



Exogenous intoxication: epidemiological analysis of reported cases in children in the city of Maringá, Brazil

Intoxicação exógena: análise epidemiológica dos casos notificados em crianças no Município de Maringá (PR)

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RESUMO

A intoxicação exógena entre crianças é um agravo que apresenta alta ocorrência e morbidade e constitui-se um importante problema de saúde pública. O objetivo desta pesquisa foi descrever o perfil epidemiológico dos casos de intoxicação exógena na população de 0 a 14 anos na cidade de Maringá (PR) entre os anos de 2017 a 2021. Trata-se de uma análise epidemiológica descritiva, retrospectiva e transversal realizada a partir dos dados das notificações compulsórias no Sistema de Informação de Agravos de Notificação. Neste recorte temporal foram notificados 1.223 casos de intoxicação exógena, a maioria ocorrida entre indivíduos de raça branca, com idade entre 1 e 4 anos, não havendo diferença entre os gêneros. Medicamentos foram os agentes tóxicos mais associados aos acidentes e 98,9% dos casos evoluíram para cura sem sequelas. Considerando a vulnerabilidade das crianças à intoxicação exógena, é de fundamental importância identificar as características epidemiológicas desse agravo nesta população.

Palavras-chave: Epidemiologia. Intoxicação. Saúde da criança. Medicina de Emergência.

ABSTRACT

Exogenous intoxication among children is a disease with high occurrence and morbidity and is an important public health problem. The objective of this research was to describe the epidemiological profile of exogenous poisoning cases in the population aged 0 to 14 years in the city of Maringá, Brazil between the years 2017 to 2021. This is a descriptive, retrospective and cross-sectional epidemiological analysis carried out from the data of compulsory notifications in the Notifiable Diseases Information System. In this time frame, 1,223 cases of exogenous intoxication were reported, most occurring among white individuals, aged between 1 and 4 years, with no difference between genders. Medicines were the toxic agents most associated with accidents and 98.9% of the cases progressed to cure without sequelae. Considering the vulnerability of children to exogenous intoxication, it is of fundamental importance to identify the epidemiological characteristics of this disease in this population.

Keywords: Epidemiology. Poisoning. Child health. Emergency Medicine.

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INTRODUÇÃO

Acute exogenous intoxication among children is a high occurrence and morbidity disease in pediatric urgency and emergency services and is related to

increased health costs, physical and emotional damage to the child, irreversible sequelae and even death, being therefore characterized as an important public health problem^{1,2}.



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, especially at home or around the home, such as toxins from venomous plants or animals, pesticides, medications, products for industrial use, alcohol, illicit drugs and household cleaning products³.

As of 2016, exogenous intoxication became a condition of compulsory notification according to GM Ordinance No. 204/2016⁴, thus, all occurrences of this nature became obligatorily notified and investigated, with a view to knowing the epidemiological profile of these diseases and favoring the creation of prevention strategies in public health.⁵

Poisonings, especially unintentional ones, represent one of the main causes of care in pediatric emergency services. Studies show that, at present, children constitute a population group at greater risk for accidents of this nature.⁶ Several authors point out that the great vulnerability of children to accidents involving exogenous intoxication may be related to the inherent characteristics of child development, such as physical and psychological immaturity, inability to identify and prevent dangerous situations, great curiosity towards the external

environment and the tendency to imitate and repeat adult behaviors^{6,7,8}.

Another aggravating factor related to accidental poisoning is related to the child's surroundings, such as inattention or lack of adequate supervision by parents or guardians, their lack of knowledge about the toxicity of agents and inadequate storage of chemicals and medications, increasing the risk of exposure in homes⁹.

Acute exogenous intoxication involving children tends to be a potentially serious event and is therefore essential to seek urgent or emergency care immediately, especially in situations characterized as acute, linked to high exposure and with life-threatening clinical signs.¹⁰ Although they are multicausal and complex events, exogenous intoxications can be avoided, and the role of health professionals, especially nurses, in the promotion and prevention of this important disease is essential.^{1,11,12}

According to data from the National Toxicological Information System (SINITOX), in 2017, 16,599 cases of intoxication were registered in Brazil among children aged 0 to 9 years, which corresponded to 21.8% of all registered cases. in the country in the same period, being caused mainly by medicines (27.1%), bites of venomous and poisonous animals (23.3%) and sanitizing and household cleaning products (8%)¹³.

In view of the complexity and specificities that involve the phenomenon of acute exogenous intoxication among children and adolescents and also the scarcity of epidemiological studies carried out in the northern region of Paraná on this subject, the objective of this research is to describe the epidemiological profile of compulsory notifications. by exogenous intoxication among children and adolescents from 0 to 14 years of age in the city of Maringá, Brazil between the years 2017 to 2021.

