

Intentional Analgesics Poisoning in Saudi Arabia from 2017–2021: A Retrospective Analysis of National Surveillance Data

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Abstract

Background: Intentional analgesics poisoning poses a significant public health challenge globally, including in Saudi Arabia. This study aims to provide a comprehensive retrospective analysis of intentional analgesics poisoning cases in Saudi Arabia from 2017 to 2021 using national surveillance data.

Methods: A retrospective investigation was conducted utilizing national poisoning surveillance data obtained from the Chemical and Drug Safety Administration, Ministry of Health. The study population comprised all cases classified as intentional self-poisoning involving analgesic drugs during the specified period. Descriptive epidemiological analyses were performed using SPSS software to explore demographic variables, temporal trends, geographical distributions, types of analgesics involved, clinical presentations, management approaches, and outcomes.

Results: A total of 863 intentional analgesics misuse incidents were documented, with Saudi nationals accounting for 81% of cases and non-Saudi nationals comprising the remaining 19%. Notably, Syrians constituted the largest subgroup among non-Saudis. Abdominal symptoms were the most prevalent clinical presentation, with paracetamol being the predominant agent implicated in poisoning cases. Riyadh reported the highest incidence among regions. Adverse outcomes, including patient deterioration and one fatality, underscored the seriousness of intentional analgesics poisoning. Solid forms of medication and oral ingestion were predominant, emphasizing the importance of preventive measures. Antidotal treatments such as activated charcoal and N-Acetylcysteine were variably administered for clinical management.

Conclusion: This study provides valuable insights into the epidemiology and characteristics of intentional analgesics misuse in Saudi Arabia. The findings underscore the need for targeted interventions, including regulatory measures, educational campaigns, and regional-specific prevention strategies, to mitigate the burden of intentional analgesics misuse and improve public health outcomes in the country.

Introduction

Because the prevalence of poisonings varies greatly from one region to another, it is considered a major public health problem on a global scale and a major medical emergency.¹ Ingesting a contaminant (microbe or abnormal material) at varied amounts into the body, whether it be food, chemicals, or medications in various forms, may worsen health. This is often known as poisoning. The World Health Organization has declared poisoning in humans to be a global health emergency.² Many people are accepting poisoning as a normal part of life, not realizing how serious a threat it is; ignoring it might be fatal.³ Depending on whether the deliberate instances are

linked to authorized or unapproved substances, the exact number of poisoning episodes that cause over one million illnesses each year may vary.² Age, sex, environment, immunological response, chronic illness, psychological and social stress, and other factors may all affect how a poisoning manifests clinically and the effects it has on a person.⁴ The agricultural, chemical, and pharmaceutical sectors have grown substantially over the last few decades, increasing the danger of poisoning globally, and in Saudi Arabia in particular.⁵ When people eat spoiled or unhealthy food, it may lead to food poisoning or another name for the same ailment: foodborne sickness. Food poisoning outbreaks are associated with catering forms, regardless of whether the food is eaten right after or saved for later.

Contamination of food with germs that cause toxicosis is known as acute contamination. Poisoning, especially in children, has been caused by an increase in the prevalence of certain bacteria, the most notable of which being *Salmonella* and *E. coli*.⁵ *Salmonella* infection is the second most prevalent clinical manifestation, and foodborne diseases caused by meat, poultry, and other meats seem to be more common in Saudi Arabia.⁶ In addition to occurrences of food poisoning, incidences of poisoning caused by chemical compounds or by accidentally taking excessive doses of prescription medicine have also risen since the recent emergence of COVID-19, often leading to severe consequences. An epidemic of lethal overdoses has recently emerged, and the culprits are medications.⁷ Women have the greatest risk of unintended poisoning (as a result of medications) in industrialized countries compared to undeveloped ones. Globally, drug poisoning ranks as the second leading cause of poisoning-related fatalities. It is now the top killer in Brazil and many other nations, surpassing smoking.⁸ Not everyone is aware of the risks associated with these substances, so it's easy to forget how important it is to restrict their usage until absolutely essential. The fact that painkillers are no longer seen as dangerous has made them widely available, which in turn encourages their abuse without thinking about the consequences; as a result, they are now the leading cause of poisoning in Latin American countries.⁹ Religious and cultural norms have a significant impact on societal norms, which means that accidental overdose from medications like Paracetamol is likely the leading cause of drug poisoning nowadays.^{10,11} A lack of knowledge about how to manage chemicals used daily has led to a huge rise in toxicity related with both drugs and chemicals used in everyday life. As a result of their expansion and improvement, chemicals are now used more often in numerous agricultural, medicinal, and industrial sectors. Chemical acute poisoning claims the lives of almost two million people annually. The majority of cases of chemical poisoning, especially in youngsters, are unintentional.⁴ Acute poisoning, such as chemical poisoning, causes serious symptoms to appear in less than 24 hours and may have a devastating impact on the victim.¹² Various causes have led to reports of chemical poisoning in people of all ages in many Saudi cities, including Jeddah, Riyadh, Makkah, Najran, and Al-Qassim.^{13,14}

