

## Original Research Article

# Prevalence of asymptomatic nephrolithiasis amongst prospective living kidney donors

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## ABSTRACT

**Background:** About 12% of men and 5% of women will develop symptomatic nephrolithiasis during their lifetime. Symptomatic nephrolithiasis is linked to many systemic conditions such as metabolic syndrome, chronic kidney disease and hyperparathyroidism. Not much is known about the prevalence of nephrolithiasis in asymptomatic patients as well as their association with systemic conditions seen in the symptomatic subset.

**Methods:** This is a retrospective study of all prospective living kidney donors who presented to Zenith Medical and Kidney Centre, Abuja, Nigeria between January 2022 and December 2022. Relevant information was retrieved from the institution's computer database, entered in a structured proforma and analyzed with SPSS version 25.0. Results were reported in percentages, mean±standard deviation.

**Results:** A total of 133 patients were recruited for the study, the age range was 18-52 years with mean age of 27.47 years and standard deviation of 6.8. The male to female ratio was 15.6:1. The body mass was greater than 30 kg/m<sup>2</sup> in 4.8% of patients. Hypertension was found in 5.3% while urinary tract infection was found in 24.1% of the patients. Nephrolithiasis was seen in 5.3% of the patients, with size ranging from 2.14mm to 9.4mm, the stone was bilateral in 0.8% of the patients.

**Conclusions:** The prevalence of asymptomatic nephrolithiasis amongst prospective kidney donors is 5.3%. Asymptomatic kidney stone formers have different demographic characteristics and lack the co-morbidities described in symptomatic kidney stone formers.

**Keywords:** Nephrolithiasis, Asymptomatic, Donors, Kidney

## INTRODUCTION

Up to 12% of men and 5% of women will develop symptomatic kidney stone during their lifetime.<sup>1</sup> Symptomatic stones are more prevalent in men, white individuals and older adults, and have been linked to many systemic conditions including hyperparathyroidism, diabetes mellitus, obesity, metabolic syndrome, hypertension, gastric bypass, and chronic kidney disease.<sup>1-19</sup> Symptomatic stones have been associated

with polycystic kidneys, upper urinary tract dilatation, medullary sponge kidney, and about 25% of them had at least one anatomical abnormality of the renal arteries or kidneys on computerized tomography scan.<sup>20-24</sup> Reports have linked low serum phosphorus levels and symptomatic kidney stone formers.<sup>25</sup>

Low serum phosphorus levels may be a manifestation of occult hyperparathyroidism.<sup>26</sup>

Not so much is known about asymptomatic kidney stones as well as their association with common risk factors seen amongst the symptomatic kidney stone formers.

### Objectives

Objectives of the study were to determine the prevalence of asymptomatic nephrolithiasis amongst prospective living kidney donors; to determine if the risk factors associated with symptomatic nephrolithiasis are the same as in asymptomatic nephrolithiasis patients.

### METHODS

This is a retrospective study of all prospective living kidney donors who presented to Zenith Medical and Kidney Centre, Abuja, Nigeria between January 2022 and December 2022. All the patients who presented as prospective living kidney donors during the study period were recruited into the study. All the patients involved in the study did computed tomography (CT) angiograms to access the prevalence of asymptomatic renal stones as well as renal anatomy prior to kidney donation for transplant. Other relevant biochemical investigations relevant to this study were also requested and done by the patients involved in the study.

All the patients involved in the study gave their approval to be part of the study. Ethical approval and sample size calculation were not applicable as the study was a retrospective study.

Patients who did not consent to the study and who did not do the requested investigations were excluded from the study.

Relevant information was retrieved from the institution's computer database, entered in a structured proforma and analyzed with SPSS version 20.0. Results were reported in percentages, mean±standard deviation.

### RESULTS

A total of 133 patients were recruited for the study, the age range was 18-52 years with mean age of 27.47 years and standard deviation of 6.8. The male to female ratio was 15.6:1. The body mass index (BMI) was greater than 30 kg/m<sup>2</sup> in 4.8% of the patients (Table 1).

