

# **Caffeine and Addictive Substances in relation to Kidney Stones**

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As part of my research, I consulted with Dr. Maham Zehra, a **Bachelor of Medicine, Bachelor of Surgery (MBBS)** with 1 year of experience. She also taught medical students and worked in the **Intensive care unit (ICU)**. residing in **Liaquat National Hospital, Karachi, Pakistan**, Dr. Maham Zehra provided valuable insights by answering certain inquiries on the connection between caffeine and addictive substances in relation to kidney stone formation.

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## **1. Are there any studies or cases where substance use led to kidney problems?**

Basically, when a drug substance (such as nicotine, alcohol, or marijuana) is ingested, it is absorbed through the mouth, stomach, and intestine, just like food, and is excreted via the kidneys. Any substance passing through this route can alter the blood flow to the kidneys, affecting their ability to filter waste.

As evidence, there are a few case reports and research articles mentioning Substance-Induced Kidney Diseases, particularly with prolonged or excessive use of substances.

**This is a news article and the link to the study is at the end of the article:**

<https://newsroom.uvahealth.com/2022/01/11/blood-pressure-drugs-may-cause-kidney-damage-study-suggests/>

**Case study:**

<https://ccforum.biomedcentral.com/articles/10.1186/s13054-023-04720-2>

## **2. Does caffeine or substances weaken kidney function over time, making the kidneys more susceptible to forming stones?**

### **Caffeine**

Caffeine consumption cannot always harm the kidney if taken in moderation. It also depends on a person's metabolism. Some studies show that caffeine intake helps prevent Acute Kidney Injury (AKI) while others say that it can cause kidney stones.

A researcher Chirag Parikh from John Hopkins University said, "Caffeine has been postulated to inhibit the production of molecules that cause chemical imbalances and the use of too much oxygen in the kidneys," he explains. "Perhaps caffeine helps the kidneys maintain a more stable system."

#### **Source:**

<https://www.hopkinsmedicine.org/news/newsroom/news-releases/2022/06/coffee-consumption-linked-to-reduced-risk-of-acute-kidney-injury-study-finds>

**The highlighted part from this source might also help you understand:**

<https://www.utoronto.ca/news/link-between-coffee-and-kidney-disease-may-depend-genetic-variant-study-finds#:~:text=%E2%80%9CWe%20think%20fast%20metabolizers%20can,per%20day%20for%20healthy%20adults.>

On the other hand, it is important to know that kidney stones are mainly formed by Calcium Oxalate. And Coffee is a main source of Calcium Oxalate which can contribute to kidney stones. People with kidney stones should consider coffee to be a possible risk factor.

### **Addictive Substances**

Similarly, there are mixed results regarding consumption of substances affecting kidney damage. Some might not affect an individual while others can cause kidney damage within a single dose.

## **3. How may a professional diagnose kidney stones in patients, and can caffeine or substance abuse complicate the diagnosis or treatment?**

A patient with kidney stones might present with back, flank or groin pain, vomiting, fever and urinary complaints. A doctor asks about these symptoms along with history and proceeds with relevant tests like X-ray, Ultrasound or a CT scan in order to locate the stone in the urinary tract.

Because coffee has diuretic properties (meaning it may cause you to pee more often), people often assume that drinking coffee may be dehydrating, thus increasing your risk for kidney stones. However, recent research on kidney stones shows that the use of caffeine may actually prevent kidney stones.

According to a 2021 study through the National Kidney Foundation, caffeine, whether in tea, soda, coffee, or alcohol, is protective and may decrease the risk of kidney stones.

### **Complications in Diagnosis:**

**Caffeine:** Caffeine-induced dehydration could alter urine concentration, which might make it more difficult for doctors to assess hydration status accurately.

**Substances:** Certain drugs like diuretics can increase calcium in the urine, while others can affect uric acid or oxalate levels, making it harder to pinpoint the stone's exact cause.

### **Complications in Treatment:**

**Caffeine:** People with kidney stones are often advised to increase their fluid intake to help pass the stones and prevent new ones from forming. If someone consumes a lot of caffeine, it may undermine this advice.

**Substances:** Certain substances, like nicotine, may worsen oxidative stress, while others (e.g., alcohol) may influence calcium or uric acid levels, complicating treatment aimed at preventing future stones.

**4. What advice would you give to young people (like teens) about reducing the risks of kidney stones, especially if they drink caffeine or experiment with substances?**

I was a teenager preparing for MCAT when I had a kidney stone. I was so stressed and focused on studies that I did not take care of my health. I skipped meals, stayed up all night on caffeine and drank less fluids which ended up causing severe backache and a 0.5cm kidney stone. I remember that I had to be on painkillers and the scan showed swelling in my urinary tract. The doctor advised me to drink at least 4 liters of water a day. Luckily, the stone excreted itself and I did not need any treatment. That's when I learned the importance of staying hydrated as it dilutes the effect of caffeine and substances.

# **Interview With a Kidney Stone Patient**

Akbar Rais

December 30 2024

As part of my research, I consulted with Akbar Rais, an individual who had been diagnosed with kidney stones in November 2022. Akbar Rais provided valuable insights by answering certain inquiries on his experiences with kidney stones.

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## Questions:

1. What symptoms did you experience, and how severe were they?
2. Did you regularly drink coffee, tea, soda, or energy drinks back then? If so, how much?
3. Did you regularly consume gateway drug supplements? If so, what kind and how much?
4. How did your doctor diagnose your kidney stones (e.g., imaging tests, urine tests)?
5. Urine test and ultrasound. Blood only visible with microscope
6. Did the doctor ever discuss whether caffeine or any substances might have contributed to your kidney stones?
7. What treatment did you receive (e.g., medications, surgery, or passing the stone naturally)?
8. Did the doctor give you specific advice to prevent future kidney stones?
9. What changes, if any, did you make to your diet or lifestyle after having kidney stones?
10. What advice would you give to someone who wants to avoid kidney stones?

## **Akbar Rais Said:**

“ While I have never consumed any addictive substances, I was addicted to sugary sodas, tea, ice caps and other delights rich in oxalates. When my doctor informed me that my stone composition (calcium oxalate) had been formed by these drinks, I vowed to limit this consumption as much as possible. Now, 3 years later, I have opted for more natural alternatives like fresh juices. I also make sure I am always hydrated by keeping a water bottle by my side at all times. Lastly, I have limited sweets for special occasions only.”

“My healthcare provider diagnosed both of my kidney stones by urine tests and an ultrasound. The urine tests revealed that I had microscopic hematuria and the ultrasound led doctors to conclude my case as it showed where my kidney stones resided.”

“My healthcare provider removed both of my kidney stones using Ureteroscopy with basket extraction. I felt absolutely no pain or had any chronic or acute symptoms or complications during or after the procedure. My doctor also provided me with antibiotics, helping me get back to my usual lifestyle instantly.”

“Both of my kidney stones remained lodged in my ureters for about 2 weeks causing me excruciating pain. I felt sharp, colicky pain in the left side of my bladder causing me to shiver in agony when an ambulance had driven me to the hospital. By far, the most painful experience of my life.”



“ I was completely unaware of my amount of caffeine intake until this experience had struck me. I highly recommended everybody, especially teens to set limitations to your intake of sugar and to always stay hydrated. This was by far one of the toughest experiences of my life and I would hate for anyone to go through anything like it. Always remember that there are countless safer options that can satisfy your needs just as much as sugar/caffeine do. As for substances, while I have not consumed any myself, it is important to know that it can cause serious damage to vital organs in your body potentially costing you your life. “