In general, elements including age, immune system type, poison reception, toxicity assessment, and administration all have a role in how harmful toxic instances may be, whether they result from food contamination, long-term medicine administration, or chemical negligence. Saudi Arabia has made great strides in the fields of agricultural technology, industrial science, and medicinal pharmacology in the last two decades. Acute poisoning patterns have shifted significantly, and a plethora of hazardous substances, such as medicinal medications, insecticides, and other chemicals, have become widely available, all because of these technological improvements.¹⁰

Problem statement

The research aims to investigate the prevalence, trends, and characteristics of intentional analgesics poisoning cases in Saudi Arabia over the period of 2017–2021 through a retrospective analysis of national surveillance data. The problem statement highlights the significance of understanding the scope and patterns of intentional analgesic poisonings, which pose serious public health concerns and require targeted interventions to mitigate the risks associated with deliberate misuse or overdose.^{13–15} By examining data from national surveillance systems, the

study seeks to identify key demographic factors, geographic variations, and temporal trends associated with intentional analgesics poisoning incidents, thereby informing evidence-based strategies for prevention and intervention efforts in Saudi Arabia.

Research question

What are the epidemiological features, trends, and outcomes of intentional analgesics poisoning cases as reported in the national surveillance system in Saudi Arabia from 2017 to 2021?

Research objectives

- To analyze the prevalence and factors associated with intentional analgesics poisoning cases in Saudi Arabia from 2017 to 2021.
- Describe the demographic and clinical characteristics of intentional analgesics poisoning cases reported in national surveillance system from 2017–2021.
- To investigate the modality of treatment and outcomes in cases of intentional analgesic poisoning in Saudi Arabia.

Relevance and rationale

Understanding the prevalence and patterns of intentional analgesics poisoning in Saudi Arabia between 2017 and 2021 is crucial for several reasons. Firstly, intentional poisoning poses a significant public health threat, often leading to severe morbidity and mortality. By conducting a retrospective analysis of national surveillance data, this research can provide insights into the demographic characteristics, geographic distribution, and temporal trends of intentional analgesics poisoning cases, thereby enabling healthcare authorities to develop targeted prevention and intervention strategies. Additionally, identifying high-risk populations and regions can help allocate resources more efficiently to address the underlying factors contributing to intentional poisoning incidents. Furthermore, the findings of this study can contribute to the existing literature on poisoning epidemiology and serve as a basis for future research and policy development aimed at reducing intentional analgesics poisoning rates and improving overall public health outcomes in Saudi Arabia.