METODOLOGIA

A descriptive, cross-sectional epidemiological analysis was carried out, with a quantitative and retrospective approach, in which data referring to cases of exogenous intoxication in children under 14 years old reported in the city of Maringá, Brazil in the Notifiable Diseases Information System (SINAN) were analyzed.) made available by the Department of Informatics of the Unified Health System (DATASUS) between 2017 and 2021.

To obtain the data, the procedure adopted consisted of: accessing the Information System on Notifiable Diseases (SINAN), Health Information (TABNET) and, in sequence, the “Epidemiological and Morbidity” options, then, later, select- if

exogenous intoxication in the age group from 0 to 14 years old tracing the data collection between the years 2017 and 2021.

The variables involved in the research of reported cases were the following: regional health of notification, age group, schooling, race, zone of occurrence, toxic agent, circumstance and outcome. The results were entered in Microsoft Office Excel 2013 spreadsheets and analyzed using simple descriptive statistics and are presented in the form of figures and tables.

As it is a public domain database, it was not necessary to submit the work to the Research Ethics Committee, according to the terms of the Sole Paragraph of art. 1 of Resolution No. 510/2016 - CNS (National Health Council).

RESULTADOS

The analysis of compulsory notifications from SINAN indicates that between the years 2017 and 2021, there were 148,645 cases of intoxication in Brazil involving children and adolescents aged 0 to 14 years, most of them from the Southeast region (41.6%). In the South region, which includes the municipality object of this study, 25,921 cases (17.5%) were reported in the same period, as seen in Table 1.

Table 1. Number of cases of exogenous poisoning in children aged 0 to 14 years according to the Brazilian region from 2017 to 2021

Region	North	North East	Southeast	South	Midwest	Total
2017	1.209	8.525	13.079	4.777	2.487	30.077
2018	1.523	8.789	13.406	5.387	2.684	31.789
2019	1.658	9.271	14.037	5.720	3.149	33.835
2020	1.263	6.591	10.390	4.994	2.676	25.914
2021	1.275	6.896	10.963	5.043	2.853	27.030
Total	6.928	40.072	61.875	25.921	13.849	148.645
%	4,7	26,9	41,6	17,5	9,3	100%

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

The State of Paraná is divided into 4 health macro-regions (East, West, North and Northwest), which in turn are subdivided into 22 other regions. When distributing the reported cases in the state of Paraná among its 22 health regions, it is noted that the 15th Regional, which comprises the municipality object of this

study, was the one with the most expressive prevalence rate of exogenous intoxication (13.5 /1000 inhabitants), when compared to other regions. The second region with the highest number of cases was Cascavel (12.0/1000 inhabitants) and the third was Foz do Iguaçu (9.4/1000 inhabitants) (Table 2).

Table 2. Prevalence rate of exogenous intoxication in children aged 0 to 14 years per thousand inhabitants between 2017 and 2021 according to the Health Region

Health Regional	2017	2018	2019	2020	2021	Total	Taxa
1 ^a - Paranaguá	50	45	67	47	71	280	4,2
2 ^a - Metropolitana	832	901	992	911	772	4.408	5,8
3 ^a - Ponta Grossa	49	74	96	178	159	556	3,7
4 ^a - Irati	40	59	56	41	48	244	6,4
5 ^a - Guarapuava	70	78	111	77	68	404	3,9
6 ^a - União da Vitória	37	33	43	39	25	177	4,5
7 ^a - Pato Branco	79	88	82	122	113	484	8,3
8 ^a - Francisco Beltrão	44	81	71	66	83	345	4,9
9 ^a - Foz do Iguaçu	157	172	159	165	155	808	9,4
10 ^a - Cascavel	224	336	280	223	280	1.343	12,0
11 ^a - Campo Mourão	47	61	90	63	90	351	5,8
12 ^a - Umuarama	40	32	33	35	57	197	3,8
13 ^a - Cianorte	40	43	50	54	62	249	8,0
14 ^a - Paranavaí	68	73	74	39	56	310	5,7
15 ^a - Maringá	541	380	345	374	431	2071	13,5

16^a - Apucarana	95	85	92	59	35	366	4,9
17^a - Londrina	262	326	323	234	314	1.459	8,0
18^a - Cornélio Procopio	25	28	29	24	49	155	3,8
19^a - Jacarezinho	18	17	28	33	38	134	2,3
21^a - Telêmaco Borba	19	10	24	17	26	96	2,1
22^a - Ivaiporã	19	14	39	23	33	128	5,1
20^a - Toledo	57	76	105	88	93	419	5,6

Fonte: Ministério da Saúde/SVS - Sistema de Informação de Agravos de Notificação - Sinan Net.

