Profile of cases of exogenous drug and plants poisoning in the municipality of maringá in the last 10 years

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ABSTRACT

The high availability of medicines, polypharmacy and self-medication contribute to medicines being the main agents causing toxicological accidents. The objective of this research was to characterize the epidemiological profile of notifications of drug and plant poisoning in Maringá-Paraná between 2012 and 2022. This is an epidemiological study prepared based on data from the Department of Informatics of the Unified Health System and the System of Notifications Information. Illnesses. A total of 5,605 cases of exogenous drug poisoning and 138 cases of plant poisoning were reported in different age groups, with drug poisoning being the most prevalent, of which the largest number occurred between 20 and 39 years old (68%). There was a predominance of females (71%) and whites (49%). Suicide attempts were the most common cause among the circumstances analyzed (72.3%) and the majority of cases were cured without sequelae (96.8%). The characterization of the epidemiological profile of poisonings in Maringá showed a predominance of cases of white women, with average education and who intentionally caused the toxicological accident (suicide attempt). These findings point to the need for greater attention from health authorities and the implementation of public policies, especially mental health policies, capable of mitigating the risks associated with this important disease.

Keywords: DATASUS, Exogenous intoxication, Medicines, Public health.

INTRODUCTION

In Brazil, exogenous intoxication is considered a relevant public health problem given its high occurrence and morbidity and mortality that culminate in considerable social and economic impacts on the population (Rangel and Francelino 2018; Soares et al. 2021).

The phenomenon of exogenous intoxication is characterized by:

> "[...] a set of toxic or just biochemical signs and symptoms resulting from accidental or intentional exposure to chemical substances found in the environment, mainly at home or peridomiciliary, such as toxins from venomous plants or animals, pesticides, medicines, products of industrial use, alcohol, illicit drugs and household products" (Oga et al. 2014).

Given its epidemiological relevance, the promulgation of Ordinance GM No. 104 of January 25th, 2011 made exogenous intoxication a notifiable aggravation, so that all occurrences of this nature began to be mandatorily notified and investigated by health services. This measure made possible not only the characterization of the sociodemographic profile of the victims, but also the identification of the risk factors involved and the creation of prevention measures in public health (Gonçalves and Costa 2018).

National epidemiological data indicate that medicines are among the main agents related to exogenous poisonings of accidental or intentional origin involving human beings (Sereno and Silva 2020; Zanette and Evangelista 2022). According to Araújo et al. (2021) for there to be a drug intoxication it is necessary that there is the consumption of drugs above the standardized doses, exceeding the therapeutic window.

Among the factors that contribute to drugs being the main agents related to exogenous intoxications, the following stand out: the high

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availability of therapeutic agents, ease of access, polypharmacy, irrational use and self-medication (Chaves et al. 2017; Zucco et al. 2021).

Studies indicate that benzodiazepines, anticonvulsants, antidepressants and anti-inflammatory drugs are among the main classes associated with accidents of a toxicological nature (Zanette and Evangelista 2022; Machado 2023). And according to the National System of Toxic-Pharmacological Information (SINITOX), although they can occur at any stage of the individual's life, children between 1 and 4 years are the most involved in accidental poisonings of drug etiology, and young adults between 18 and 25 years in intentional drug intoxications.

Medicines are used for therapeutic, preventive and diagnostic purposes, being essential in functions of their benefits such as minimizing suffering and clinical manifestations resulting from different pathologies, thus improving the quality and life expectancy of the population (Gonçalves and Costa 2018). Although the contribution of medicines as therapeutic tools is undeniable, one cannot fail to consider the numerous problems related to the use of these agents, as well as the impact that exacerbated, incorrect or abusive use causes in health systems (Zacchi 2020).

Despite the numerous prevention campaigns and the efforts of health authorities to warn about the risks associated with the use of medicines, the number of exogenous poisonings involving these therapeutic agents still large. According to estimates by the World Health Organization (WHO), annually, between 1.5% and 3.0% of the world population are subject to cases of exogenous poisoning with drugs, of which 0.1 to 0.4% may progress to death. In the case of Brazil, this number corresponds to 4.8 million people (Brasil 2018).

On the other hand, it is often said that the use of medicinal plants is a safe alternative and does not carry any risks unlike synthetic medicines. However, according to statistical data from Department of Informatics for the Unified Health System (DATASUS), it is possible to analyze the reality in Brazil regarding poisonings with synthetic medicines and toxic plants. Many of the plant species that cause poisoning are ornamental, being inside the residence. Other plants can also cause poisoning due to the pursuit of recreational use as they have hallucinogenic effects, but they sometimes cause damage due to the wrong therapy or lack of information on the correct dosage (Villalobos 2000).

