

## Awareness and Impact of Commonly Used Medications on Kidney Health: A Survey on the Risks of Over-dosage and Preventive Measures

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### ABSTRACT:

Kidney disorders can be caused by certain drugs, primarily due to their inability to break down in the liver or pass harmlessly through the digestive tract. Instead, these drugs accumulate and damage the kidneys due to their increased toxicity from overdosage. Some classes of such drugs include antibiotics, antivirals, diuretics, NSAIDs (non-steroidal anti-inflammatory drugs), PPIs (proton pump inhibitors), laxatives, analgesics, ACE inhibitors (angiotensin-converting enzyme inhibitors), and HIV medications. The objective of this study is to raise awareness about the risks of overdosing on commonly used drugs and their potential to cause various kidney diseases. A small survey was conducted to assess public awareness regarding the impact of these medications on kidney health and to educate participants about the dangers of drug overuse. It was found that 81.8% of respondents were aware that overdosage or long-term use of these medications could lead to kidney failure, while 18.2% were unaware of these risks. To prevent kidney failure and related diseases, lifestyle changes must be adopted, such as reducing salt intake, limiting dietary phosphorus and potassium, and avoiding foods that promote water retention and high blood pressure. By implementing these modifications, the risk of kidney failure and associated health issues can be mitigated.

### Key Words

Kidney disorder, acute renal impairment, NASIDS, ADRs, Overdosing

## Introduction

The kidneys, a vital component of the urinary system, play a crucial role in filtering blood and maintaining the body's overall health. However, these essential organs are susceptible to infection and damage, leading to various kidney disorders<sup>(1)</sup>. Acute kidney disease, a sudden and short-term condition, disrupts the glomerular filtration process, resulting in the retention of salts, wastes, and water<sup>(1, 2)</sup>. In contrast, chronic kidney disease is a long-term condition that, if left untreated, may lead to irreversible damage and even renal failure. Chronic kidney disease can be caused by a range of factors, including excessive renal injury and persistent long-term diseases such as hypertension and diabetes<sup>(2, 3)</sup>. Beyond diseases, certain medications can also contribute to kidney disorders. These drugs, which do not break down in the liver or pass through the digestive tract, can accumulate in the kidneys, leading to toxicity and damage due to overdosage<sup>(4)</sup>. Examples of such drugs include antibiotics, antivirals, diuretics, non-steroidal anti-inflammatory drugs (NSAIDs), proton pump inhibitors (PPIs), laxatives, analgesics, angiotensin-converting enzyme (ACE) inhibitors, and HIV medication<sup>(5)</sup>. The mechanisms by which these drugs harm the kidneys vary, but can include the formation of unbreakable crystals that obstruct urine flow, toxic effects on kidney cells, promotion of excessive water loss, hindrance of blood flow to the kidneys, and disruption of the kidneys' reabsorption function<sup>(5)</sup>. Understanding the impact of these drugs on kidney health is essential for preventing and managing kidney disorders.

## Methodology

This study employed a survey-based approach to investigate the awareness and understanding of the general population regarding the effects of commonly used medications on kidney health, as well as their experiences with medication use and potential addiction.

### Survey Design and Participants

A total of 1013 individuals participated in the survey, comprising both males and females, with a majority being females. The survey consisted of a series of questions designed to assess the participants' knowledge and perceptions about the impact of medications on kidney health, as well as their personal experiences with medication use.

## Questionnaire

The questionnaire was divided into several sections, each focusing on a specific aspect of medication use and kidney health. The sections included:

1. **Demographic Information:** Participants were asked to provide basic demographic information, such as age, gender, and occupation.
2. **Medication Use:** Participants were asked about their current and past use of various medications, including antibiotics, antivirals, diuretics, NSAIDs, PPIs, laxatives, analgesics, ACE inhibitors, and HIV medication. They were also asked about the duration of medication use and the frequency of dosage.

3. **Awareness of Medication Effects:** Participants were asked about their awareness of the potential effects of medications on kidney health, including the risks of over dosage and addiction.
4. **Symptoms and Diagnosis:** Participants were asked about their knowledge of the symptoms and diagnosis of kidney-related diseases that can be caused by medication over dosage.
5. **Treatment Options:** Participants were asked about their awareness of treatment options for kidney-related diseases caused by medication over dosage.
6. **Drug Addiction:** Participants were asked about their experiences with drug addiction, including the types of drugs they were addicted to and the duration of addiction.

## Data Analysis

The data collected from the survey was analyzed using descriptive statistics to identify trends and patterns in the responses. The results were presented in the form of frequencies, percentages, and graphs to facilitate easy interpretation.

## Limitations

This study had some limitations. The sample size, although relatively large, was limited to a specific geographic region and may not be representative of the general population. Additionally, the survey relied on self-reported data, which may be subject to biases and inaccuracies.