Literature review

Medications that are available without a doctor's prescription are known as over-the-counter (OTC) pharmaceuticals. The misconception that over-the-counter drugs pose no health risks to consumers has, alas, gained significant traction. Misuse, often linked to excessive intake and sometimes fatal effects, is common, but most of them are generally safe when taken responsibly.¹⁶ The availability of non-opioid analgesics over the counter (OTC) has been linked to an increase in hospital presentations including non-opioid analgesic toxicity and deaths, according to studies.^{17,18} Within that three-year span, about 34·5 overdose instances per 10,000 individuals were recorded, leading to almost 1·1 million patients being brought to emergency rooms in the US due to drug poisoning.¹⁹ In most countries, paracetamol may be purchased over the counter and is one of the non-opioid drugs that are generally considered safe for consumption. However, hepatotoxicity may occur if the dosage of these drugs is more than the recommended daily allowance.²⁰ Reduced rates of paracetamol and salicylate-related suicides, fewer cases of hepatotoxicity resulting in liver transplants and hospitalizations to liver units, and fewer cases of non-fatal paracetamol and salicylate overdoses were all outcomes of UK legislation limiting the size of analgesic packs.²¹ When Denmark instituted age and pack size limitations, the number of non-opioid analgesic poisonings each month dropped significantly. There was a decrease in the number of severe poisonings that might cause liver damage.²²

Analgesics have been found to be commonly implicated in prior studies of self-harm cases presenting to hospitals across Saudi Arabia. A study that looked at the trend of drug poisoning in Jeddah, Saudi Arabia, from 2011 to 2016 found that the frequency of drug poisoning rose, with analgesics being the most commonly reported substance.⁴ A further research conducted at the King Khalid National Guard hospital in Jeddah indicated that, out of all the poisoning cases recorded during a five-year period at the facility, the majority were caused by analgesics and nonsteroidal

anti-inflammatory medicines.¹ The research found that analgesics were the most regularly used drugs in children poisoning cases that occurred during a 5-year period in the east Jeddah hospital.²³ Researchers in the al Qassim area looked at the trends in drug poisoning cases reported in the province and found that analgesics were the most common culprits.²⁴ Analgesics were ranked second in terms of toxicological exposure in children, according to a two-year research conducted at Riyadh's Al Yamamah Pediatric Hospital and King Saud Medical City Hospital.²⁵ King Khaled University Hospital in Riyadh, Saudi Arabia, conducted a retrospective cross-sectional descriptive assessment of all instances of child poisoning reported to their medication and poison information center between January 2010 and December 2016. One hundred thirty-three people took analgesics.³

The aforementioned publications are helpful, however they sometimes have restricted sample numbers from certain locations or don't reflect the whole country. To this day, comprehensive national epidemiological statistics on cases of deliberate self-poisoning remain scarce in Saudi Arabia. To begin driving targeted preventive efforts, it is necessary to profile the demographic breadth and patterns of intentional overdoses, according to available studies.

Methods

Study Design

A retrospective investigation was employed to analyze existing national poisoning surveillance data collected from January 2017 to December 2021.

Data Source

The primary data source for this study was the national poisoning surveillance data. Data were obtained from Chemical and drug Safety Administration, Ministry of Health.

Study Population

The study encompassed all cases classified as intentional self-poisoning involving analgesic drugs reported in Saudi Arabia from 2017 to 2021.

Sample Size and Selection

The sample size comprised the entire accessible population of intentional analgesics poisoning cases as documented in the national poisoning surveillance data in Saudi Arabia from 2017 to 2021. (give justification for this period)

Data Collection and Management

Relevant patient-level epidemiological and clinical data were extracted and encoded from the electronic database into a standardized format. Definitions for key variables such as patient demographics, substances involved, clinical presentations, management, and outcomes were established a priori. Subsequently, de-identified data were securely stored, cleaned, and managed within statistical software. Data were obtained from Chemical and drug Safety Administration, Ministry of Health.

Data Analysis

Descriptive epidemiological analyses were conducted using SPSS software. These analyses included frequency distributions of demographic variables, temporal trends in poisoning incidents, geographical distributions, types of analgesics involved, clinical presentations, management approaches, and outcomes. Additionally, inferential analyses such as chi-square tests or logistic regression may have been performed to explore associations between various factors and intentional analgesics poisoning incidents.

Results

A comprehensive analysis of intentional analgesics misuse cases in Saudi Arabia from 2017 to 2021 yielded a total of 863 documented incidents. Most of cases were females (n= 671, 77.8%). Among these cases, the majority (699 cases, 81%) were attributed to Saudi nationals, while 164 cases (19%) involved non-Saudi individuals. Notably, Syrians constituted the largest subgroup among non-Saudis, with 24 cases, followed closely by Egyptians and Indians, each accounting for 21 and 16 cases, respectively. Filipinos, Sudanese, and Pakistanis comprised smaller yet notable

proportions, with 16, 9, and 8 cases, respectively. Figure 1 presents nationalities of study participants.