Maringá, Brazil was the city of the 15th regional health chosen for the detailed analysis of cases of exogenous intoxication that occurred among children aged 0 to 14 years. We observed that in the last 5 years, 1,223 cases of exogenous intoxication in this population were reported in the municipality.

Data released on Tabnet DATASUS demonstrate that most of the 1,223 cases of exogenous intoxication in children and adolescents reported in the municipality of Maringá, Brazil between 2017 and 2021 occurred in 2017 (33.8%), with a significant drop in notifications in subsequent years (Graph 1).

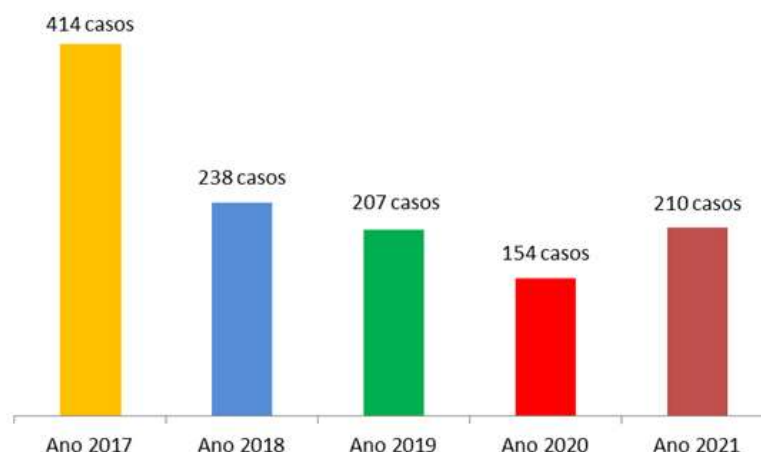


Gráfico 1. Casos de intoxicação exógena em crianças de 0 a 14 anos notificados em Maringá, Brazil entre os anos de 2017 e 2021.

Fonte: Ministério da Saúde/SVS - Sistema de Informação de Agravos de Notificação - SINAN Net.

Specific information on the sociodemographic variables associated with these notifications is contained in Table 3. The data available at SINAN showed that there was no difference in the number of intoxications between males and females, although there was a predominance of

exogenous intoxication in children between 1 to 4 years of age (61.6%), a reduction in the number of cases in the age group from 5 to 9 years old (11%), increasing again between 10 and 14 years of age (20.2%). The analysis of the data collected in TABNET in relation to the schooling

variable showed a prevalence of cases in which schooling is not applied (74.7%), that is, most children were not yet of school age, being, therefore, consistent with the largest number of intoxicated children in the 1 to 4

year old age group. With regard to race, we identified that white individuals (63.9%) had higher rates of exogenous intoxication, followed by brown (15%) and black (3.1%).

Table 3. Sociodemographic characteristics of children aged 0 to 14 years reported with exogenous intoxication between 2017 and 2021 in Maringá, Brazil

Variables	Exogenous poisoning cases	
Sex		%
Male	612	50
Feminine	611	50
Ignored or not informed	0	0
Age	n	%
< 1 year	88	7,2
1-4 years	753	61,6
5-9 years	134	11,0
10-14 years	248	20,2
Ignored or not informed	0	0
Education	n	%
Not applicable	914	74,7
Complete primary education	59	4,9
5th to 8th grade incomplete	176	14,4
Complete primary education	27	2,3
Incomplete high school	37	3,0
Complete high school	4	0,3
Ignored or not informed	6	0,4
Race	n	%
White	781	63,9
Brown	184	15,0
Black	38	3,1
Indigenous	15	1,2
Yellow	3	0,2
Ignored	202	16,6
Total	1.223	100

Fonte: Ministério da Saúde/SVS - Sistema de Informação de Agravos de Notificação - SINAN Net.

Table 4 contains the types of agents causing reported exogenous

intoxications. Medicines represent more than 50% of exogenous intoxications,

followed by household products (20.2%) and chemical products in general (8.4%). Toxic plants, rodenticides and cosmetics account for more than 10% of reported poisoning cases.

