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Analyzing the Reports of Chemical Poisoning and Pharmacological Toxicity in Cases Presented to the Poison Centre in Basra City, Iraq

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Abstract. Poisoning remains a major global public health concern, accounting for significant morbidity and mortality, particularly in developing countries where access to toxic agents is common. In Iraq, especially in Basra, cases of acute poisoning are frequent, yet epidemiological data remain limited, hampering effective prevention and management strategies. Despite regional studies, there is insufficient systematic analysis of poisoning trends, types of agents, and demographic risk factors in Basra over recent years. This study aimed to evaluate the prevalence, types, and outcomes of chemical and pharmaceutical poisoning cases reported to the Basra Poison Control Centre over a three-year period (2020–2022). A total of 244 cases were analyzed, with nearly half occurring in children under seven years old, indicating their high vulnerability. Males predominated in 2020 and 2021, while females were more frequently affected in 2022. Drugs were the leading cause of poisoning (171 cases), particularly benzodiazepines (18–29.5%) and paracetamol (15–18.5%). Pesticides, especially organophosphorus compounds and zinc phosphide, were the most common non-pharmaceutical agents in 2020 and 2021, whereas sulfur dioxide gas accounted for 30% of chemical cases in 2022. This is the first comprehensive epidemiological study documenting temporal and demographic variations in poisoning cases in Basra, integrating both pharmaceutical and chemical exposures. The findings highlight the urgent need for stricter drug dispensing regulations, enhanced public awareness, and improved poison control strategies, including antidote availability and healthcare worker training, to reduce the burden of poisoning.

Highlights:

1. A total of 244 poisoning cases were reported between 2020–2022, with nearly half involving children under seven years old.
2. Pharmaceuticals, especially benzodiazepines and paracetamol, were the leading causes of poisoning across all years.
3. Pesticides and sulfur dioxide gas were the most common non-pharmaceutical agents, highlighting the need for stricter regulation and preventive strategies.

Keywords: drug; poisoning; chemical; Benzodiazepines; analysis

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Introduction

Poisoning is described as the introduction of any foreign substance (toxin) that adversely affects living organisms, whether accidentally or intentionally; the poisonous substance can be detrimental at specified dosages [1]. Acute poisoning happens when someone is exposed to a hazardous material only once or for a brief time. The symptoms get worse right after the exposure. Acute poisoning is a common reason for people to go to the hospital, particularly throughout developed countries [2]. There are many things that can affect the effects of acute poisoning, such as the type of toxins, the amount taken, the time between exposure and getting medical help, and the quality of the medical facilities [3]. Intoxication is a serious public health problem around the world and one of the things that makes people sick and die. Short-term poisoning is a common reason for going to the emergency room, especially in developing nations [4]. The World Health Organization (WHO) reports that toxins result in one million cases of poisoning and 300,000 fatalities annually [5]. Intoxication was the eighth most common cause of death in young adults in 2000 [6]. It's hard to figure out how many people become intoxicated each year because most of them don't keep track of it [7]. A lot of different types of drugs and non-drugs can be used to poison someone. The chemicals in the medication include painkillers, anti-inflammatory drugs, psychiatric pharmaceuticals like antidepressants, and benzodiazepines [8]. When patients get their prescriptions at therapeutic amounts for a set amount of time, this is called rational usage. However, if there are any contradictions, this is called irrational use, which is one of the main causes of acute drug poisoning [9]. Non-medicinal agents, on the other hand, are chemicals like organophosphates, pesticides, insecticides, organic solvents, and common household cleaning products like bleach and caustics, which have also been shown to be major sources of poisoning in kids [8]. Changes in lifestyle and social behavior led to more incidents of contamination [10]. For instance, improvements in agricultural, industrial, and pharmaceutical parts have made it simpler to get hazardous things like pesticides, medicines, and other chemicals that are not good for you. This has also led to big changes in how people poison themselves [10]. It has been suggested that there is a different association between types of poison and places where people get poisoned. Some dangerous substances may be more common and easier to find in some parts of the world than in others. For instance, those who live in cities may be more likely to come into contact with "over-the-counter" drugs like paracetamol, while poisoning from agricultural chemicals is more common in rural areas among people of different ages [8]. Because of this, the number of people who get sick or die from contaminating changes depending on where it happens and over time [10]. Families are more prone to accidentally come into contact with toxic substances, whereas teens and young adults are more likely to intentionally poison themselves [11]. Common signs of accidental intoxication are business failure, mental problems, and stress from having to deal with chronic illnesses [12]. Particularly

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prevalent among adolescents was poisoning from psychotropic medications [8]. Young children are more susceptible to poisoning because of the way their bodies work. Older individuals with a long-term illness and multiple drugs may not always know which prescriptions they are supposed to take, which can lead to improper usage of pharmaceuticals [9]. Sexual orientation is another risk factor for poisoning. Some earlier research found that men are more likely than women to come in with drug-related poisoning cases, but women are more likely than men to come in with suicidal poisoning [13]. Poisoning-related epidemiological surveillance is very important for figuring out how the problem is becoming worse and what the risk factors are [6]. This means figuring out what kind of poisoning incidents happen in each country, how bad they are, and what happens after they happen in order to put in place the right preventative and management plans [14]. Acute poisoning is a typical reason for people to go to the hospital, and in severe situations, people need to be sent to intensive care units so they can be monitored and get technical help [15].

Aim of the study

The present investigation highlights to evaluate the prevalence of poisoning from pharmaceuticals, chemicals, and household goods, as well as to examine the determinants, circumstances, and outcomes of intoxicated patients during a three-year period utilizing data from the Poison Control Centre in Basra City, Iraq.