In view of the data exposed, this study is justified by the relevance of the theme for public health and also by the need for current studies capable of promoting a delineation of the local epidemiological scenario and the risk factors associated with exogenous intoxication, so that coping, prevention and control strategies can be implemented.

Thus, the objective of this research was to analyze retrospectively the epidemiological profile of notifications of acute poisoning caused by drugs and plants that occurred in the municipality of Maringá, Paraná in the period from 2012 to 2022 from the data provided by the Information System of Notifiable Diseases (SINAN 2023).

METHODOLOGY

This is an epidemiological, descriptive, quantitative study with literature review, elaborated from the data made available by the DATASUS and from the Information System of Notifiable Diseases (SINAN). In this system was consulted the application TABNET, a tabulator of public domain and in it accessed the option epidemiology and morbidities and later the notifications for exogenous poisonings caused by drugs and plants.

The population of this study was composed of all cases of exogenous drug poisoning and toxic plant reported in the municipality of Maringá-Paraná in the period between 2012 and 2022. From these cases, the following sociodemographic variables were analyzed: age group, gender, schooling, race, circumstance of intoxication and clinical evolution. The data obtained were attached to a spreadsheet in the Microsoft Office Excel 10.0 software and evaluated through simple descriptive statistics. Because it is a secondary study, that is, from the use of computerized public data, it was not necessary to submit this study for consideration by the Research Ethics Committee of the Ingá University Center (UNINGÁ).

RESULT AND DISCUSSION

The data available in the SINAN database indicate that, in the time frame analyzed, 5605 cases of exogenous drug poisoning and 138 cases of plant poisoning were reported in the municipality of Maringá-Paraná, Brazil, 2012 and 2022.

These results indicate that exogenous intoxication is a notable public health problem in the municipality studied, given the high frequency of notifications during the period investigated. It is very impressive how the number of cases reported in Maringá between 2012 and 2022 also exceeds the cases reported in the same period by other municipalities in the state, such as Cascavel (3896 cases), Foz do Iguaçu (3138), Londrina (3429), São José dos Pinhais (2344 cases) and Ponta Grossa (2116).

This important difference in the number of

cases among the municipalities of the state can be, in fact, attributed to a higher number of toxicological accidents involving drugs in Maringá, but it may also result, among other factors, from underreporting by other municipalities.

In this context, a service performed by the pharmacist that significantly contributes to improving the notification, evaluation and management of adverse drug events is pharmacovigilance. This service allows the identification, understanding and prevention of problems related to medicines and plants, in addition to the implementation of appropriate corrective measures, which helps in the management of poisonings. Furthermore, its purpose extends to guiding other health professionals and the general population, promoting clinical training, ensuring notifications are carried out, in addition to collaborating in the development of public health policies (UFCG, 2023).

Ordinance No. 204, of February 17th, 2016, provides for the need for compulsory notification of some infectious diseases and cases of exogenous intoxication. Therefore, all of the incidents must be notified and investigated, in order to evaluate them epidemiologically and create prevention and control strategies. Despite this, the lack of commitment by the part of local health authorities in sending these compulsory notifications is still notable, which ends up resulting in a high number of underreporting in DATASUS, which underestimates the actual number of cases (Araújo et al. 2021).

A study conducted by Almeida et al. (2020) demonstrated that acute and severe poisonings occurring in Brazil are usually attended and reported in health units of medium and high complexity, however, mild and chronic cases are often not notified. These caseshinder the real understanding of the epidemiological scenario related to exogenous poisonings in the country.

SINAN data show that in 2017, in the municipality of Maringá, there was the highest number of notifications of drug poisoning, with 938 cases and for plant poisoning there were 29 cases in 2016. It is noted that there was a stability in the number of cases reported between 2018 and 2019, with a significant drop in notifications in subsequent years (Table 1).

The greater number of cases in 2017 (n=938) for drug and in 2016 (29) for plants may be associated with factors such as greater efficiency of notification services; gaps in actions to prevent toxicological accidents or even due to the ease of acquisition of pharmacological substances (Chaves et al. 2017). In a recent study, Rodrigues (2022) also observed a significant drop in cases of exogenous poisoning reported between the years 2020 and 2021 and attributed this finding to the eminence of the COVID-19 pandemic in this same period. According to this author, the pandemic has caused authorities and health professionals to focus their efforts on the control and treatment of the disease, impairing the performance and quality of services in other areas of care.