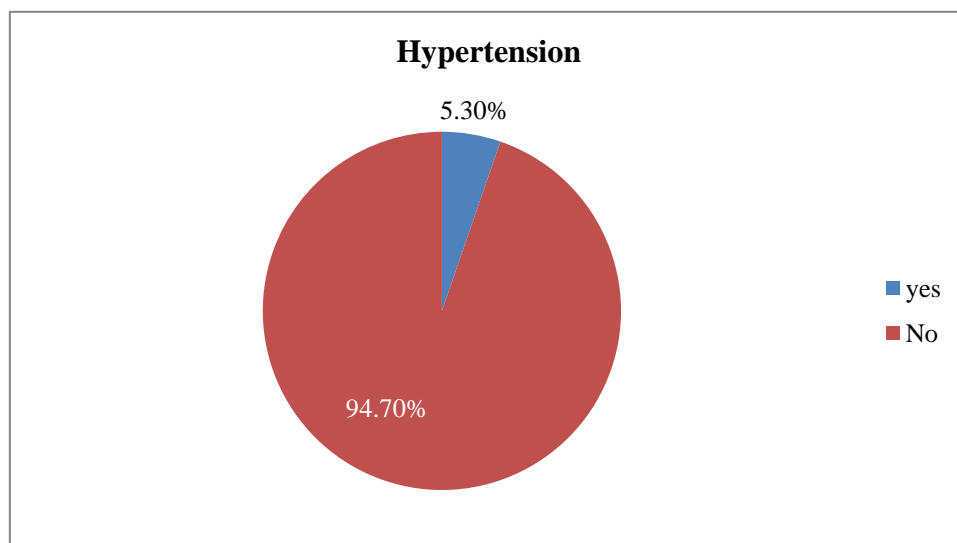
Hypertension was found in 5.3% (Figure 1) while urinary tract infection was found in 24.1% (Figure 2) of the patients. The total protein was greater than 8.3 g/dl in 22.5% of patients while albumin was greater than 5.5 g/dl in 1.7% of the patients (Table 2).

**Table 1: Demographic characteristics of patients involved in the study.**

Total number of patients	Age range	Mean age	Standard deviation	Number of males	Number of females	Percentage of patients with BMI > 30 kg/m <sup>2</sup>
133	18-52	27.47	6.8	125	8	4.8

**Table 2: Total protein and albumin frequencies amongst patients involved in the study.**

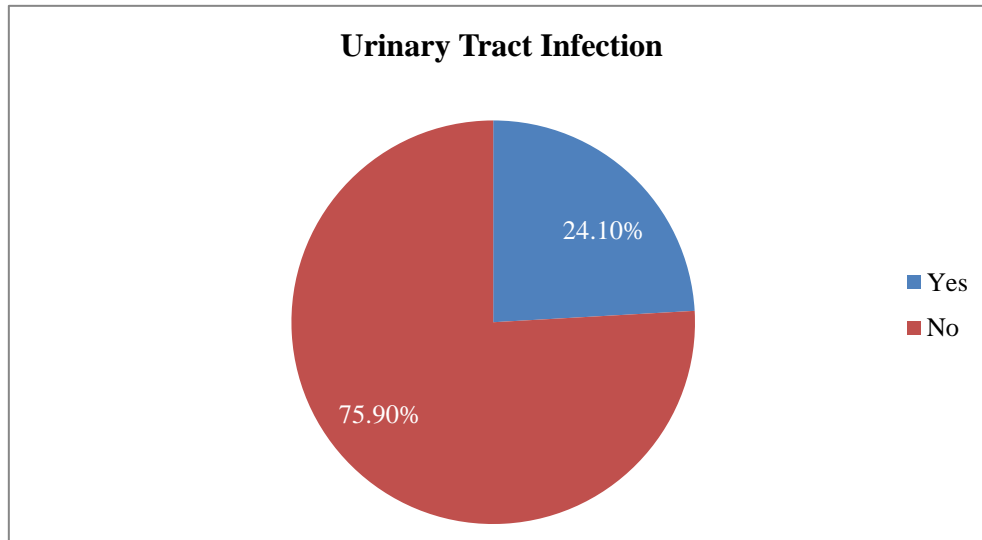
Parameter	Number of patients	Percentage (%)
Total protein greater than 8.3 g/dl	27	22.5
Total albumin greater than 5.5 g/dl	2	1.7



