

Prevalence of Asymptomatic Renal Stones in Diabetic Population in Tertiary Care Hospital

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ABSTRACT

Introduction: Renal stone is one of the mostly found kidney disease. It is estimated that 1% to 15% of people are having a lifetime risk of having a kidney stone. It has been reported that highest prevalence is seen in northern Thailand, Turkey and Greece (16.9%, 14.8% and 15.2% respectively). As the disease mostly affects the productive age group i.e, 20-60 years of people, there is a great indirect economic burden of this disease in the form of loss of working days.

Methodology: Two groups were included in this study, one is diabetic & another one is non-diabetic. This study was conducted in the Department Of Medicine, C. U. Shah Medical College, Gujarat, India. The duration of study was over a period of one year.

Results: Higher prevalence of asymptomatic renal stones in diabetic population (8.90%) was seen as compare to non-diabetic group (2.30%).

Conclusion: The findings of this study revealed that higher prevalence of asymptomatic renal stone disease exists in

diabetic population. Though long term follow up of asymptomatic renal stone disease is not available yet we have given existing evidence that they are not innocuous.

Keyword: Renal Stones, Diabetic Population, Non- Diabetic Population.

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Article History:

Received: 09-06-2019, Revised: 05-07-2019, Accepted: 11-08-2019

Access this article online

Website: www.ijmrp.com	Quick Response code 
DOI: 10.21276/ijmrp.2019.5.5.003	

INTRODUCTION

Worldwide, renal stone is one of the mostly found kidney disease. It is estimated that 1% to 15% of people are having a lifetime risk of having a kidney stone. It has been reported that highest prevalence is seen in northern Thailand, Turkey and Greece (16.9%, 14.8% and 15.2% respectively).¹⁻⁴ As the disease mostly affects the productive age group i.e, 20-60 years of people, there is a great indirect economic burden of this disease in the form of loss of working days.⁵ One of the most dreaded complication of nephrolithiasis is the development of chronic kidney disease. In comparison to asymptomatic renal stone disease, the symptomatic stone disease is at a higher risk. Renal stones harm the parenchyma by obstruction, recurrent urinary tract infection, micro-calculi in the duct of belini as well as during extracorporeal shock wave lithotripsy (ESWL).⁶

There is lack of data about the follow up of asymptomatic kidney stone disease and their influences on renal functions. In one of their recent study Long He et al. observed that after surgical procedure, asymptomatic renal stone disease patients suffer a greater amount of glomerular filtration rate (GFR) loss in comparison to symptomatic renal stone disease. The effect in multivariate analysis is also positively influenced by existence of diabetes mellitus.⁷ Due to Type 2 diabetes mellitus, there are

more chances of developing nephropathy. Though, around 20% of patients will have microalbuminuria, significant amount of them will end-up in developing overt diabetic nephropathy (35%- 40%).⁸⁻¹⁰ The prevalence of renal stone disease is higher in type 2 diabetes mellitus as compared to the general population. Subsequently unobserved renal stone disease will lead to additional renal damage over and above conventional risk factors for diabetic nephropathy.

Therefore, the present study was planned to have a clear idea on the prevalence of asymptomatic renal stone disease in diabetic patients. This study hypothesis was that if we find out significantly more asymptomatic renal stone in type 2- diabetes, then routine screening for stone disease probably will be beneficial to the patients.

MATERIALS & METHODS

Study Population: Two groups were included in this study, one is diabetic & another one is non-diabetic.

Study Area: This study was conducted in the Department Of Medicine, C. U. Shah Medical College, Gujarat, India

Study Duration: The duration of study was over a period of one year.

Data Collection: Patients were divided into diabetic and non-diabetic groups as per present blood glucose reports or by the history of known diabetes. Diabetic Group was defined as those patients whose age group was more than 40 years and was either taking oral hypoglycemic agents or under insulin replacement. A minimum duration of five years was decided as the cut-off. Diabetic patients with known micro or macrovascular complications were excluded from the study. Patients with known symptoms of Nephrolithiasis or previously diagnosed or operated for urinary calculi, patients with Bladder outlet obstruction, or patients with known surgical or medical diseases of the kidneys and urogenital system were excluded. One hundred and twenty three patients were recruited in the Diabetic Group as compared to 129 patients in the Non-diabetic Control Group. Detailed History and clinical examination of the recruited patients from both the groups were documented along with the following laboratory parameters:

Serum Urea, Creatinine, FBS, PPBS, HbA1C, Complete Hemogram, Serum proteins, Calcium, Phosphorus and Uric Acid. Patients had also undergone ultrasound of whole abdomen for diagnosis and documentation of Nephrolithiasis.

Data Analysis: Data were analyzed by using Microsoft excel.

RESULTS

In our study, we were included two groups. One group is diabetic which contain 123 cases, out of 123, 82 were male & 41 were female. We were also non diabetic group, which contain 129 cases, out of 129, 84 were male & 45 were female. In our study, higher prevalence of age is 51-60 group followed by other age group in diabetic as well as in non-diabetic group. Different parameters were suggested in this study, which were showing in table 5. Higher prevalence of asymptomatic renal stones in diabetic population (8.90%) was seen as compare to non-diabetic group (2.30%).