Table 4. Cases of exogenous intoxication in children aged 0 to 14 years according to the toxic agent between the years 2017 and 2021 in the city of Maringá, Brazil

Toxic agent	Number of cases	
	n	%
Medicines	636	52,0
Home use product	248	20,2
Chemical product	103	8,4
Toxic plant	45	3,7
Rodenticide	42	3,4
Cosmetic	37	3,0
Household pesticide	35	2,9
Drugs of abuse	26	2,1
Agricultural pesticide	18	1,5
Veterinary product	16	1,4
Metal	7	0,6
Other	7	0,6
Ignored or blank	3	0,2
Total	1.223	100

Fonte: Ministério da Saúde/SVS - Sistema de Informação de Agravos de Notificação - SINAN Net.

As for the circumstance of intoxication, the accidental form was the most identified (76.7%), followed by suicide attempt (12.8%) (Table 5).

Table 5. Circumstances of the occurrence of exogenous intoxication in children aged 0 to 14 years between 2017 and 2021 in the city of Maringá, Brazil

Circumstance	Number of cases	
	n	%
Accidental use	938	76,7
Suicide attempt	157	12,8
Admin error	47	3,9
Self-medication	26	2,1
Others	52	4,3
Ignored or blank	3	0,2
Total	1.223	100

Fonte: Ministério da Saúde/SVS - Sistema de Informação de Agravos de Notificação – SINAN Net.

Regarding the clinical outcome of the cases analyzed, the present study found that 98.9% of the 1,223 reported cases evolved to a cure without sequelae and 5

cases (0.4%) to a cure with sequelae. Two deaths were reported during the study period (0.2%), as shown in Table 6.

Table 6. Evolution of cases of exogenous intoxication in children aged 0 to 14 years between 2017 and 2021 in the city of Maringá, Brazil

Evolution	Number of cases	
	n	%
Healing without sequel	1.210	98,90
cure with sequel	5	0,40
Death from exogenous intoxication	2	0,20
segment loss	5	0,40
Ignored or blank	1	0,08
Total	1.223	100

Fonte: Ministério da Saúde/SVS - Sistema de Informação de Agravos de Notificação - SINAN Net.

DISCUSSÃO

Exogenous intoxication in childhood and youth is an important public health problem given the high vulnerability and inability of children to take care of themselves and also the significant economic and social impacts generated by injuries of this nature¹⁴.

The high frequency of emergency care directed to this type of disease in the city of Maringá, Brazil points to the importance of knowing the local epidemiological scenario, as well as the groups and risk factors involved so that coping strategies, prevention and adoption of measures preventables can be implemented.

Maringá is a municipality located in

the Northwest region of Paraná, and together with 30 other municipalities, it includes the 15th regional Health. Data from SINAM indicate that this region recorded the highest prevalence rate of exogenous intoxication when compared to other regions.

In the last 5 years, 1,223 cases of exogenous intoxication in the age group between 0 and 14 years were reported in the city of Maringá, Brazil, cases that had the sociodemographic variables of the patients analyzed in this research.

No difference was observed in the number of intoxications between males and females. Most studies available in the literature, however, indicate that boys are commonly more prone to complications of this nature, contrary to the findings of this

research^{7,15,16,17}.

Exogenous poisoning is one of the main accidents involving children, accounting for about 7% of all accidents in children under five years of age, and approximately 2% of all childhood deaths worldwide¹⁸. Our findings are consistent with other studies in the literature, which show that the age group from 1 to 4 years old is significantly more susceptible to accidental intoxications^{7,15,19,20}.

Several authors justify that this fact is due to the intrinsic particularities of child development, since this is the phase in which children begin to walk, explore and analyze the environment, thus favoring the contact and ingestion of toxic agents^{7,15,19}. This statistic points to the need to promote discussions about the risks of accidents of this nature in childhood, and also to create surveillance and prevention strategies in the domestic environment¹⁶.

Regarding the schooling variable, there was a prevalence of cases in which schooling was not applied, that is, the children were not yet of school age, which is consistent with the fact that most intoxicated children are in the age group of 1 to 4 years old. This finding is similar to other studies with the same methodological design^{21,22}.

With regard to race, white individuals showed higher rates of exogenous intoxication. This same pattern in the correlation between race and

exogenous intoxication had been previously reported by other studies^{23,24,25}.

The classification on the self-perception of ethnicities is subjective, which may contribute to the non-representation of this variant in certain locations, in addition, the incidence of exogenous intoxication in relation to race in different locations of the country is divergent, mainly due to its extensive territorial area and its different colonizations.⁵.

Regarding the place where the intoxications occurred, the lack of information provided by SINAN did not allow the identification of the area of residence, with all cases reported as ignored or blank. However, most national studies analyzed to support this research indicate that, on average, 90% of accidents with toxic agents occur within households^{11,22}.

