

Drug products intoxications in Brazil: An epidemiological view between 2012 and 2021

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Abstract— The present study aimed to perform an epidemiological analysis of cases of drug intoxication in Brazil from 2012 to 2021. For this, data available in the Notifiable Diseases Information System (SINAN) of the Informatics Department of the Unified Health System (DATASUS) were used, considering the drug product as a toxic agent. During the study period, there were 1,255,435 cases of intoxication in Brazil. Of these, 47.5% (n= 596,086) were caused by drug products, with prevalence in females (72.11%; n= 429,838), age group 20 to 39 years (42.06%; n= 250,718), ethnicity/white color (45.51%; n= 271,268) and schooling - high school (23.81%; n= 141,934). Regarding the circumstances that triggered drug intoxication, the main reason was the suicide attempt in 391,635 cases (65.70%), and the Southeast region presented the highest number of intoxications per drug (49.51%), followed by the South (21.80%) and Northeast region (18.71%). Most cases of drug intoxication were defined based on clinical criteria (68.24%) and only 3.35% on clinical and laboratory criteria, which evolved to cure without sequelae in 81.11% (n= 483,490) of the cases, with 1,233 deaths. These data reinforce the need for health education focused on the rational use of medications and the importance of health professionals in this process, such as pharmacists, which are the interface between the patient and the medication.

I. INTRODUCTION

Intoxication is defined as a clinical manifestation of harmful effect produced in a living organism as a result of the interaction of a toxic agent with this organism (Silva, 2018). Currently the major causes of intoxication are due to ingestion of contaminated food or drug products, handling or accidents with pesticides, consumption or accidents with

sanitary products (Lima, 2020). Among these, drug poisoning is one of the most alarming. By definition, drug intoxication consists of a series of clinical manifestations produced when a drug is administered or comes into contact with the body in doses above those recommended for treatment (Rangel & Francelino, 2018).

The main reason associated with this problem involving the drug product is its easy acquisition, with Brazil in fifth place in the world list of drug consumption and in first place in Latin America (Silva, 2019). Other factors that contribute to the high incidence of drug intoxication in Brazil include the variety of preparations available on the retail market, which may exhibit dubious safety and efficacy; proliferation of pharmacies and drugstores, which facilitate indiscriminate access to medication; medical prescription and dispensing errors; increased advertising in the pharmaceutical industry, in addition to weak preventive measures in the authorities' ability to carry out inspections and controls, and self-medication practices have led to irrational drug use (Serenó, 2021).

In Brazil, there is a scarcity of epidemiological data on toxicological information, due to the lack of standardization and storage of data on appropriate platforms, which hinders statistical analyses for better relocation of the patient by the multidisciplinary team (Silva, 2021). Fortunately, the data available in the Notifiable Diseases Information System (SINAN) are of great value to trace and understand the dynamics of a series of Brazilian health problems, such as drug intoxications. This is related to Ordinance No. 104 of January 25, 2011, which allowed exogenous intoxications to appear in the list of diseases, injuries and compulsory notification events throughout the country (Diógenes, 2022). Still, the impact of the COVID-19 pandemic on drug intoxication is unclear. Thus, the present study aims to perform an epidemiological analysis of cases of drug intoxication in Brazil from 2012 to 2021.

II. METHODOLOGY

The present work is a descriptive and quantitative population-based study, carried out with secondary data collected on the DataSUS website, from the Notifiable Diseases Information System (SINAN). Initially, the information was obtained from the health information section (TABNET) in the option "epidemiology and morbidities". Next, we selected the option "Diseases and Diseases of Notify - 2007 onwards (SINAN)" and "Exogenous Intoxication" notified in the entire Brazilian federative unit, in the period from 2012 to 2021. The drug product was considered as a toxic agent and the variables evaluated were: Gender, age group (years), race, education, circumstance, region of residence, Federation Unit, pregnant woman, confirmation criteria, and evolution. Descriptive statistics were applied in the tables and graphs, and the data were organized in spreadsheets and analyzed in

the Microsoft Excel® software, made available as absolute and relative frequency.

This study was conducted with secondary data from the public domain, so there was no need for submission to an ethics committee. Nevertheless, all procedures were performed in accordance with Resolution No. 466 of December 12, 2012 of the National Health Council.

