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Suicide attempts due to exogenous intoxication in Brazil, 2012-2022: an integrative review

Tentativas de suicídio por intoxicação exógena no Brasil, 2012-2022: uma revisão integrativa

Intentos de suicidio por intoxicación exógena en Brasil, 2012-2022: una revisión integrativa

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ABSTRACT

Objective: This study aims to review the literature on risk factors, toxic agents, and the epidemiological profile of people who have attempted suicide due to exogenous intoxication in Brazil. **Method**: An integrative review was carried out using the MEDLINE, Virtual Health Library, SciELO, and Embase databases, including observational studies, in English or Portuguese, of patients who had attempted suicide by exogenous intoxication in Brazil, indexed between September 2012 and August 2022, in patients aged 13 or over. Studies of non-human populations, only specific groups, and studies with an analysis period prior to 2001 were excluded. The final selection analyzed 23 articles using descriptive and qualitative statistics, using ATLAS.ti and Microsoft Excel programs. **Results**: There was a predominance of studies that analyzed only one municipality (78.4%), with the main databases coming from the records of the institutions where the research took place (34.7%). Women accounted for the majority of attempted self-harm (60%), especially those aged between 20 and 59, single (48.2%), with up to elementary school education (50.4%). The most frequent place of occurrence was the urban area (84%), and the most commonly cited toxic agents were medicines (65.2%). **Conclusion**: There was a predilection for self-harm attempts in females, young adults, with associated comorbidities, in unfavorable contexts of quality of life, and the most commonly used exogenous toxic agents were medications.

Descriptors: Attempted Suicide; Suicide Attempt; Suicide; Poisoning; Intoxication; Drug Utilization.

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RESUMO

***Objetivo**: Revisar a literatura sobre os fatores de risco, agentes tóxicos e o perfil epidemiológico das pessoas que realizaram tentativas de suicídio por intoxicação exógena no Brasil. **Método**: Efetuou-se uma revisão integrativa nas bases de dados do MEDLINE, Biblioteca Virtual em Saúde, SciELO e Embase, incluindo-se estudos observacionais, em língua inglesa ou portuguesa, de pacientes que realizaram tentativa de suicídio por intoxicação exógena no Brasil, indexados entre setembro de 2012 a agosto de 2022, em pacientes com 13 anos ou superior. Foram excluídos estudos de populações não humanas, somente de grupos específicos e estudos que detivessem um período de análise anterior ao ano de 2001. A seleção final analisou 23 artigos, por meio de estatística descritiva e qualitativa, com a utilização dos programas ATLAS.ti e Microsoft Excel. **Resultados:** Houve predomínio dos trabalhos que analisaram somente um município (78,4%), com as principais bases de dados advindas de registros das instituições em que ocorreram as pesquisas (34,7%). As mulheres representaram a maioria das tentativas de autocídio (60%), sobretudo dos 20 a 59 anos, solteiras (48,2%), com escolaridade até o ensino fundamental (50,4%). O local de ocorrência mais frequente foi a zona urbana (84%) e os agentes tóxicos mais citeds foram os medicamentos (65,2%). **Conclusão**: Evidenciou-se uma predileção das tentativas de autocídio no sexo feminino, em adultos jovens, com comorbidades associadas, em contextos desfavoráveis de qualidade de vida. Ainda, constatou-se que os medicamentos foram os agentes tóxicos exógenos mais utilizados.*

***Descritores**: Tentativa de Suicídio; Suicídio; Intoxicação; Uso de Medicamentos.*

RESUMEN

***Objetivo:** Revisar la literatura sobre los factores de riesgo, los agentes tóxicos y el perfil epidemiológico de las personas que realizaron intentos de suicidio mediante intoxicación exógena en Brasil. **Método:** Se realizó una revisión integrativa en las bases de datos MEDLINE, Biblioteca Virtual en Salud, SciELO y Embase, incluyendo estudios observacionales, en idioma inglés o portugués, que abordaran pacientes que intentaron suicidarse mediante intoxicación exógena en Brasil, indexados entre septiembre de 2012 y agosto de 2022, en individuos de 13 años o más. Se excluyeron estudios con poblaciones no humanas, aquellos restringidos a grupos específicos y estudios cuyo periodo de análisis fuese anterior al año 2001. La selección final incluyó 23 artículos, analizados mediante estadística descriptiva y cualitativa, utilizando los programas ATLAS.ti y Microsoft Excel. **Resultados:** Predominaron los estudios que analizaron exclusivamente un municipio (78,4%), con fuentes de datos principalmente provenientes de registros institucionales donde se realizaron las investigaciones (34,7%). Las mujeres representaron la mayoría de los intentos de suicidio (60%), especialmente en el grupo etario de 20 a 59 años, solteras (48,2%) y con escolaridad hasta la enseñanza básica (50,4%). El lugar más frecuente de ocurrencia fue la zona urbana (84%) y los agentes tóxicos más mencionados fueron los medicamentos (65,2%). **Conclusión:** Se evidenció una mayor prevalencia de intentos de suicidio en mujeres adultas jóvenes, con comorbilidades asociadas y en contextos de vida desfavorables. Además, se constató que los medicamentos constituyen los principales agentes tóxicos exógenos utilizados.*

