), hypertriglyceridemia was common in group I (30%) than group II (23%), low HDL-cholesterolemiamia was common in group I (54%) than group II (14%) and high LDL-cholesterolemia was more common in group II (16%) than group I (8%). Ding Q et al14 evaluated the association between dyslipidemia and nephrolithiasis risk in a Chinese population. Fasting plasma lipid profiles were measured in a case-control study of 540 nephrolithiasis cases and 656 kidney stone-free controls. Triglycerides (TG) levels were significantly higher, but total cholesterol (TC), high-density lipoprotein cholesterol (HDL-C) and low-density lipoprotein cholesterol (LDL-C) levels were significantly lower in nephrolithiasis patients than those in the control group (each $p < 0.05$). Similar associations were found in both primary and recurrent nephrolithiasis patients except for TC levels. Significantly lower TC and LDL-C levels were found in all patients except those with uric acid stones. Patients with calcium oxalate (CaOx) and uric acid stones had significantly higher TG levels. Individuals with hypertriglyceridemia and low HDL-cholesterolemia were associated with increased risk of nephrolithiasis (OR 1.31, 95% CI 1.01–1.71 and OR 7.57, 95% CI 5.64–10.17, respectively). Conversely, those with hypercholesterolemia and high LDL-cholesterolemia were associated with decreased nephrolithiasis risk (OR 0.60, 95% CI 0.46–0.79 and OR 0.61, 95% CI 0.42–0.90, respectively). The risk remained in patients with CaOx stones.

The limitation the study is small sample size.

Conclusion

Authors found that dyslipidemia was associated with an increased risk of stone disease.

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