III. RESULTS AND DISCUSSION

Between 2012 and 2021, there were 1,255,435 cases of intoxication in Brazil. Of these, 47.5% (n= 596,086) were caused by drug products, followed by drugs of abuse (12.8%; n= 160,995) and others (30.1%; n= 378,258), and 120,096 cases (9.6%) were classified as ignored/white. **Graph 1** shows the follow-up of cases of drug poisoning over the years in Brazil. However, it is worth mentioning that although intoxications are compulsory notification, there is an estimate that official records represent only 20% of cases that occur annually (SERENO, 2021). Thus, the reduction of cases in 2020 and 2021, in relation to 2019, may not reflect a real reduction in cases, which serves as a warning to the Centers for Information and Toxicological Assistance (CIATs) about the need and importance of notification (Silva & Álvares, 2019).

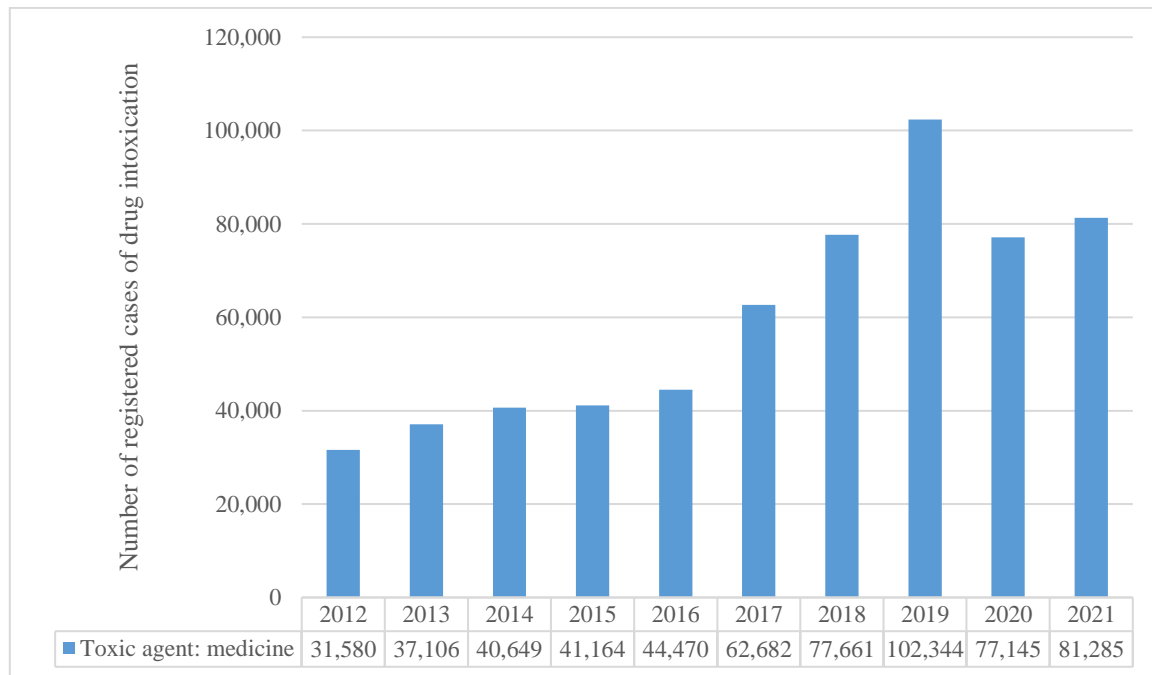
Table 1 presents the epidemiological variables related to cases of drug intoxication. There was a significant prevalence in females (72.11%; n= 429,838). The study conducted by Mota et al., (2020) also points to a greater number of cases in females, which may be related, in part, to the fact that women with suicidal thoughts try less aggressive methods than males, which are more interconnected to violent practices such as hanging or the use of firearms (Sousa, 2020). Regarding age, the age group from 20 to 39 years (42.06%; n= 250,718) was predominant, as reported in a previous study (Monte, 2016). This fact may be related to the higher consumption of psychotropic drugs in this population, which can lead to the use of these substances and suicidal behaviors (Rolim, 2021). In turn, white ethnicity/color (45.51%; n= 271,268) and high school education (23.81%; n= 141,934) were also the most prevalent, as reported in previous studies (Verdiono, 2022; Alvim, 2020).