In this study, drugs were the main cause of exogenous intoxication. This finding corroborates the results of several other studies carried out in different regions of the country.^{19,26,27,28,29} and also with information from the National Toxicological Information System (SINITOX)¹³ from Fundação Oswaldo Cruz that point to a prevalence of exogenous drug intoxication in all age groups since 2014.

The SINAN database does not provide information on which drug classes are most commonly related to accidents.

National surveys carried out in Rio Grande do Sul³⁰ e no Maranhão³¹ demonstrated that the drugs that cause acute intoxication in children and adolescents are not always specified by family members or patients in emergency services. However, according to these authors, antiepileptic, sedative-hypnotic, antiparkinsonian drugs, systemic antibiotics, analgesics, non-opiate antipyretics and anti-inflammatory drugs are the most commonly reported classes. These findings denounce a child's environmental exposure to more than one therapeutic class, many of them with high risk and toxicity.

There are several factors associated with the greater number of toxicological accidents caused by drugs, among which we can mention: easy access to drugs; improper storage thereof; caregivers' inattention; lack of guidance regarding the use and risks of therapy^{6,11,31}. Errors related to medication administration, polypharmacy and self-medication are still reported, which are important public health problems that favor exogenous intoxication.²²

Household cleaning agents, that is, chemical products intended for cleaning, sterilization or disinfection at home, were the second class of agents most commonly related to intoxication in children. A survey carried out in the state of Bahia showed values of intoxication by these products similar to those identified in this research (29,4%)⁷.

Among household cleaning products of considerable toxicological relevance, the following stand out: hypochlorite (chlorine and bleach), kerosene, turpentine and caustic soda^{15,32}. The lack of knowledge and attention to the risks of these products, as well as the inadequate supervision of children, contribute to the occurrence of intoxication with household cleaning products in childhood¹⁵.

In addition, improper storage of these products and the attractive colors of substances and packaging favor accidents^{33,34}. The literature also points out that disorganized environments and families with many children, low income and little schooling cooperate for poisoning to occur³⁵.

As for the circumstance of intoxication, the accidental form was the most identified, followed by suicide attempt. These results are similar to other studies in the literature^{6,36,37}.

Most exogenous intoxications, especially in childhood, occur accidentally, are preventable and result from low incentives for preventive measures³⁸. In most cases, accidental events involving children are the result of negligence or inattention on the part of caregivers, and often, not knowing the product that caused the accident ends up delaying diagnosis and therapy³⁷. In this sense, studies indicate that the reduction of risk factors, such as lack of

surveillance of caregivers and incorrect storage of potentially toxic products, could reduce childhood toxicological accidents by 13 to 19%.³⁹

In general, exogenous intoxications result in significant morbidity, low lethality and short hospital stay¹⁵. The present analysis confirms this information by noting that the absolute majority of the reported cases evolved to a cure without sequelae, with notification of two deaths during the studied period.

Two studies carried out in the states of Sergipe³⁵ and Pernambuco²⁰ corroborate the present analysis by demonstrating that the cases of exogenous intoxication identified evolved to cure without sequelae with rates of 88.1% and 78.7%, respectively. Despite the expressive number of positive evolution of cases, the importance of controlling and preventing exogenous intoxications should not be excluded, since most are potentially preventable¹⁷.

The high vulnerability of children to exogenous intoxication points to the need to correctly identify the characteristics of this condition in this population. The findings of this study, by allowing the identification of risk factors related to child and adolescent intoxication, contribute to the adoption of health promotion and prevention measures and the minimization of the impacts of this phenomenon on public health.

CONCLUSION

The analysis of epidemiological data on cases of exogenous poisoning in children aged 0 to 14 years in the city of Maringá, Brazil indicates that the findings of this research are in line with other national studies with similar methodologies. Most exogenous intoxications in childhood occur in the age group between 1 and 4 years; there was no significant difference between the sexes and the white race prevailed over the others. These findings point to the need for awareness of caregivers and guardians to reinforce supervision of children, especially in the most vulnerable age group.

Medications were the toxic agents most frequently associated with accidents, followed by household products, and accidental intoxication events were predominant, reinforcing the need for safe and adequate storage of medications and other chemicals. Although most cases have evolved positively towards healing without sequelae, it is worth mentioning that most accidents could have been prevented or avoided.

Some relevant information was not available in the DATASUS database, such as the type of drug or chemical involved; the place where most of the cases occurred; and also the way in which the intoxication occurred, characterizing itself as a difficulty for the accomplishment of this research.

The results of this research indicate that exogenous intoxication among children is prevalent in the city of Maringá, Brazil, therefore, it is necessary to adopt prevention and control measures to minimize the risks of this disease in this population.

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