Table 1. Number of cases of exogenous drug and plants poisoning in the municipality of Maringá-Paraná in the last 10 years (2012-2022).

Year of notification	Number of cases (n) Drug	Number of cases (n) Plant
2012	255	12
2013	472	6
2014	174	7
2015	246	10
2016	758	30
2017	938	14
2018	668	16
2019	700	10
2020	397	7
2021	492	18
2022	505	8
Total	**5605**	**138**

Source: Ministry of Health/SVS - Information System of Notifiable Diseases - SINAN Net.

The analysis of the sociodemographic data of these notifications indicate that the number of poisonings was higher in females (71% and 59.4%) This finding is consonant with other studies from different regions of the national territory (Timóteo et al. 2020; Soares et al. 2021; Fernandes et al. 2021; Silva et al. 2021; Nepomuceno et al. 2023). Among the reasons that justify the higher occurrence of drug toxicology accidents among women are the fact that they are more concerned with health and culturally use more medications medicinal plants than men, thus increasing the risk of toxicological exposure (Rangel and Francelino 2018; Fernandes et al. 2021). In addition, research indicates that women self-medicate more and are more often involved in hospitalizations for intentional ingestion of medications, here including suicide and abortion attempts (Mendes and Pereira 2017; Timóteo et al. 2020; Fernandes et al. 2021).

Regarding race, white individuals (49% and 43.5%) had higher rates of exogenous intoxication, followed by individuals self-reported as mixed race (13.2% and 5.1%) and black (2.7% and 3.6%), indigenous and yellow (1% and 0%), ignored or

blank (34.1% and 47.8%). A study conducted by Gonçalves and Costa (2018) in the state of Santa Catarina also identified that there was a highlight for drug poisoning in individuals of white ethnicity. These authors point out that the classification of self-perception of ethnicities is something subjective and may be impaired, considering a general tendency of the population to declare itself white. According to Machado et al. (2021), although the race/color criteria are a complex variable to be analyzed, their use should remain, since the verification of ethnic-racial disparities favors the elaboration of public policies aimed at reducing possible inequalities.

The analysis of the data collected in TABNET in relation to schooling indicates that most individuals intoxicated with medications had completed middle school (49.1% and 10.9%), followed by those who were attending or completed higher education (16% and 1.5%) and elementary school (10.9% e 27.5%). Illiterate totaled 0.6% and 0.7%. Among those for whom this criterion does not apply, due to insufficient school age, they totaled 13.9% and 52.2%. Ignored or blank (9.5% and 7.2%) (Table 2).

Studies show that a population with a low educational level is more susceptible to the dangers of exogenous intoxication. The lack of knowledge about the harms and the correct use of medications contributes to a possible toxicological accident (Leão and da Silva Júnior 2020; Marques 2023).

Although low educational level is a risk factor for the occurrence of toxicological events, research indicates that having a higher level of educational instruction also favors drug poisoning. Silva et al. (2021) state that the higher the schooling, the greater the self-medication, because thus, the individual becomes more confident to self-medicate. The findings of our research confirm this hypothesis by evidencing that the second highest portion of the notifications of the municipality were of individuals with complete graduation.

Regarding the variable age of the intoxicated by drug, it is noticed that, of the 5605 reported cases, 3556 cases occurred in adults (63%) and 2049 cases in children and adolescents (37%). It is different when we talk about plant poisoning with 138 reported cases, 88 cases were in children (63.7%) and 50 cases were in adults (36.3%). Among adults, the

Table 2. Sociodemographic characteristics of cases of exogenous drugs and plants poisoning reported in the municipality of Maringá-Paraná in the last 10 years (2012-2022).

Variables	Cases of Exogenous drug poisoning (n)	Drugs poisoning (%)	Cases of Exogenous plants poisoning (n)	Plants poisoning (%)
Sex				
Male	1631	29.0	56	40.6
Female	3974	71.0	82	59.4
Race				
White	2751	49.0	60	43.5
Brown	743	13.2	7	5.1
Black	139	2.7	5	3.6
Indigenous	18	0.3	0	0
Yellow	41	0.7	0	0
Ignored or blank	1913	34.1	66	47.8
Schooling				
Not applicable	780	13.9	72	52.2
Illiterate	36	0.6	1	0.7
Elementary school	610	10.9	38	27.5
Middle school	2753	49.1	15	10.9
Higher education	896	16.0	2	1.5
Ignored or blank	530	9.5	10	7.2
Total	**5605**	**100**	**138**	**100**

Source: Ministry of Health/SVS - Information System of Notifiable Diseases - SINAN Net.

majority of notifications occurred between 20 and 39 years (68%) and 40 - 59 years old (36%) for plant poisoning. Among children and adolescents, it is noticed that there was a predominance of exogenous intoxication in the age group between 1 and 4 years for both (29.7% and 67%), decreasing between 10 and 14 years, rising again after 15 years (44.1%) (Table 3).