Methods

The current investigation is a retrospective hospital-based research that was conducted over a three-year period on acutely poisoned patients who were admitted to various hospitals in Basra city. The poisoning status of the case was recorded from January 2020 to December 2022. We obtained the data from the electronic database and medical records of the Basra Poison Control Centre. The study variables include demographic features (name, age, sex, and place of residence), toxic type (drug or chemical) and the quantity of the poison consumed, time and location of admission, treatment of poisoning, and outcome.

The research protocol was approved by the Basrah Health Directorate, the College of Pharmacy at the University of Basra, and the Poison Control Center. This study is retrospective and utilizes medical records, thus patient consent is not necessary.

Statistical analysis

The analysis was done with graph pad Prism program (Version 8n) for statistical purposes. We utilize a fraction of the whole to figure out the percentages and the Chi-square

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approach to look at and compare the data. In contingency evaluation, a difference of $P< 0.05$ is thought to be important.

Results

The investigation looks back at statistics and information that were collected for three years at the poison center in Basra, Iraq, from January to December 2022. 244 patients with drug or chemical poisoning go to different hospital emergency departments for treatment. The Poison Control Centre in Basra City, Iraq, talked about all of those things. There were 81 cases of drug and chemical poisoning in 2020. The number of incidents went down to 67 in 2021, and the most poisoning cases happened in 2022, when there were 96. As seen in the figure (1).

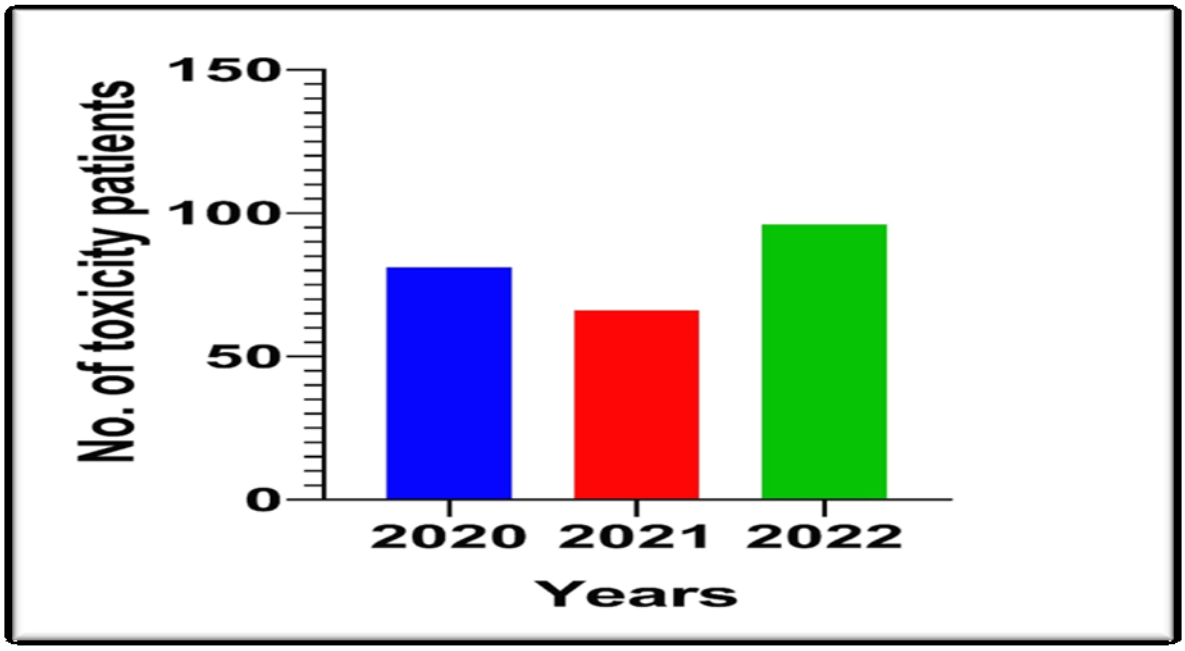

Figure (1): Incidents of poisoning happen per year.

There were 171 cases of drug and pharmaceutical poisoning and 73 cases of chemical poisoning. Surprisingly, the most drug poisoning instances were recorded in 2022, with 70 cases. 2020 and 2021 followed with 60 and 41 cases, respectively. With just 21 reported occurrences, 2020 was the year with the fewest instances of chemical poisoning. This number went up by 26 instances in 2021 and 2022. Figure (2) illustrates this point.