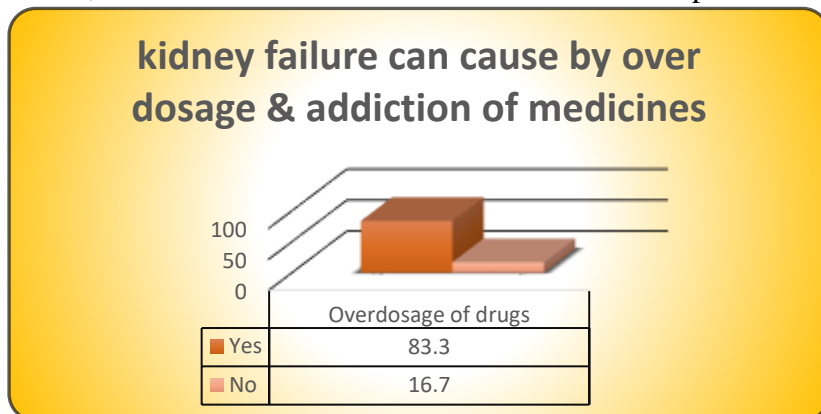
## Ethical Considerations

The study was conducted in accordance with ethical principles, and participants were informed about the purpose and scope of the study. Their consent was obtained before administering the survey, and their responses were kept confidential and anonymous.

## RESULT:

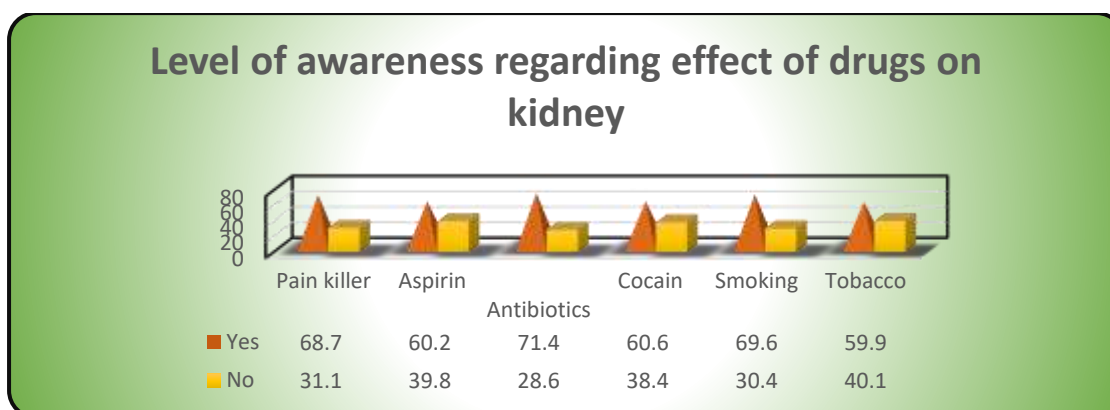
Through this survey, awareness about the severity of kidney diseases and the risks associated with drug addiction leading to kidney failure were raised. We informed participants about both acute and chronic kidney problems resulting from medication overdosage and the factors contributing to kidney diseases. As shown in Figure 1, a significant majority (81.8%) of respondents were aware that overdosage or long-term use of medications can lead to kidney

failure, while 18.2% were not aware of the impact of medicines on kidney health.



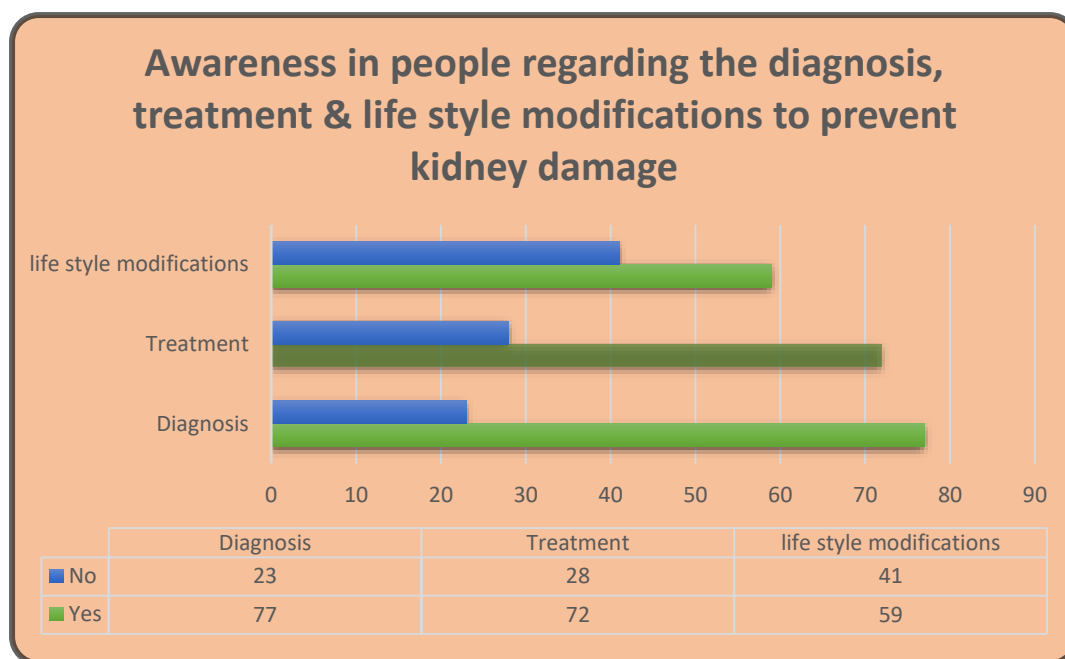
**Figure 1:** response of people about over dosage of medicine on kidney