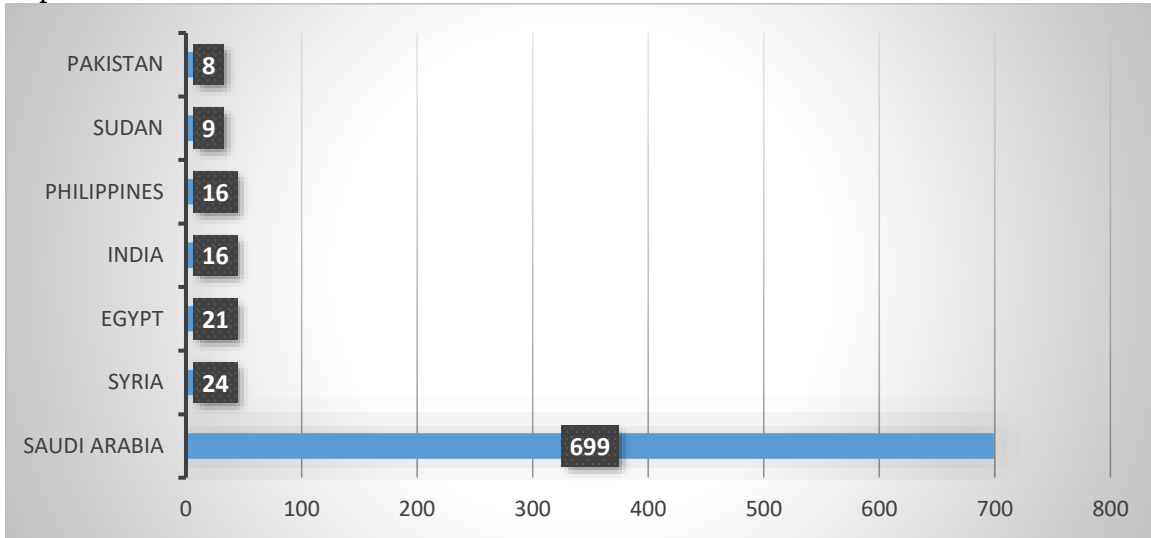


Figure 1: Participants distribution based on nationality

Regarding presenting symptoms, abdominal symptoms were the most prevalent, reported in 176 cases, followed by nausea in 130 cases and vomiting in 107 cases. A smaller subset of patients presented with dizziness (18 cases) or other symptoms (17 cases), underscoring the diverse clinical manifestations associated with intentional analgesics misuse.