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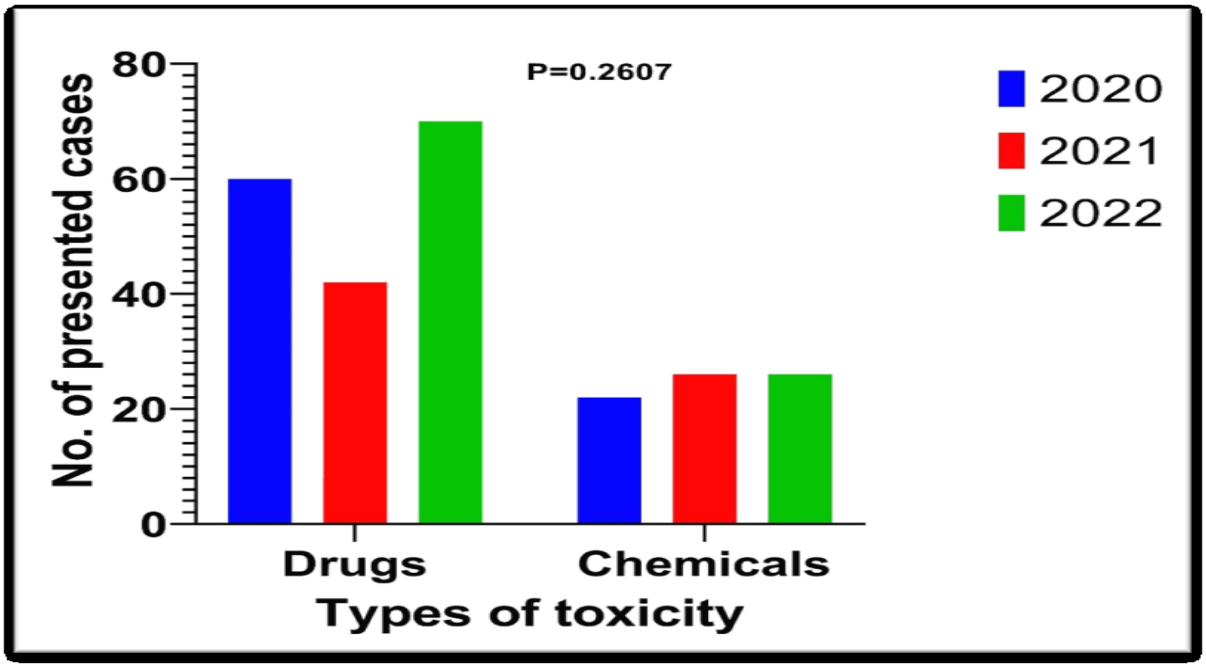

Figure (2): Compounds that cause toxicity

There were 46 men and 35 women in the study group in 2020. Children are the most at risk, with 52 cases, followed by adults (18) and teens (11). Figure (3) shows this. There isn't a big difference in the age and sex distribution between 2021 and 2020. Males had a greater rate of hazardous exposure than females (38 versus 29). There were also more incidents of poisoning in children (35), adults (27), and teens (5). Figure (4). In 2022, the age and sex distribution was very different. There were more girls (55) than males (41) in all age categories that were poisoned. Also, unlike the last two years, the most instances (47) were in adults, followed by children (34 cases) and teens (15 cases). Figure (5).

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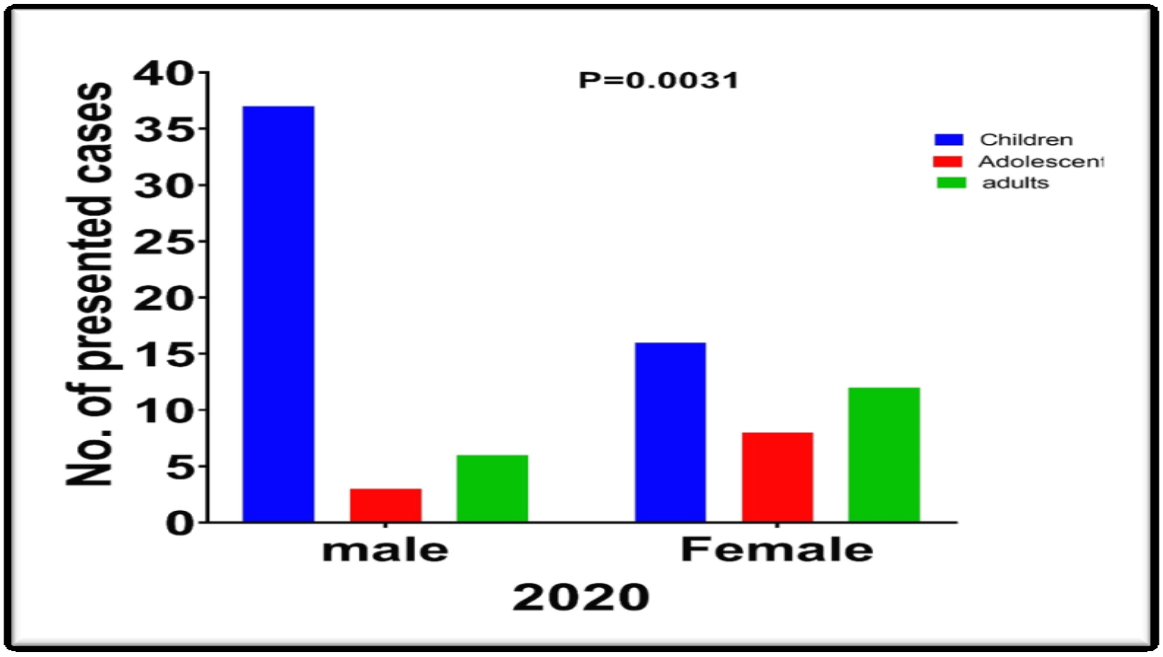