Table 1: Distribution of Cases According to Group

Group	No. of Cases	Percentage
Diabetic	123	48.8
Non-Diabetic	129	51.2
Total	252	100

Table 2: Distribution of Cases According To Gender

Gender	Diabetic Group	Non-Diabetic Group
Male	82	84
Female	41	45
Total	123	129

Table 3: Distribution of Cases According to Age

Age	Diabetic Group	Non-Diabetic Group
41-50	16	17
51-60	83	91
>60	24	21
Total	123	129

Table 4: Distribution of Cases According To History

History	Diabetic Group	Non-Diabetic Group
Smoker	37	28
Non-Smoker	86	101
Total	123	129

Table 5: Distribution of Cases According To Parameters

Parameters	Diabetic Group	Non-Diabetic Group	P Value
BMI (in Kg/M2)	26.1±2.3	25.8±2.1	P=0.28
Mean Hb Level	12.3±1.2	12.5±1.3	P=0.2
Urea (mg/dl)	44±12	46±17	P=0.05
Creatinine (mg/dl)	1.2±0.9	1.3±0.8	P=0.06
Calcium (meq/L)	5.2±1.	4.4.9±1.5	P=0.1
Phosphorus (meq/L)	2.1±1.2	1.9±1.3	P=0.2
Uric Acid (mg/dl)	3.6±1.2	3.4±1.3	P=0.2
FBS (mg/dl)	166±3.2	96±3.6	p<0.00
PPBS (mg/dl)	220±3.6	134±13.1	P<0.00
HbA1C (%)	7.8±0.6	5±0.4	P<0.00

Table 6: Distribution of Cases According To Prevalence

Prevalence	Diabetic Group	Non-Diabetic Group
Stone	8.90%	2.30%
No Stone	91.10%	97.70%

DISCUSSION

Type 2 diabetes is a well-known factor for renal stone disease. Insulin resistance is the underlying patho-mechanism. Through various methods, insulin resistance predisposes diabetic population to stone formation. Most importantly, insulin resistance produces decrease in ammonia production in proximal tubule. The reason could be due to suppression of glutamine production and increased delivery of free fatty acids in the tubular cells. Low level of pH in urinary also leads to hypocitraturia which in turn leads to more calcium stone formation. In vivo several studies reported that high plasma insulin levels in type 2 diabetes mellitus due to insulin resistance, leads to hypercalciuria.¹¹ It is already established that type 2 DM is a risk factor for renal stone disease. This study found that in general (nondiabetic) population, the prevalence of asymptomatic renal stone disease was 2.3%. Similar findings were found in United states (2.9% to 4%).¹² and even to a high prevalence “stone-belt” country like Pakistan (3%).¹³ There is a lack of data about the prevalence of asymptomatic kidney stone disease in diabetic population. The aim of this present study was to study the prevalence of asymptomatic kidney stone disease in this special population. The first sight of disease prevalence came out to be 8.9% in this study. In a study Meydan N et al showed the prevalence of USD (Urinary Stone Disease) in diabetic population to be as high as 21%.¹⁴ Eric n. Taylor et al. observed that the baseline prevalence of renal stone disease was higher in diabetic population irrespective of BMI. ¹¹ Asymptomatic kidney stones are not entirely

innocuous. There is a lack of data regarding the history of asymptomatic kidney stone disease specially in diabetic population. Only Long He et al. shown that after detection by ultrasonography and then surgical intervention, GFR decline in patients with asymptomatic stone disease was more in comparison to their symptomatic counterpart (58.2% versus 31%, $p < 0.05$).⁷

The reason for accelerated GFR decline was probably due to the physical damage caused by long standing calyceal calculi. Burgher A et al in their study on asymptomatic renal stone disease found that 77% of patients experienced disease progression, with 26% requiring surgical intervention.¹⁵ Asymptomatic ureteral stones are more dangerous. Marchini et al. showed that even asymptomatic ureteral stones are related with less than normal GFR and even after surgical intervention and correction of hydronephrosis the GFR failed to improve to a normal value indicating chronic parenchymal damage.¹⁶

Kidney stones not only increases the risk of CKD¹⁷, it also increases the risk for urinary tract infections. Even after treatment, diabetes mellitus and renal stones, both are significantly related with poor outcome in acute pyelonephritis, even after treatment.¹⁸ Urinary tract infections are related with diabetes and renal stone disease. It is usually associated with acute kidney injury or acute on chronic kidney disease with significant impact on mortality and morbidity.

CONCLUSION

The findings of this study revealed that higher prevalence of asymptomatic renal stone disease exists in diabetic population. Though long term follow up of asymptomatic renal stone disease is not available yet we have given existing evidence that they are not innocuous. The findings of this study suggested the routine use of ultrasound screening for diabetic patients for asymptomatic renal stone disease along with screening for nephropathy and retinopathy. It may lead to early prevention of chronic renal damage and probably reduce the incidences of acute pyelonephritis related kidney injury in diabetic patients.

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Source of Support: Nil. **Conflict of Interest:** None Declared.

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Cite this article as: Dilip M. Pancholi, Shyam N Shah, Ketul Joshi. Prevalence of Asymptomatic Renal Stones in Diabetic Population in Tertiary Care Hospital. *Int J Med Res Prof.* 2019 Sept; 5(5):17-19. DOI:10.21276/ijmrp.2019.5.5.003