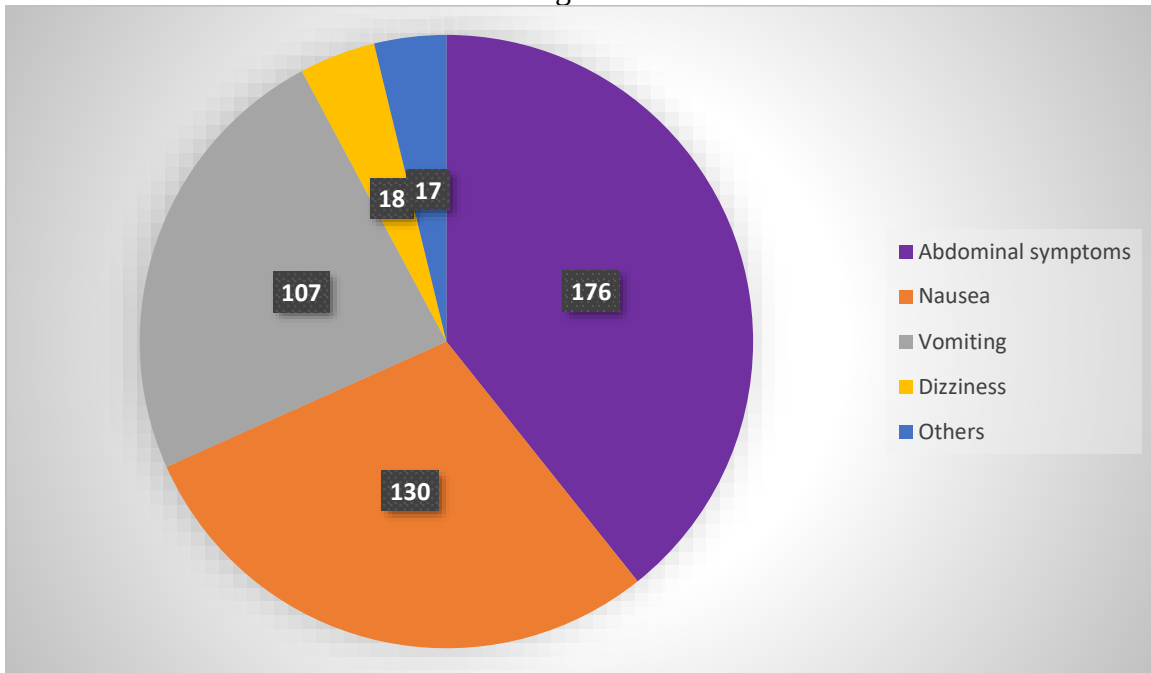


Figure 2: Participants distribution based on symptoms

In terms of the specific drugs involved, paracetamol emerged as the predominant agent, implicated in 645 cases (75%). Aspirin and Brufen were also identified, albeit less frequently, with 24 and 17 cases, respectively, indicating a varied spectrum of analgesic agents utilized in cases of intentional misuse.

Geographically, the distribution of cases across regions revealed notable disparities. Riyadh, the capital city, reported the highest incidence with 245 cases (28%), followed by Jeddah (120 cases, 14%), Alhasa (110 cases, 13%), the Eastern region (75 cases, 9%), Najran (38 cases, 4%), and Qassim (35 cases, 4%). These findings underscore the need for targeted interventions tailored to the specific regional epidemiological profiles.