Figure (3): Distribution of sex and age in 2020

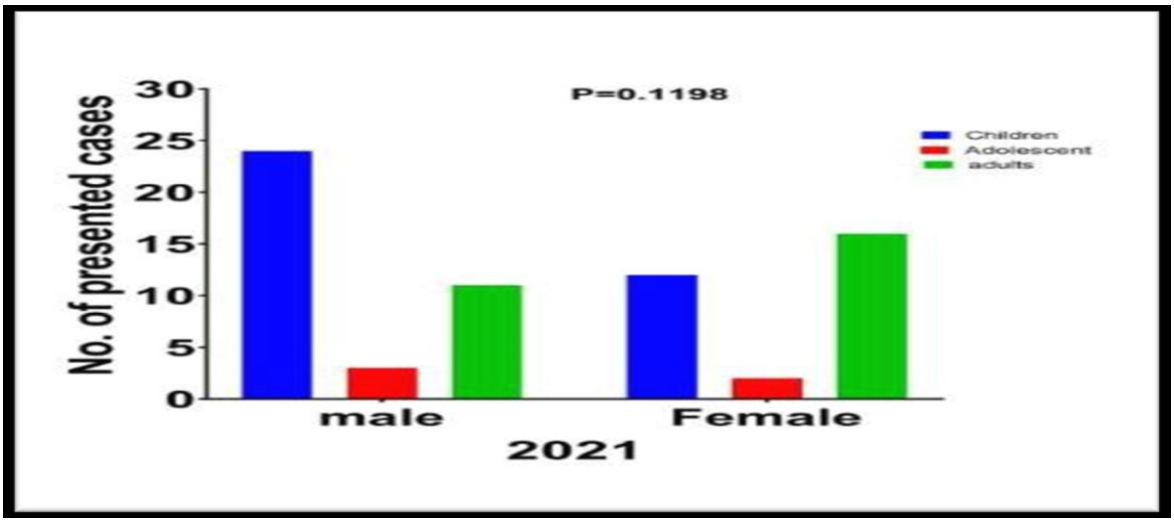

Figure (4): The number of presented cases depended on age and sex during 2021

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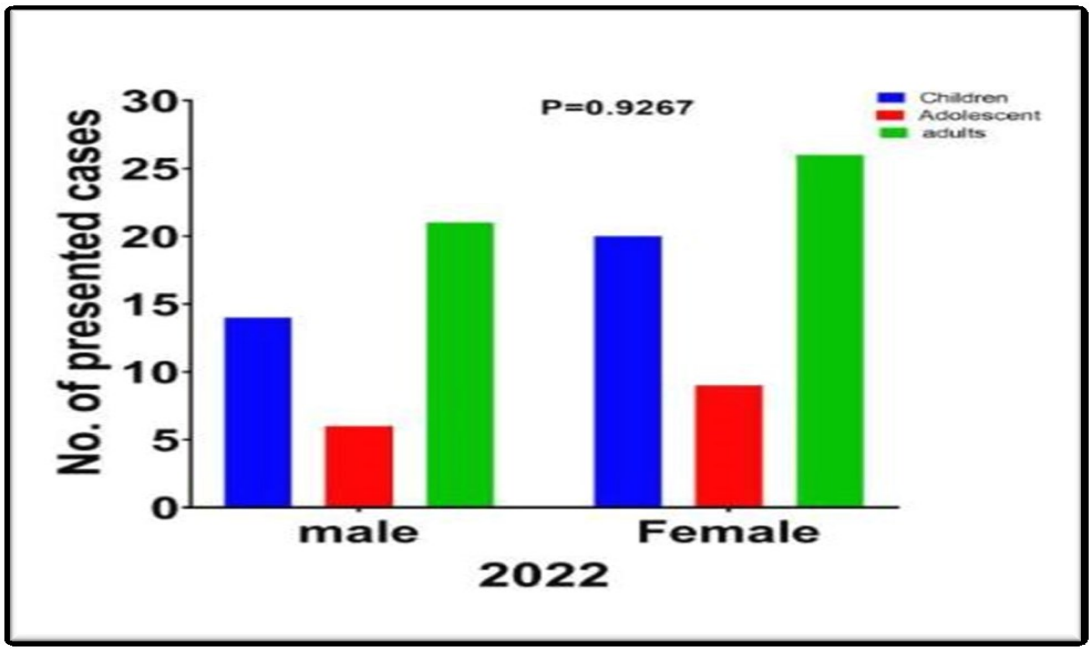

Figure (5): The number of cases presented in 2021 depends on age and sex.

There have been 60 drug-poisoning instances in 2020. Benzodiazepines were responsible for 18% of poisoning cases, followed by paracetamol and birth control pills (15% and 10%, respectively). There were fewer cases of aspirin, opioids, iron supplements, warfarin, multivitamins, and cyproheptadine, each making up 5% of the total. About 2.5% of the poisoning cases are caused by each of the following drugs: pregabalin, quetiapine, chloramphenicol, mefenamic acid, dexamethasone, leflunomide, dextromethorphan, domperidone, metformin, and vitamin D3. In 2020, on the other hand, there were 21 incidents of chemical poisoning, with organophosphorus pesticides being the main cause (32%). Zinc phosphide rodenticides came in second with 16%. Carbamate insecticides, potassium permanganate, and zinc phosphate each make up 8% of the total. Also, 4% of people who were poisoned used imidacloprid insecticides, pyrethroid insecticides, permethrin solution, collagen cream, kerosene, silica gel, or BAYSAN QAC. Figure (6) and also Figure (7) prove this.

