

# Chemical Classification of Renal Stones via FTIR: Implications for Laboratory Practice and Patient Management



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## INTRODUCTION

Renal stone disease is a significant contributor to obstructive uropathy and renal impairment in Sri Lanka. Determining the chemical composition of these stones is critical for developing focused treatment and prevention strategies.

## OBJECTIVE

To analyze the composition of surgically removed renal stones at a major Sri Lankan referral center using Fourier Transform Infrared (FTIR) spectroscopy and assess correlations with demographic and clinical parameters.

## METHOD

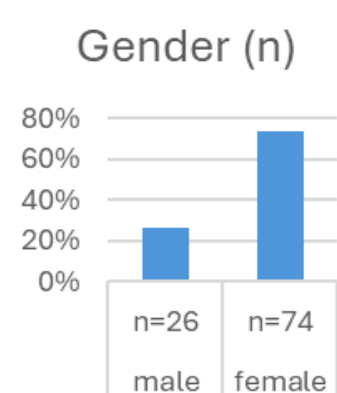
- Design: Institutional-based prospective cross-sectional study.
- Period: 2016 – 2018.
- Sample: 61 surgically removed stones.
- Analysis: Fourier Transform Infrared (FTIR) Spectroscopy.
- Data: Demographic and clinical parameters were recorded for all patients

## DISCUSSION AND CONCLUSION

### The Diagnostic Journey

#### PATIENT DEMOGRAPHICS

gender	mean age
female	47.5
male	49.55

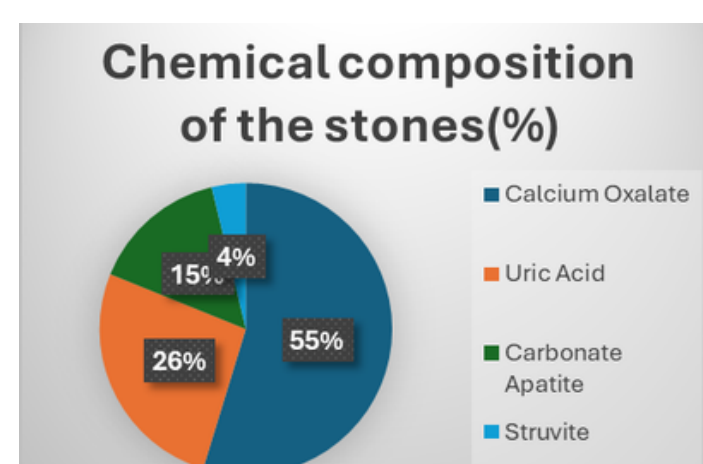


Stone Localization by Gender:

- Males: Ureteric (38.1%) > Renal > Bladder.
- Females: Ureteric (69.2%) > Renal > Bladder.

**Statistical Note:** No significant correlation was found between gender and stone site ( $p > 0.05$ )

#### CHEMICAL COMPOSITION



staghorn calculi 66.7%(n=2) was primarily calcium oxalate, while non-staghorn stones were largely calcium oxalate (46.6%) and Uric Acid (24.1%)

#### CLINICAL CORRELATIONS

Staghorn vs. Non-Staghorn:

- Staghorn Calculi: 66.7% (n=2) were primarily Calcium Oxalate.
- Non-Staghorn: Largely Calcium Oxalate (46.6%) and Uric Acid (24.1%).

Age-Related Trends:

- 31–59 Years: Calcium Oxalate and Struvite were most common.
- >60 Years : Uric Acid was the most frequent stone composition.

- The findings of this **study align** with previous research conducted in the Northern part of Sri Lanka.
- The high prevalence of **Calcium Oxalate suggests a need for metabolic workups focusing on hypercalciuria and hyperoxaluria in the local population.**
- The shift toward **Uric Acid stones in the elderly (>60)** may reflect age-related metabolic changes or dietary habits.
- Improving the availability of **FTIR assessment is vital for low-resource settings** will allow urological surgeons to move beyond "**one-size-fits-all**" treatments toward **patient-focused management and recurrence prevention based** on precise chemical composition.

#### KEYWORDS

Infrared Spectroscopy • Staghorn calculi • Chemical composition

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