Table 2 presents the circumstances that triggered drug intoxication, the main reason for suicide attempts in 391,635 cases (65.70%). According to Teixeira (2020), the suicide attempt occurs mainly in adolescence and adulthood, caused by the combination of a range of factors that lead the person to seek intentional intoxication. Furthermore, there are studies that point to a direct relationship between suicide attempts and the use of

medications (Gomes, 2020). The second most important cause of drug intoxication was reported as accidental (11.44%), which reinforces the need for public health

education policies, and the importance of pharmaceutical presence and guidance (Araújo, 2021).

Graph 1- Cases of drug poisoning in the period 2012-2021, Brazil.



Source: Ministry of Health/ Notifiable Diseases Information System (SINAN).

Table 1- Absolute and relative frequencies of drug poisoning cases by gender, age group, race and schooling, from 2012 to 2021, in Brazil.

Variable	N	%
Sex		
Male	166,158	27.88
Female	429,838	72.11
Ignored/White	90	0.01
Age group (years)		
< 1	10,762	1.81
1 to 4	51,676	8.67
5 to 9	16,780	2.82
10 to 14	38,130	6.40
15 to 19	103,491	17.36
20 to 39	250,718	42.06
40 to 59	103,421	17.35
60 to 64	7,591	1.27
65 to 69	4,919	0.82
70 to 79	5,579	0.94
≥ 80	2,935	0.49
Ignored/White	84	0.01

Race		
White	271,268	45.51
Black	26,306	4.41
Yellow	3,585	0.60
Brown	196,802	33.02
Indigenous	1,208	0.20
Ignored/White	96,917	16.26
Schooling		
Illiterate	2,636	0.44
Elementary school	119,019	19.97
Middle school	141,934	23.81
Higher education	31,802	5.33
Does not apply	71,761	12.04
Ignored/White	228,934	38.41

Source: Ministry of Health/ Notifiable Diseases Information System (SINAN).

Table 2- Condition Notifications in the period 2012-2021, Brazil.

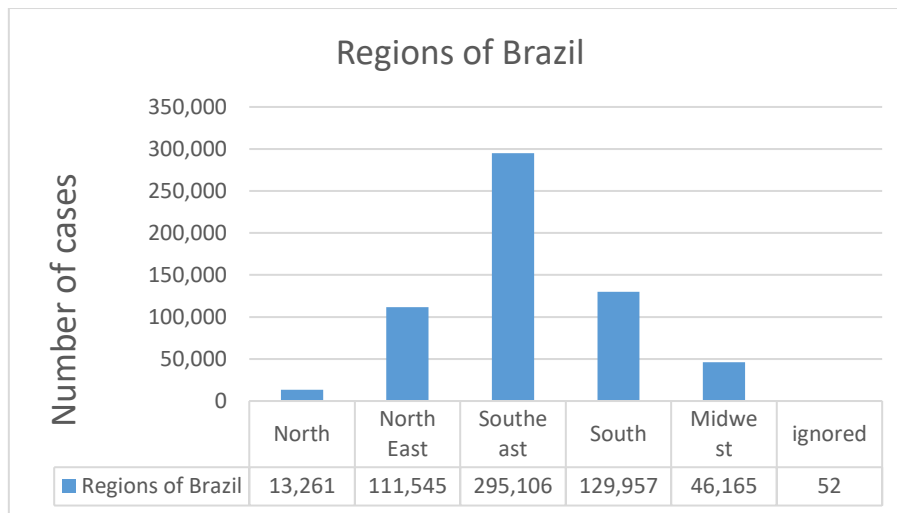
Circumstance	N	%
Usual Use	21,079	3.54
Accidental	68,189	11.44
Environmental	288	0.05
Therapeutic use	21,029	3.53
Prescription	822	0.14
Administration error	10,927	1.83
Self-medication	33,830	5.67
Abuse	13,146	2.21
Food intake	1,508	0.25
Suicide attempt	391,635	65.70
Attempted abortion	1,293	0.22
Violence/homicide	3,467	0.58
Other	3,775	0.63
Ignored/White	25,098	4.21
TOTAL	596,086	100

Source: Ministry of Health/ Notifiable Diseases Information System (SINAN).

As shown in **graph 2**, the Southeast region presented the highest number of poisonings per drug (49.51%), with the highest number of poisonings per drug in the state of São Paulo (26.5% of the reported cases). The South (21.80%) and northeast (18.71%) followed this. The North (2.22%) and Midwest (7.75) regions had lower number of cases of drug intoxication. This profile has been

demonstrated in previous years, which is related to the fact that the Southeast region has the highest consumption of medicines and where almost half of the total number of pharmacies officially existing in the country is present. In this region, there is a greater number of Toxicological Information Centers (CITs), making records have a higher coverage (Rangel & Francelino, 2018).