This age pattern for adults is similar to previously conducted national studies (Silva and Costa 2017; Sereno et al. 2020). In this investigation, in adulthood, the highest number of notifications occurred in the age group between 20 - 39 and 40 - 59 years old. This data may appear to be related to the fact that this age group has a greater tendency and autonomy to consume drugs of abuse and medications or, in the case of plant poisoning, it may be related to fear of inappropriate use for some disease or error in identifying the plant species, thus increasing the risk of accidental or intentional exposure (suicide) (Souza and Andrade 2021).

A research conducted by Zanette and Evangelista (2022) identified a predominance of exogenous intoxication in children between 1 and 4 years with rates of 61.6%. Our results indicate that this age group is the second with the most predominance cases of drug poisoning and the first for plants. It shows that this age group deserves attention from the community and public health managers, since it is proven to be a group of high vulnerability to this disease.

Toxicological events caused by medications in childhood are usually accidental and occur mainly at lunchtime, when those responsible are busy with household chores and children are hungry (Gomes and Costa 2018). Among the various factors that favor them, the following stand out: the details of child development manifested by a natural tendency to explore the environment through touch and taste, thus favoring the accidental ingestion of toxic agents (Brito et al. 2019; Mathias et al. 2019); lack of supervision by those responsible; inadequate storage; errors related to medications and self-medication; (Silva and Oliveira 2018; Rodrigues 2022). It is also highlight the attractive characteristics of drug packaging and the absence of safety mechanisms that favor accidents, in addition to self-medication and the lack of formulations produced especially for the pediatric population (Mendes and Pereira 2017; Bego et al. 2020).

There is a significant increase in cases of drug poisoning in adolescence, especially between the ages of 15 and 19. For Souza and Andrade (2021) the immaturity, overcharging and insecurity added to common emotional problems at this stage of life has increased the risk of intoxication in this population, since many adolescents tempted to commit suicide resort to the abusive use of medications. This statistic points to the need to promote discussions about the risks of accidents

Table 3. Age group of the population intoxicated by drugs and plants in the municipality of Maringá-Paraná in the last 10 years (2012-2022).

Children and Adolescents				
Age	**n (drug)**	**% (drug)**	**n (plant)**	**% (plant)**
< 1 year	78	3.8	5	5.7
1-4 years	609	29.7	59	67.0
5- 9 years	156	7.6	17	19.3
10-14 years	304	14.8	5	5.7
15-19 years	902	44.1	2	2.3
Total	**2049**	**100**	**88**	**100**
Adults				
Age	**n (drug)**	**% (drug)**	**n (plant)**	**% (plant)**
20-39 years	2417	68.0	16	32.0
40-59 years	931	26.1	18	36.0
60-64 years	58	1.7	7	14.0
65-79 years	111	3.2	7	14.0
80 years or older	39	1.0	2	4.0
Total	**3556**	**100**	**50**	**100**

Source: Ministry of Health/SVS - Information System of Notifiable Diseases - SINAN Net.

of this nature in adolescence and to the creation of surveillance and prevention strategies in the social and domestic environment (Vilaça et al. 2019).

Regarding the circumstance of intoxication, suicide attempts accounted for 72.3% of all cases of drug poisoning, characterizing an absolute majority, followed by accidental use with 14%. It is different for the circumstances of plant intoxication, which is 92.1% due to accidental use. Other circumstances together totaled 12.3% and 6%, which can be seen in detail in Table 4.

Statistics from the World Health Organization (2021) indicate the occurrence of more than 700000 deaths by suicide in 2019. It is the fourth leading cause of death worldwide and the third leading cause among women aged 15 to 29. For Veloso et al. (2017) suicide exposes the discomfort and psychological suffering of individuals and constitutes an important public health problem.

The WHO points out that for every suicide that occurred in the world, 20 previous attempts were made, and this behavior is an important marker of suicide risk in society. Generally, the individual at risk of suicide presents an associated mental disorder and/or problems related to gender inequalities and intrafamily violence, so mental health care actions are fundamental (Dantas 2018). In addition, the high frailty, the lack of courage and the feeling of hopelessness prevent the subject from seeking adequate health support, thus contributing to the inappropriate and abusive use of psychotropic medications becoming the most accessible and available means for the practice of self-extermination (Santos et al. 2015).