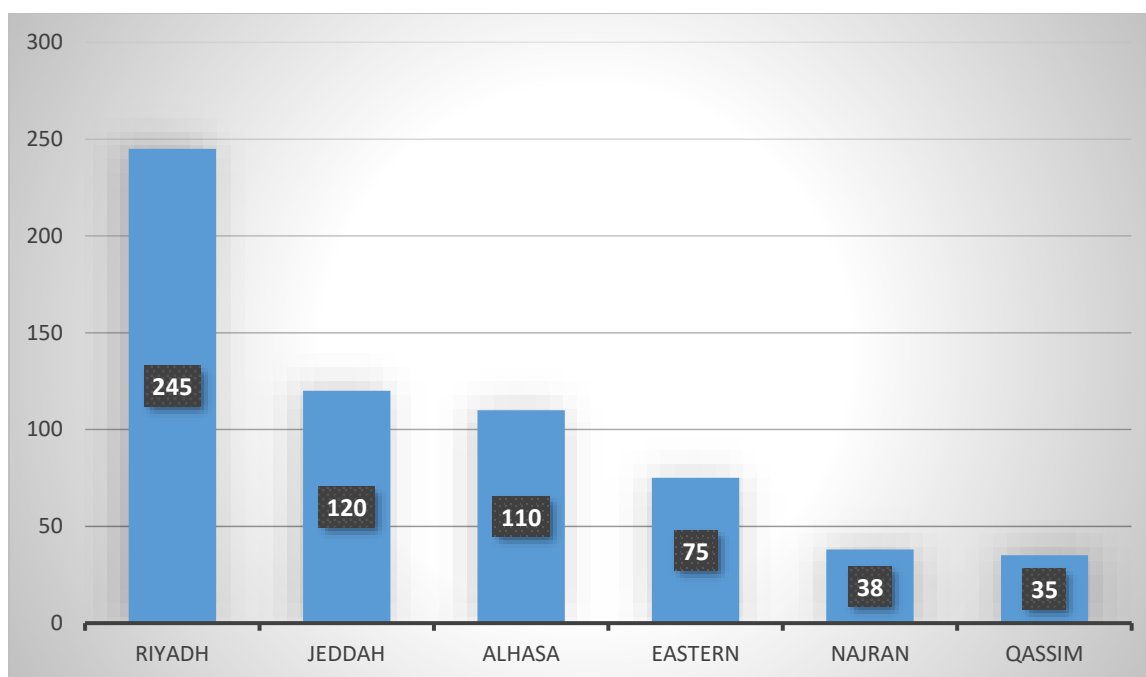


Figure 3: Participants distribution based on geographical region

Tragically, the outcomes of intentional analgesics misuse were not uniformly benign. Seventeen patients experienced deterioration in their condition, while one fatality was recorded, highlighting the gravity of the consequences associated with deliberate misuse or overdose of analgesic medications.

In terms of the form and route of ingestion, solid forms of medication were overwhelmingly predominant, accounting for 772 cases (89%). Additionally, oral ingestion emerged as the most common route, implicated in 851 cases (99%), underscoring the importance of preventive measures targeting this mode of exposure. Blood samples were obtained from 436 participants (50.5%) while urine sampled from 165 participants (19.1%) and gastric samples from 99 participants (11.5%). Majority of participants recovered, however, one participant was reported to death.

Antidotal treatment strategies varied, with activated charcoal administered in 189 cases and N-Acetylcysteine provided in 141 cases. These interventions represent critical components of the clinical management of analgesic misuse, aimed at mitigating the absorption and adverse effects of ingested substances.

Discussion

Intentional analgesics poisoning poses a significant public health concern globally, with Saudi Arabia being no exception. This retrospective analysis of national surveillance data from 2017 to 2021 provides valuable insights into the epidemiological characteristics and patterns of intentional analgesics poisoning cases in the country. The predominance of intentional analgesics poisoning among Saudi nationals underscores the importance of targeted preventive measures tailored to the local population. However, the involvement of non-Saudi nationals, particularly Syrians, Egyptians, and Indians, suggests the need for comprehensive prevention strategies that consider the diverse demographic composition of the country.

The diverse clinical presentations of intentional analgesics poisoning, with abdominal symptoms being the most prevalent, highlight the challenges in diagnosing and managing such cases. Furthermore, the predominance of paracetamol as the primary agent involved in poisoning incidents underscores the importance of regulatory measures and educational campaigns aimed at promoting safe medication practices and preventing overdose. Geographical disparities in the distribution of poisoning cases across regions emphasize the need for targeted interventions

tailored to specific regional epidemiological profiles. Riyadh, as the capital city, reported the highest incidence of poisoning cases, indicating a potential area for focused intervention efforts. Drug, food, and chemical toxicity were most often experienced by children less than five years old, according to data from a number of nations, including Saudi Arabia.²⁶ This confirms previous Saudi study¹¹ that found that Saudis make up the bulk of drug poisoning cases. According to the study, most cases were caused by unintentional toxin consumption. The²⁶ investigation found that poisoning rates in Saudi Arabia varied greatly. Except for the obvious population-to-restaurant ratio mismatch, no obvious reasons emerged. Interestingly, this research found that the number of misuse cases reported at home was higher than the number of cases documented in restaurants.²⁶ A large portion of the world's contaminated food and cases of food poisoning originate from restaurants. Ingesting toxins may be classified as mild, intermediate, or very harmful.²⁴ This classification applies to food, pharmaceutical household goods, and derivatives of plant products with different levels of toxicity. Acute poisoning ranks high among the leading causes of hospitalization and mortality. Even in Saudi Arabia, cases of food poisoning, also called microbiological foodborne sickness, are common.²⁷

The good news is that most individuals who have food poisoning get well quickly and don't have any lasting effects. Many different types of bacteria may cause food poisoning. Salmonella, the most prevalent bacterium in the world that may cause food poisoning, is likewise becoming more widespread in Saudi Arabia every year.²⁸ Salmonella causes food-related difficulties in people of all ages, but notably in kids, according to this study's findings.²⁹ Also, with a female-to-male ratio of 1·2:1, this research concluded that males were somewhat more likely to suffer from poisoning than women, particularly among children aged one to ten. Another research³⁰ found that food poisoning was more common in men than in women, lending credence to this idea. Although many other types of bacteria may cause food poisoning, our analysis indicated that Salmonella infections much outnumbered those caused by Enterococcus and E. coli.³¹