Graph 2- Notifications by Region of Residence in the period 2012-2021, Brazil.



Source: Ministry of Health/ Notifiable Diseases Information System (SINAN).

Most cases of drug intoxication were defined based on clinical criteria (68.24%) and only 3.35% on clinical-laboratory criteria (Table 3). Similar results were reported by Gonçalves (2018) and Soares (2021), which

evidences a low structure provided to health professionals to perform their activities, who often cannot use exams and equipment for proper clinical management (Lima & Holanda, 2021).

Table 3- Notifications by Criterion Confirmation in the period 2012-2021, Brazil.

Confirmation Criterion	N	%
Clinical-Laboratory	19,983	3.35
Clinical-epidemiological	128,206	21.51
Clinical	406,748	68.24
Ignored/White	41,149	6.90
TOTAL	596,086	100

Source: Ministry of Health/ Notifiable Diseases Information System (SINAN).

Positively, 81.11% (n= 483,490) of patients who suffered from drug intoxication evolved to cure without sequel (Table 4), and 1,233 deaths were recorded between 2012 and 2021 due to this toxic agent. Silva (2021) and Lima Filho (2022) reported similar results in previous studies. It is important to note that these individuals, even

evolving to cure without sequelae, can continue to maintain self-harming behaviors and end up killing themselves (Gerheim, 2022). Thus, the data discussed here also serve to increase the discussion of the importance of subsequent care directed to this public.

Table 4- Notifications by Evolution in the period 2012-2021, Brazil.

Evolution	N	%
Cure without sequel	483,490	81.11
Cure with sequel	6,324	1.06
Death from Exogenous intoxication	3,405	0.57
Death from another cause	1,233	0.21
Loss of Follow-up	12,845	2.15
Ignored/White	88,789	14.90
TOTAL	596,086	100

Source: Ministry of Health/ Notifiable Diseases Information System (SINAN).

One limitation of the study is the lack of data resulting from the underreporting process, because it is public data. Even so, these data have been used satisfactorily and of great value for epidemiological studies, which are capable of supporting decision-making in health services (Leão, 2020).

IV. CONCLUSION

These data reinforce the need for health education focused on the rational use of drug products and the importance of health professionals in this process, such as pharmacists, which are the interface between the patient and the medication. These data will also support to monitor the dynamics of drug product poisoning in the COVID-19 pandemic period.