Thus, pharmacotherapeutic follow-up and pharmaceutical care are actions that can reduce the risks of intoxication in individuals with psychological distress (Gretzler et al. 2018; Araújo et al. 2021). The pharmacist can contribute, in a direct and accessible way, to the health of the population, especially by providing guidance that minimizes the risks of irrational use of medications and ensures better adherence to pharmacological treatment (Thomazin and Alves 2022).

Regarding the clinical outcome of the cases analyzed, the present study found that 96.8% and 97.9% were poisoned by medicines and plants, respectively, which progressed to cure without sequelae and 38 cases to cure with sequelae (0.6 %), as well as for healing with sequelae for plant poisoning, which was 1 case (0.7%). A total of 34 deaths were reported during the study period (0.6%), as can be seen in Table 5.

Although it has been found that the vast majority of cases evolve to a favorable outcome, toxicological episodes promote a lot of discomfort and, in some situations, intoxication can leave irreversible sequelae that culminate in the need for expensive hospital care and generate exacerbated suffering in victims and their families (Toscano et al.

Table 4. Circumstance in which the cases of exogenous intoxication by drugs and plants reported in the municipality of Maringá-Paraná occurred in the last 10 years (2012-2022).

Circunstance	**Number of cases of intoxication**			
	n (drug)	**% (drug)**	**n (plant)**	**% (plant)**
Habitual use/prescription	127	2.3	1	0.7
Accidental use	836	14.9	127	92.1
Administration Error	201	3.7	0	0
Self medication	248	4.5	0	0
Abuse	91	1.7	4	2.9
Suicide attempt	4058	72.3	1	0.7
Violence/homicide	8	0.1	0	0
Abortion	16	0.2	0	0
Ignored or blank	20	0.3	0	0
Food intake	0	0	2	1.4
Others	0	0	3	2.2
Total	**5605**	**100**	**138**	**100**

Source: Ministry of Health/SVS - Information System of Notifiable Diseases - SINAN Net.

Table 5. Evolution of cases of exogenous poisoning in Maringá-PR in the last 10 years (2012-2022).

Evolution	Number of cases			
	n (drug)	% (drug)	n (plant)	% (plant)
Cure without sequelae	5427	96.8	135	97.9
Cure with sequelae	38	0.7	1	0.7
Death from exogenous intoxication	34	0.6	0	0
Death from another cause	8	0.2	0	0
Segment loss	82	1.5	1	0.7
Ignored or blank	16	0.2	1	0.7
Total	**5605**	**100**	**138**	**100**

Source: Ministry of Health/SVS - Information System of Notifiable Diseases - SINAN Net.

2017). For Napomuceno et al. (2023) exogenous intoxications have avoidable characteristics, so that managers and communities need to be co-responsible for the prevention and control of these diseases.

The work carried out from secondary data revealed the lack of completeness, with a large amount of data ignored or blank in the SINAM notifications, which, in a way, may have masked the real situation of the problem in the municipality in question.

As difficulties for the accomplishment of this research, it is noted that some relevant information was not available in the DATASUS database, such as, for example, the type of medication involved, the place where most of the cases occurred and in what way or by what route the intoxication occurred.

CONCLUSION

Medicines and medicinal plants contribute greatly to the quality of life of the population due to their potential to prevent, treat and diagnose diseases, however, over the years, they have become one of the main causes of accidental or intentional toxicological accidents.

The analysis of epidemiological data of cases of drug and plant poisoning in the municipality of Maringá is prevalent and is in line with other national studies of similar methodologies. This scenario points to the need to make the population aware of the risks of incorrect and indiscriminate use of medicines/plants and to program campaigns for their rational use.

Suicide was the main circumstance related to exogenous drug intoxication, especially in young adults. Therefore, focusing efforts in the area of mental health becomes necessary and urgent. In addition to improving access to information for adults on the use and correct identification of medicinal plants.

The findings of this research are crucial for the elaboration of health policies and point to the need not to neglect information regarding cases of exogenous poisoning so that it is possible to promote prevention in an assertive, targeted and effective way.

Finally, the crucial role of the pharmacist as a health professional capable of resolving doubts and guiding the community about the risks and errors related to medications and plants is highlighted.

AUTHOR'S CONTRIBUTION

Data curation, formal analysis and writing – original draft: BFB; Conceptualization and supervision: TAU; Writing – review & editing: CBL, DC, APMT, and RTS; Conceptualization and project administration: DCMA.

CONFLICT OF INTEREST

The authors have no conflicts of interest to declare.

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