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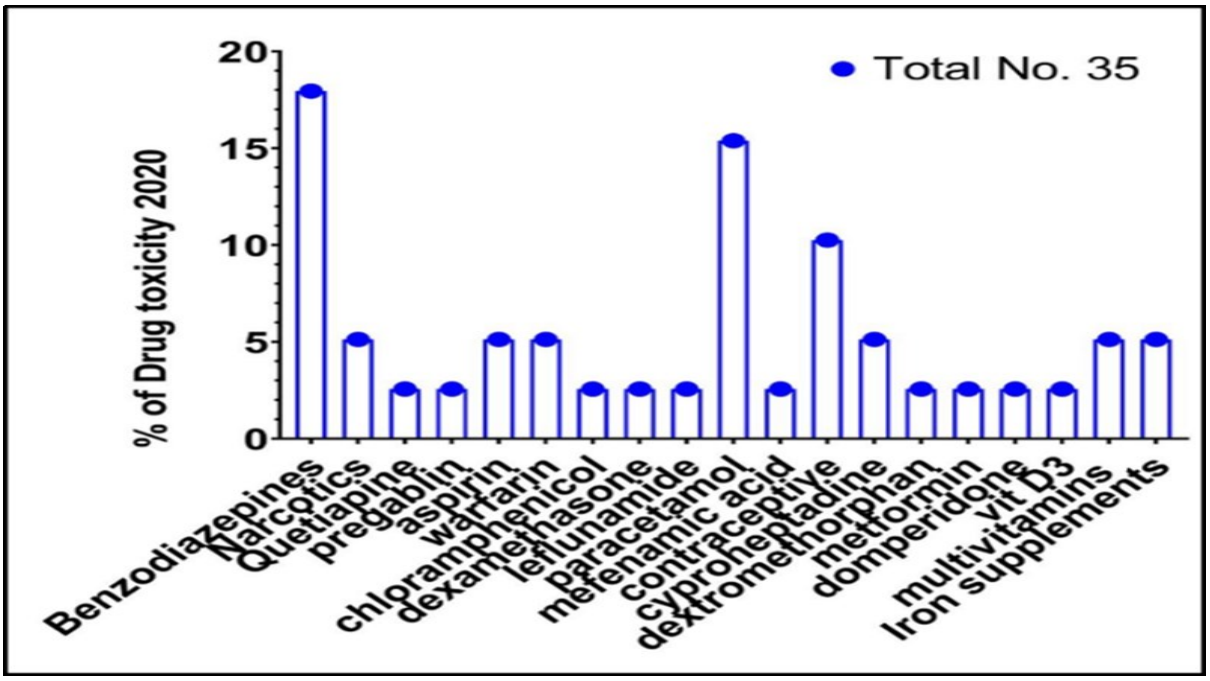

Figure (6): Medications used in cases of pharmaceutical toxicity in 2020

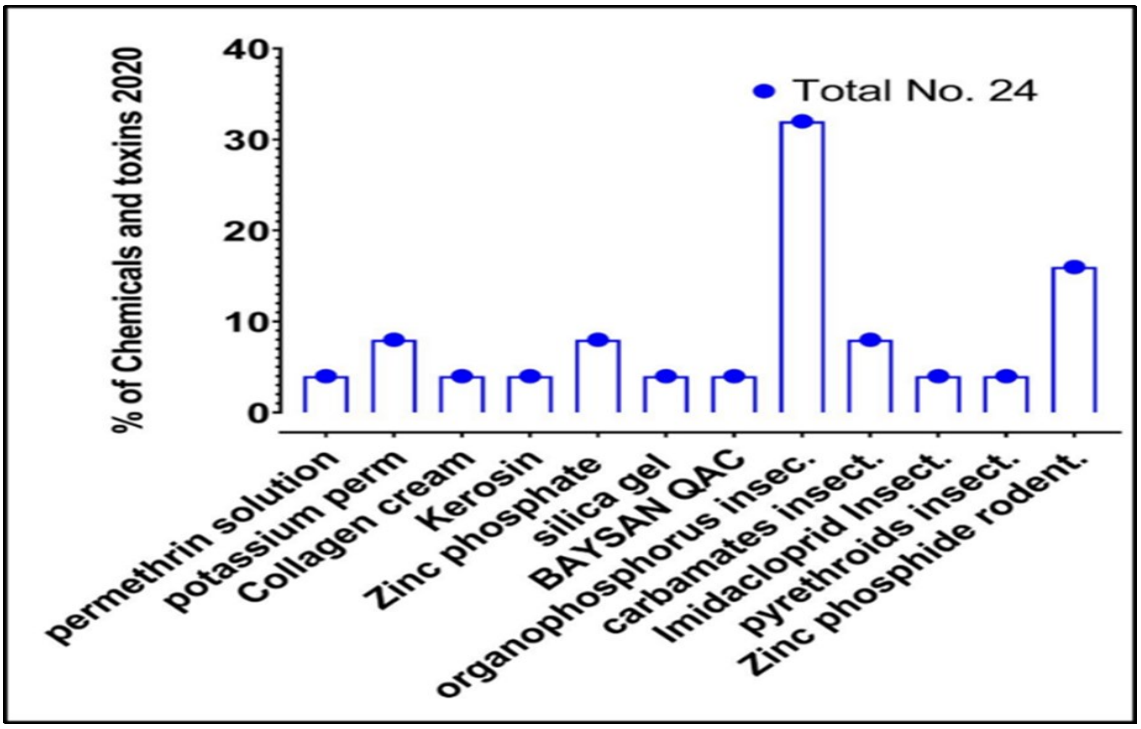

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Figure (7): Chemicals that were implicated in cases of chemical toxicity in 2020.

There have been 41 cases of drug poisoning in 2021. 29.5% of drug poisoning cases are caused by benzodiazepines, which is the highest percentage. Then came paracetamol (18%) and birth control pills (15%). Around 7% of each Ondansetron and multivitamin. methyldopa, Candesartan, sunitinib, omeprazole, thyroxine, and folic acid each make up 3.5% of the total. There were 26 cases of chemical poisoning found in 2021. Zinc phosphide rodenticides have been responsible for the most chemical poisoning cases (48%). Chlorine (16%) came up second, followed by organophosphorus insecticides (18%). Also, 4% of poisoning cases are caused by arsenic, ethanol, potassium permanganate, snake bites, or scorpion stings. Figures 8 and 9 show this.