Figure 2 illustrates the awareness levels among participants regarding the harmful effects of various drugs on kidney health. The survey revealed that most people are aware that all drugs can have some detrimental effects on the kidneys. This indicates a general understanding of the potential risks associated with medication use.



**Figure 2:** shows the awareness level in people about harmful effect of different drugs on kidney

Figure 3 highlights participants' awareness regarding kidney function diagnosis and treatment options. Most participants were aware of the diagnosis of kidney function, with only 23% lacking awareness. Regarding the treatment of acute kidney disease, 72.8% of participants were informed, while 27.2% were not aware. Additionally, 41% of participants were educated about various lifestyle modifications for kidney disease prevention, whereas 59% were already knowledgeable about these preventative measures.



**Figure 3:** shows awareness in people regarding the diagnosis, treatment and life style modifications to prevent kidney damage.

## DISCUSSION

The kidneys play a crucial role in the excretion of many drugs and their metabolites. Certain drugs, when taken for treatment purposes, are selectively absorbed by renal cells and then excreted in urine<sup>(6)</sup>. High concentrations of these drugs can cause renal medulla toxicity, affecting the renal papillae and tubular cells, potentially leading to nephrotoxicity and subsequent kidney dysfunctions, such as acute or chronic kidney disease or even kidney failure. These effects are dose-dependent; thus, prolonged use of any medication can impair renal function<sup>(7)</sup>.

Painkillers, including opioids, paracetamol, and NSAIDs, can have adverse effects in patients with kidney problems, often being contraindicated for these individuals<sup>(8)</sup>. Overdosing on painkillers can cause chronic kidney failure, affecting approximately 5% of cases annually. It is essential for individuals to avoid long-term use of such medications and consider alternatives, such as natural remedies, to prevent kidney damage<sup>(9)</sup>.

NSAIDs, including common painkillers like naproxen sodium, diclofenac, ibuprofen, and aspirin, inhibit the synthesis of the cyclooxygenase enzyme, reducing the production of prostaglandins, which mediate renal blood flow<sup>(10)</sup>. This inhibition leads to constriction of the

afferent arteriole, decreasing renal perfusion pressure and causing various kidney diseases like nephrotic syndrome, interstitial nephritis, acute tubular necrosis, and acute renal failure<sup>(11)</sup>. Long-term use of aspirin, particularly in doses exceeding 6-8 tablets a day, can significantly impair kidney function<sup>(12)</sup>.

Antibiotics can also affect the kidneys differently. Some can form crystals in the kidneys, leading to urine blockage, while others can cause cellular damage<sup>(13)</sup>. Antibiotic classes such as sulfas, cephalosporins, fluoroquinolones, nitrofurantoin/methenamine, and broad-spectrum penicillins are associated with an increased risk of kidney stones due to antibiotic-induced reductions in the microbiome<sup>(13)</sup>.

Substances like cocaine and heroin are potent drugs that can cause hypertension and rhabdomyolysis, leading to toxic tissue breakdown and kidney failure<sup>(14)</sup>. Alcohol consumption exacerbates these effects by causing dehydration, elevating blood pressure, and leading to cirrhosis, further impairing kidney function. Smoking introduces toxic chemicals that harm blood cells, constrict blood vessels, and increase the risk of atherosclerosis, ultimately affecting kidney function<sup>(15)</sup>.

Certain treatments are effective for short-term kidney diseases. Initially, the severity of kidney damage is assessed, and treatments are tailored accordingly, such as drug therapy, dialysis, or transplantation<sup>(16)</sup>. Acute kidney failure treatments aim to reduce infection, manage blood pressure, and prevent fluid retention. If these therapies are insufficient, dialysis (hemodialysis or peritoneal dialysis) is considered<sup>(17)</sup>.

Chronic kidney disease treatments focus on suppressing disease progression and symptoms. Treatments include managing blood pressure with ACE inhibitors and diuretics, reducing cholesterol levels, and addressing anemia and fluid retention. When medications are inadequate, dialysis or transplantation becomes necessary<sup>(18)</sup>.

Preventive measures for kidney diseases include lifestyle modifications, such as reducing salt intake, limiting dietary phosphorus and potassium, increasing water consumption, maintaining blood sugar levels, minimizing alcohol and tobacco use, and avoiding excessive drug use<sup>(19)</sup>. Regular exercise and fresh air also contribute to overall kidney health<sup>(20)</sup>.

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