REFERENCES

- [1] Alvim, A. L. S., et al (2020). Epidemiologia da intoxicação exógena no Brasil entre 2007 e 2017. *Brazilian Journal of Development*, 6 (8), 63915-63925.
- [2] Araújo, C. S., et al (2021). Diagnóstico situacional dos pacientes do Componente Especializado de Assistência Farmacêutica do Piauí e orientação farmacêutica para uso racional de medicamentos. *Revista Extensão & Sociedade*, 12 (2).
- [3] Diógenes, I. V., Evangelista, B. P., de Freitas, T. S., da Silva, I. F., de Freitas, K. M., & Duarte, R. B. (2022). Perfil dos casos notificados de intoxicação exógena em um município cearense no período de 2017 a 2021. *Research, Society and Development*, 11(12), e206111234477-e206111234477.
- [4] Gerheim, P. S. A. S., Ferreira, M. L., & dos Santos Grincenkov, F. R. (2022). O suicídio no Brasil: uma análise das intoxicações por medicamentos nos últimos 10 anos. *HU Revista*, 48, 1-7.
- [5] Gomes, K. M. B. S. (2020). Análise das tentativas de suicídio por intoxicação exógena no estado de Goiás entre os anos de 2007 e 2017. *Revista Científica do ITPAC*, 13(2), 2.
- [6] Gonçalves, H. C., & da Costa, J. B. (2018). Intoxicação exógena: casos no estado de Santa Catarina no período de 2011 a 2015. *Arquivos catarinenses de medicina*, 47(3), 02-15.
- [7] Leão, M. L. P., & da Silva Júnior, F. M. R. (2020). Perfil epidemiológico dos casos de intoxicação exógena no ano de 2017 em Pernambuco, Brasil. *Research, Society and Development*, 9(6), e161963618-e161963618.
- [8] Lima Filho, C. A., da Silva, M. V. B., de Oliveira Bernardino, A., Vieira, C. M., Nunes, A. M. B., de Souza, K. R. F. (2022). Perfil das intoxicações exógenas por medicamentos na região Nordeste do Brasil. *Research, Society and Development*, 11(14), e279111436371-e279111436371.
- [9] Lima, D. M. N., & de Almeida Holanda, M. M. (2021). Intoxicações exógenas por medicamentos: uma série histórica de 10 anos. *Revista Inspirar Movimento & Saude*, 21(1).
- [10] Lima, G. S., Chagas, R. D. B., Macêdo, K. P. C., Silva, M. C., de Sousa Leal, B., Vaz, J. L. S. (2020). Caracterização das intoxicações por produtos de uso domiciliar na cidade de Teresina Piauí. *Revista Eletrônica Acervo Saúde*, (55), e666-e666.
- [11] Monte, B. S. M., Nunes, M. S. T., Nunes, M. D. S., & Mendes, C. M. M. (2016). Estudo epidemiológico das intoxicações por medicamentos registrados pelo centro de informações toxicológicas do Piauí: 2007 a 2012. *R. Interd.* 9(3): 96-104.
- [12] Mota, S. F., do Rosário Palma, A. L., de Lapena, S. A. B., de Paula Ramos, L., Fernandes, W. S., de Barros Júnior, M. C. (2020). Caracterização do perfil das intoxicações medicamentosas na população de Taubaté, São Paulo, no período de 2014 a 2018. *Brazilian Journal of Health Review*, 3(5), 12672-12683.
- [13] Rangel, N. L., & Francelino, E. V. (2018). Caracterização do Perfil das Intoxicações Medicamentosas no Brasil, durante 2013 a 2016. ID on line. *Revista de psicologia*, 12(42), 121-135.
- [14] Rolim, H. M. L., Holanda, E. C. (2021). Principais determinantes nas intoxicações por fármacos na Cidade de Teresina-PI, Brasil. *Research, Society and Development*, 10(10), e142101017138-e142101017138.
- [15] Sereno, V. M. B., Silva, A. S., & da Silva, G. C. (2021). Perfil epidemiológico das intoxicações por medicamentos no Brasil entre os anos de 2013 a 2017. *Revista Boaciencia. Saúde e Meio Ambiente*, 1(2), 74-90.
- [16] Silva, A. K. M., da Silva Costa, M. F., Vaz, J. L. S., da Silva Souza, K. A., da Cruz, L. P. L., Freitas, J. E. D. S. M., & de Oliveira, E. H. (2021). Análise de intoxicações exógenas no Estado do Piauí no período de 2013 a 2017. *Research, Society and Development*, 10(10), e505101017260-e505101017260.
- [17] Silva, E. R., & Álvares, A. D. C. M. (2019). Intoxicação medicamentosa relacionada à tentativa de autoextermínio. *Revista de Iniciação Científica e Extensão*, 2(2), 102-108.
- [18] Silva, T. J., & Oliveira, V. B. (2018). Intoxicação medicamentosa infantil no Paraná. *Visão acadêmica*, 19(1).
- [19] Soares, J. Y. S., de Lima, B. M., Verri, I. A., & de Oliveira, S. V. (2021). Perfil epidemiológico de intoxicação exógena por medicamentos em Brasília. *Revista de Atenção à Saúde*, 19(67).
- [20] Sousa, E. S. F., da Silva Carvalho, F., Macêdo, K. P. C., de Sousa Leal, B., Feitosa, C. L. P., Rodrigues, M. M. M., ... & Neto, M. P. L. (2020). Análise das intoxicações por medicamentos no Piauí entre os anos de 2007 a 2017. *Revista Eletrônica Acervo Saúde*, (51), e745-e745.
- [21] Teixeira, L. H. S. (2020). Intoxicações exógenas em sete lagoas, minas gerais: análise de notificações ao sinan entre 2011 e 2019. *Revista Farmácia Generalista/Generalist Pharmacy Journal*, 2(2), 29-41.
- [22] Verdiono, W. L., et al (2022). Perfil epidemiológico de intoxicações exógenas em Ceres-GO no período de 2008 a 2017. *Revista Ibero-Americana de Humanidades, Ciências e Educação*, 8 (5), 2103-2121, 2022.