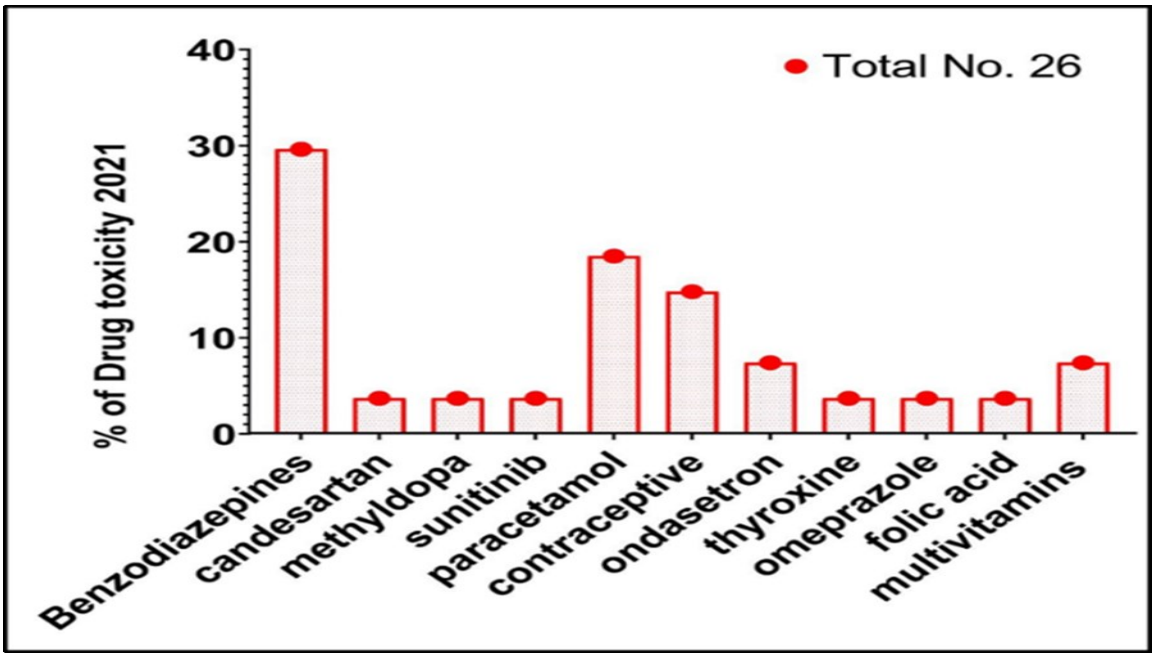

Figure (8): Drugs causing poisoning in 2021

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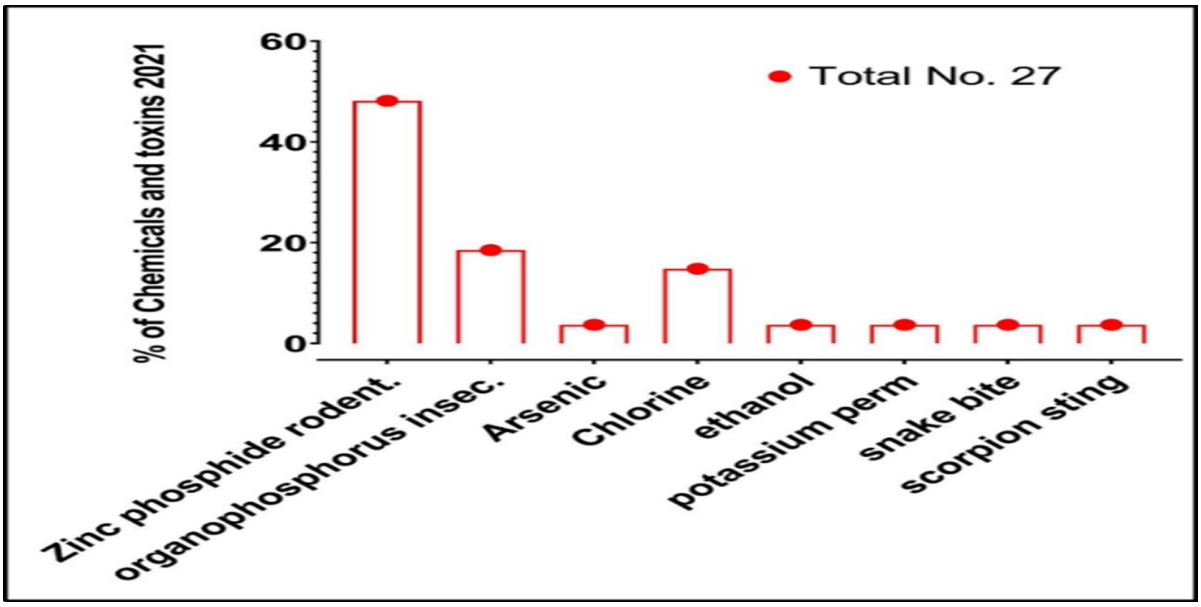

Figure (9): Compounds that were used in instances of toxic exposure in 2021

In 2022, a total of 70 cases of drug poisoning were reported. Among these, 23% were linked to benzodiazepines, establishing them as the primary cause. Paracetamol was the second most prevalent, representing 18.5% of the cases. Additional substances associated with drug poisoning comprised multivitamins at 9% and tramadol at 7%. Nifedipine, cyproheptadine, doxycycline, mefenamic acid, and melatonin accounted for approximately 4.5% of the total cases each. The substances with the lowest percentages, each at 2%, comprised amphetamine, bisoprolol, pregabalin, diphenhydramine, carbamazepine, montelukast, dextromethorphan, and iron supplements. Additionally, there were 26 instances of chemical poisoning recorded in that year. A substantial portion of these cases, specifically 30%, was attributed to sulfur dioxide gas poisoning. Rodenticides constituted the second most prevalent cause, representing 20% of cases. Organophosphorus insecticides and zinc phosphate accounted for 10% of chemical poisoning incidents each. The remaining substances, which include carbamate, cypermethrin, detergent (phenol), Dettol, ethanol, and cosmetic cream, accounted for 5% of the cases each. This analysis identifies the diverse causes of poisoning incidents, underscoring the necessity for specific prevention and intervention strategies, as in figures 10 and 11.

