

# Correlation between Ketamine dosage and time of use with LUTS, anatomical bladder capacity and upper urinary tract involvement

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## Introduction

- Increasingly popular over the last two decades.
- Toxic metabolites are excreted via the urinary system<sup>2</sup>The bladder is the most commonly affected organ but the ureters and kidneys can be secondarily affected<sup>1</sup>
- It is unclear if the severity of LUTS is related to the dose of ketamine or the duration of use<sup>1</sup>
- Equally unclear is the relation of dose/ duration to bladder capacity reduction and upper tract involvement

## Aim

To identify the theoretical correlation between the amount of ketamine consumed (grams per week) LUTS, bladder capacity reduction and upper tract involvement

## Materials and Methods

- Prospective cohort
- Questionnaires ICIQ LUTS
- Blood tests
- CT Urogram
- Patients without complete investigations were excluded
- Sub analysis anatomical bladder capacity measurement
- R software, version 4.3.0, was used for statistical analysis.
- Normality of the numerical variables was evaluated through the Shapiro-Wilk test and the Fisher's exact and Mann Whitney u tests were used to evaluate statistically significant differences, with a significance level of 5%.

## Results

- 54 patients were included (57.4% male/ 42.6% female)
- Median age 32
- 22.2% Abnormal kidney function (egfr <90)
- High dose group: >30g/ week and low dose group: <30g/week
- Lower use group (<30g/week) were found to have more ureteric involvement- based on this we were unable to find a correlation between amount of ketamine used and either upper tract involvement or deranged renal function

- Significant association between urinary frequency and higher use (p=0.03)
- The group with longer consumption (>30g/week) associated to nocturia (p=0.02) and pelvic pain (p=0.02) (Table 2)
- Anatomical bladder capacity was lower in patients with higher consumption (p=0.20)
- A longer duration of consumption was also associated with smaller bladder capacities (p=0.30)
- Incidentally we found that patients who consumed ketamine for long periods of time used significantly higher doses (Table 2) Suggesting that the effect of ketamine decreases over time and people have to increase the amount to experience the same effects.

	Low use (<30g/week)	High use (>30g/week)	P value
eGFR<90 eGFR>90	30 9	8 3	0.99
Nocturia: No Yes Severe	8 10 21	0 2 9	0.20
Urgency: No Yes	2 37	1 10	0.50
Urgency incontinence: No Yes	21 18	5 6	0.70
Pelvic pain: no yes	5 34	1 10	0.99
Hydronephrosis: no Unilateral Bilateral	21 2 6	7 0 4	0.70
Ureteric involvement: No Unilateral Bilateral	28 4 7	7 0 4	0.50
Frequency: No yes severe	2 15 22	1 0 10	0.03
Duration of use: <1 year 1-2 years 2-5 years >5 years	9 6 4 10	0 0 0 11	0.04
Bladder capacity (ml) Mean (SD) Median (min,max) No data	234 (197) 200 (45, 800) 21 (53.8%)	141 (93.4) 175 (45, 250) 2 (18.2%)	0.20

Table 1: Dose

	1-5 years (n=19)	>5 years (n=31)	P value
Dose group: >30g/week <30g/week	0 (0%) 19 (100%)	11 (35.5%) 20 (64.5%)	0.003*
Nocturia: 0 1 2	6 (31.6%) 7 (36.8%) 2 (10.5%)	2 (6.3%) 6 (19.4%) 23 (74.2%)	0.02*
Urgency: 0 1	2 (10.5%) 17 (89.5%)	1 (3.2%) 30 (96.8%)	0.50*
Urgency incontinence: 0 1	10 (52.6%) 9 (47.4%)	16 (51.6%) 15 (48.4%)	0.99
Pelvic pain: 0 1	5 (26.3%) 14 (73.7%)	1 (3.2%) 30 (96.8%)	0.02*
eGFR: <90 >90	4 (21.1%) 15 (78.9%)	8 (25.8%) 23 (74.2%)	0.99
Hydronephrosis: 0 1 2	15 (78.9%) 1 (5.3%) 3 (15.8%)	23 (74.2%) 1 (3.2%) 7 (22.6%)	0.90*
Ureteric involvement: 0 1 2	14 (73.7%) 2 (10.5%) 3 (15.8%)	21 (67.7%) 2 (6.5%) 8 (25.8%)	0.60*
Bladder capacity (ml) mean (SD) Median (min,max) missing	271 (247) 200 (45, 800) 10 (52.6%)	189 (117) 188 (40, 400) 13 (41.9%)	0.30**

Table 2: Time of use. Chi square test \*Fisher exact test \*\*Mann-Whitney U test

## Conclusion

- Ketamine induced LUTS, especially frequency, nocturia and pelvic pain are correlated with the amount and time of ketamine use.
- We could not demonstrate a correlation between either dose or time with upper tract involvement or impaired kidney function.
- Patients with higher or longer consumption have a tendency for smaller bladder capacities without reaching statistical significance in our study

- Chan EOT et al (2022) Systematic review and meta-analysis of ketamine associated uropathy. Hong Kong Medical Journal. 28(6) 466-474
- Yee CH et al (2017) The risk of upper urinary tract involvement in patients with ketamine associated uropathy. International neurourology Journal. Volume 21(2) 128-132