The results of a 2019 investigation by Qi et al. corroborated these findings regarding the prevalence of Salmonella food poisoning.³² Additionally, our findings demonstrated that bacterially-induced food poisoning is moderate and not life-threatening. Although only a small number of instances were determined to be severe, those that were required treatment included a range of antibiotics tailored to the children' ages. Consistent with our results, a previous research demonstrated the national incidence of foodborne illnesses among patients and the efficacy of essential treatments and medicines in facilitating patient recovery.³³ There has been a recent increase in cases of food poisoning, which has many causes, including inadequate sanitation and the prevalence of food trucks and restaurants.³⁴ Similarly, several parts of Saudi Arabia have high rates of drug and chemical toxicity. We accomplished a significant result by demonstrating the frequency of poisoning in various groups, as we originally described in Al-Baha. In addition, the present study's findings suggest that food, chemical, and medication poisoning cases vary greatly across all age groups. We observed a steady trend in occurrences of food poisoning in children, especially in the 1–20 year old age bracket. Previous research on instances of chemical, medication, and food poisoning is in line with our findings.³⁴

The study results²⁶ are at odds with claims that male poisoning instances exceed female poisoning cases in other countries. Previous studies in Saudi Arabia found that suicidal ideation and medication poisoning are more common among women than males. These findings are in line with previous Saudi data showing that Saudis make up the bulk of drug poisoning cases. Furthermore, the majority of cases in this study were caused by unintentional poisoning. Other investigations³⁵ have found a same tendency. The leading cause of drug poisoning was suicide, which contradicts the results of this research.³⁶ This research's findings that analgesics were the most often implicated medicine in pharmaceutical drug poisoning are in line with those of a Saudi Arabian investigation. Consistent with most international and national studies, analgesics and NSAIDs are most often used by both adults and children.³⁷ Consistent with a previous research, the²⁶ investigation found

that chemical poisoning was more common in males than in women. Several research have asserted that poisoning was more common in males in the province of Al-Baha, which contradicts our results. Consistent with results from earlier Saudi studies in Riyadh and Qassim, the age group most at risk of chemical poisoning was children under the age of twenty. Our results are at odds with those of a previous research that found that chemical poisoning was more common in those aged 21–30.³⁸ Consistent with previous Saudi studies, the data also showed that the majority of cases of chemical poisoning were involving Saudis.⁴

The adverse outcomes observed, including patient deterioration and one fatality, underscore the gravity of intentional analgesics poisoning and the urgent need for preventive measures. Strategies aimed at early recognition, timely intervention, and appropriate clinical management are essential to mitigate the risk of adverse outcomes associated with intentional analgesics poisoning. The predominance of solid forms of medication and oral ingestion routes highlights the importance of preventive measures targeting these modes of exposure. Additionally, the variability in antidotal treatment strategies underscores the need for individualized clinical management approaches tailored to the specific characteristics of each case.

This study provides valuable insights that can inform the development and implementation of targeted public health policies and interventions aimed at reducing the burden of intentional analgesics poisoning in Saudi Arabia and improving public health outcomes in the country.

Conclusion

In summary, this study reveals significant insights into intentional analgesics poisoning in Saudi Arabia from 2017 to 2021. While Saudi nationals accounted for the majority of cases, a notable proportion involved non-Saudi individuals, emphasizing the need for inclusive prevention strategies. Abdominal symptoms predominated, indicating the diverse clinical presentation of poisoning incidents. Paracetamol was the most commonly implicated agent, suggesting a focus for regulatory measures and educational campaigns. Regional disparities in incidence highlight the necessity of tailored interventions. Adverse outcomes, including deterioration and one fatality, underscore the severity of this issue. The prevalence of solid forms of medication and oral ingestion routes underscores the importance of preventive measures in these areas. Varied antidotal treatments further emphasize the need for individualized clinical management. Overall, these findings provide crucial insights for shaping targeted public health policies and interventions to mitigate the burden of intentional analgesics poisoning in Saudi Arabia.

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