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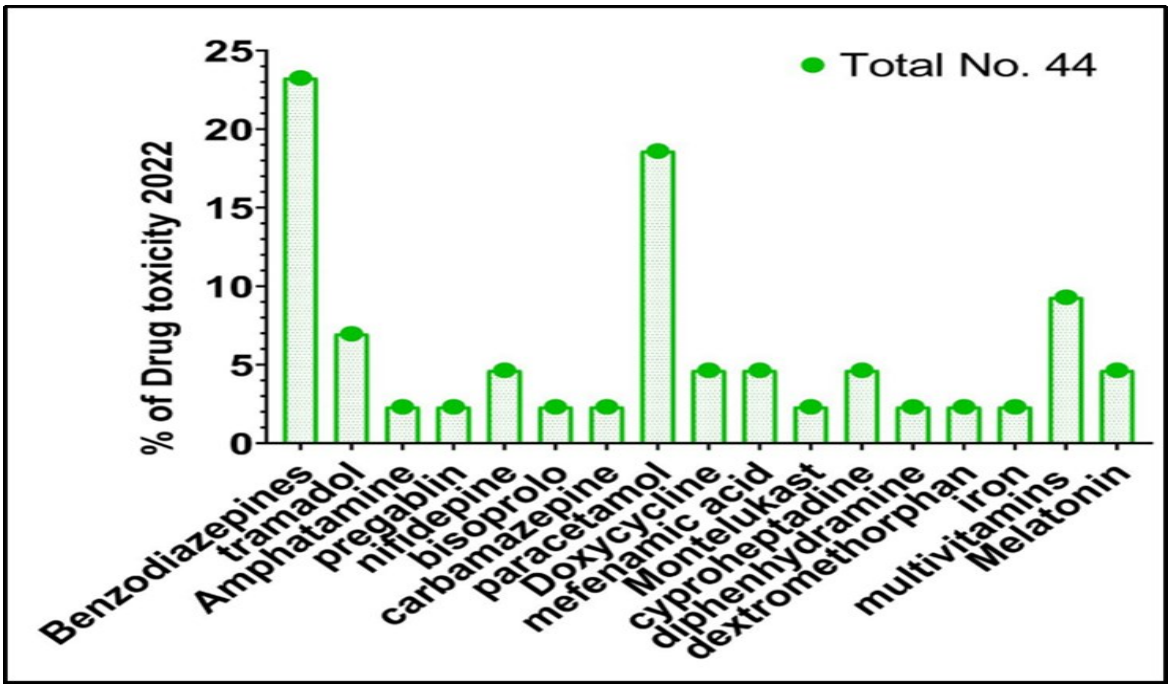

Figure (10): Treatments that were involved in poisoning situations in 2022

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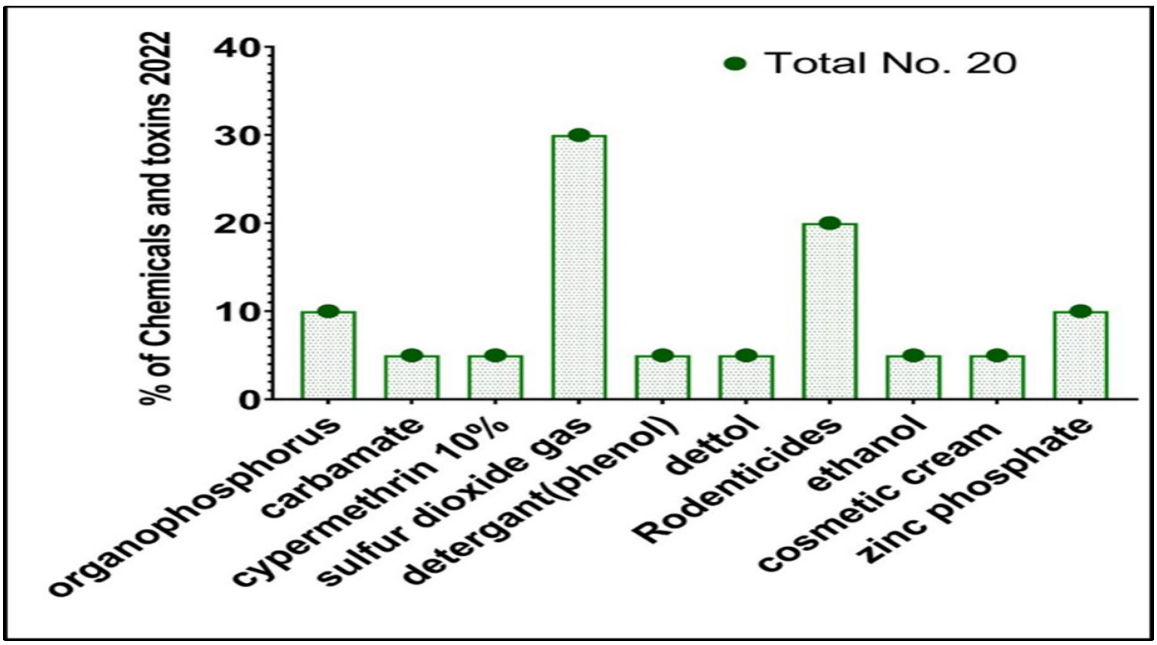