**Figure 1: Prevalence of hypertension amongst the patients involved in the study.**

**Table 3: Total cholesterol, serum magnesium, serum calcium, serum phosphate and serum uric acid frequencies amongst patients involved in the study.**

Parameter	Number of patients	Percentage (%)
Total cholesterol greater than 200 mg/dl	6	6.7
Serum magnesium greater than 1.1 mg/dl	1	1.4
Serum calcium greater than 2.7 mmol/l	5	4.1
Serum phosphate greater than 1.5 mmol/l	1	1.4
Serum uric acid greater than 8.5 mg/dl	1	0.9

**Figure 2: Prevalence of urinary tract infection amongst patients involved in the study.**

The total cholesterol was greater than 200 mg/dl in 6.7% of the patients, serum magnesium greater than 1.1 mmol/l in 1.4% of patients, serum calcium greater than 2.7 mmol/l in 4.1%, serum phosphate greater than 1.5 mmol/l in 1.4% while serum uric acid was greater than 8.5mg/dl in 0.9% of the patients (Table 3).

Medullary sponge kidney, focal scarring, upper tract dilatation, parenchymal thinning or polycystic kidney disease were not seen in all the patients studied.

Nephrolithiasis was seen in 5.3% of the patients, with size ranging from 2.14 mm to 9.4 mm, the stone was bilateral in 0.8% of the patients.

## DISCUSSION

The mean age of the patients involved in the study was 27.47 years which was in contrast to similar studies done which revealed that nephrolithiasis was common in older adults.<sup>1,2</sup> Nephrolithiasis was commoner in males from this study which was in keeping with the findings from similar studies.<sup>1,2</sup> Obesity was rarely found in most of the patients studied which was in contrast with what was known about symptomatic nephrolithiasis where obesity was a common risk factor for nephrolithiasis.<sup>6,7</sup> Hypertension was rare as well in most of the patients studied which was in contrast with what was known about symptomatic nephrolithiasis.<sup>11-13</sup> Urinary tract

infection which is a risk factor for kidney stone formation was not commonly found amongst the patients studied. High total protein and albumin are risk factors for kidney stone formation and these were rarely seen amongst the patients studied. Elevated serum total cholesterol, magnesium, calcium, phosphate and uric acid levels are all known risk factors for kidney stone formation amongst patients with symptomatic nephrolithiasis and these were found elevated in few of the patients studied. Lorenz et al revealed that 25% of patients with symptomatic nephrolithiasis have anatomical abnormalities in the kidneys but no anatomical abnormalities were seen amongst the patients involved in the study.<sup>24</sup> The prevalence of asymptomatic nephrolithiasis from this study was 5.3% which was lower than the 10% reported by Lorenz et al who also reported association of asymptomatic stone formers with medullary sponge kidneys, focal renal scarring, renal parenchymal thinning and polycystic kidney disease which were not seen in all the patients involved in this study.<sup>27</sup>

## Limitations

The number of patients involved in the study and duration of the study were noted as limitations in this work. The fact that it is a single centre study was also noted as a limitation. Larger number of patients over a

longer period of time involving multiple centres will be needed in the future to validate the findings of this study.

## CONCLUSION

The prevalence of asymptomatic nephrolithiasis is 5.3%. Asymptomatic kidney stone formers have different demographic characteristics and lack the co-morbidities described in symptomatic kidney stone formers. Medullary sponge kidneys, focal renal scarring, renal parenchymal thinning and polycystic kidney disease were not seen amongst the patients with asymptomatic nephrolithiasis.

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