Figure (11): Chemicals that participated in poisoning situations in 2022

Discussion

Poisoning is seen as a substantial risk to the general population. There is currently no published epidemiological research on poisoning patterns in Basra city in international publications. The data from this study can be beneficial in evaluating risk factors for poisoning, facilitating the modification of preventive measures in the city, and guiding physicians in delivering accurate medical treatment recommendations [6]. All 244 poisoning cases reported to the Poison Control Centre by emergency departments at various hospitals were included in this study. The information is comprised of 81, 67, and 96 cases from the three years 2020, 2021, and 2022, correspondingly. Accurate data collection is challenging due to the fact that a significant number of poisoned individuals may decide not to seek medical attention, resulting in their undetected status. This could result in the production of inaccurate statistics regarding the actual number of poisoning cases [13]. For the years 2020 and 2021, men dominated females in this look back survey. These findings are consistent with those of the earlier research conducted in Saudi Arabia and Karnataka [4, 11]. According to Abdelhamid's study in Egypt, there were more females than males in 2022 [7]. Cultural factors and ways of living can explain the differences in the number of men and women [4]. According to our findings, over half of all patients were younger than seven years old. Similarly, in 2012 a study in Egypt indicated that children under the age of 10 accounted for 58.2% of all accidental poisonings [2]. Another study in Iran found similar results, with half of the poisoning cases involving

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children younger than four [16]. This happens because toddlers and preschoolers are naturally inquisitive and want to explore their surroundings by putting whatever they see in their mouths. Parents should be well-informed on how to create a safer environment for their children, since a higher number of poisoning incidents happened in homes with small children and easy access to common household items and chemicals [2]. Nevertheless, strategies exist to prevent and mitigate child poisoning, such as refraining from using food or beverage containers to store chemicals, pharmaceuticals, and home cleaners. Adults should refrain from consuming the drug in the presence of children, since it may be mistaken for confectionery. Pharmaceuticals and chemicals must be stored in secured cabinets or on elevated shelves [17, 18]. In the current study, pharmaceuticals accounted for the bulk of the instances of poisoning, whereas chemicals exhibited a lower prevalence of poisoning. These findings align with studies from adjacent nations such as Iran and Egypt, which reported that pharmaceuticals account for 77.7% and 59.5% of poisoning incidents, respectively [6, 7]. The results indicated that the medications can be readily obtained from pharmacies without a prescription, leading to their improper usage. Moreover, Basra City is classified as an urban region rather than a rural one. Therapeutic drugs are more prevalent in metropolitan regions due to a greater incidence of chronic diseases or elevated socioeconomic status [2]. On the opposite hand, ninety percent of patients in the Sri Lankan cohort were poisoned with chemicals that were not medications (19). Benzodiazepines (centrally acting) and paracetamol had been greatest frequently reported medications associated with poisoning cases for the past three years of our investigation. Benzodiazepines constituted 18%, 29.5%, and 23% of drug poisoning cases in 2020, 2021, and 2022, respectively. Paracetamol accounts for 15%, 18%, and 18.5%, respectively. This agreement aligns with the findings of the 2015 study conducted in Cairo, which indicated that the biggest percentage of toxicity was attributable to CNS depressants and analgesics [14]. Because this study was done during the COVID-19 pandemic, it seems that there were a lot of poisoning cases with multivitamins because they were widely used and available in almost every home. People may have also been more likely to raise the dose to avoid getting sick. There were also cases of poisoning from more than one medicine over these years (13%, 17%, as well 17%). Furthermore, this category encompassed product combinations. In 2020, pesticides, particularly organophosphorus insecticides, were the most frequently used agent in chemical poisoning (32%), with zinc phosphide rodenticide following closely behind (16%). Conversely, organophosphorus (18%) and zinc phosphide rodenticide (48%) comprised the largest percentages in 2021. In 2022, sulphur dioxide gas accounted for 30% of the total, with rodenticide following closely behind. The industrial combustion of coal, a prevalent source of air pollution, is the cause of the sulphur dioxide toxicity [20]. The study indicated that certain individuals were poisoned by different kinds of pesticides, such as carbamate and pyrethroid insecticides. In addition to pesticides, various chemical agents, including cleaning products, cosmetics, and fuels like paraffin, have been linked to poisoning

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cases over the past three years. These domestic chemicals are frequently accessible and are known to be corrosive and irritating. Some limitations of this retrospective study include the difficulty in obtaining precise information, absent data, and the absence of a well-regulated data collection method.

Conclusion

The results of this research indicated that children under 7 years old constituted the most susceptible demographic for toxicity in Basra city from 2020 to 2022, accounting for almost 50% of all cases. In this age range, male children outnumbered females, although females were dominating in the earlier age group. The analysis indicates no rise in poisoning cases over time, as the total cases in 2021 were fewer than those in 2020, whereas the total cases in 2022 exhibited a noticeable increase. The majority of poisoning events were attributable to pharmacological substances. Paracetamol and benzodiazepines were the predominant causes of drug intoxication. The pesticides, particularly organophosphorus insecticides and zinc phosphide rodenticides, were the predominant agents responsible for non-pharmaceutical poisoning.

Suggestions for Future Work

More research has to be done on records of deaths from intoxication, long-term complications, hospital stays, suicidal thoughts, and the way the drug was given. Put money into teaching people how to safely store dangerous material. Some pharmaceuticals should not be able to be bought without a prescription, and some regulations should be passed to make this happen. Getting information on poisoning cases from diverse parts of the country can help improve the clinical management of these cases by making sure that antidotes are available, training health care workers, and setting treatment standards.

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