***Descriptores:** Intento de Suicidio; Suicidio; Intoxicación; Utilización de Medicamentos.*

INTRODUCTION

Suicide attempts are a public health problem of great relevance and no easy solution. According to the State Health Department of Rio Grande do Sul, suicide attempts are defined as self-harm to take one's own life, using a means that the individual believes to be lethal, without resulting in death[1]. Suicide, also referred to as self-cide and self-extermination, is the deliberate act of taking one's own life, with a fatal outcome[1].

The World Health Organization (WHO) estimates that more than 800,000 people commit suicide each year, with a prevalence among young people aged 15 to 29 (79%) and from low-income countries[2]. In fact, for every individual who commits suicide, five to six people close to the victim are expected to be impacted, both emotionally and economically[3,4]. In this context, women opt for less violent methods, with the most frequent being the ingestion of drugs and medication. At the same time, men use more violent methods, such as hanging, knives, firearms, and pesticides, resulting in higher rates of self-extermination than women[5].

Brazil is among the countries with low rates of self-murder; however, as it is a populous country, it has significant absolute numbers of suicides, placing it in eighth place worldwide in deaths by self-extermination[3,5]. Suicide, therefore, involves a sequence of events that culminate in social, financial, and psychological damage to the entire society[5].

It is understood that suicide attempts are often a prelude to suicide, although they are little valued given their dimension. In this context, records on suicide attempts are underestimated and less transparent than data on self-extermination rates; however, around 20 to 30 suicide attempts are expected for each completed self-cide[6].

The prevalence of suicide attempts is more evident in young adults, females, single, with low education, with use of alcohol/psychoactive substances, with a psychiatric disorder or disabling clinical condition, and victims of abuse of any kind[4-16]. The most commonly used methods for attempted self-extermination are poisoning, hanging, firearms, and biting objects[9]. Poisoning is the most common form, with special emphasis on the use of medications, which corresponds to rates higher than 58% of poisoning cases, with benzodiazepines, antidepressants, anxiolytics, and anticonvulsants[7,9] among the most commonly used drugs. In Brazil, in 2017, these data corroborate the evolution of registered cases of human poisoning by exogenous agents, in which the use of medications (27.11%) followed by accidents with venomous animals (15.34%) are considered recurring causes, according to data from Sinitox[17].

Furthermore, the unbridled use of medication in Brazil represents an aggravating factor, since the country is the world's third largest consumer of benzodiazepine anxiolytics and the second largest consumer of Zolpidem – a sedative-hypnotic drug used mainly to treat insomnia, with the potential to cause physical and emotional dependence, withdrawal symptoms and changes in performance in daily activities[16]. Based on this, it is clear that suicide attempts using drugs are prevalent and, based on the trivialization of use, constitute a public health problem that is difficult to resolve[16].

Thus, suicide attempts are serious acts and deserve as much attention as the completion of self-extermination, since the main risk factors for self-cide include a history of suicide attempts and mental disorders[2]. The study aims to review the literature on risk factors, toxic agents, and the epidemiological profile of people who attempted suicide by exogenous poisoning in Brazil.

METHOD

This is an integrative review, which aims to include and organize divergent studies regarding suicide attempts by exogenous intoxication in Brazil, over 10 consecutive years (2012-2022). In this study, searches were carried out in the Medical Literature Analysis and Retrieval System Online (MEDLINE) databases, via the National Library of Medicine National Institutes of Health (PubMed), the Regional Portal of the Virtual Health Library (BVS), the Scientific Electronic Library Online (SciELO) virtual library and Embase, as they are sources of scientific knowledge with free access and international impact. This work was conducted in Porto Alegre, Rio Grande do Sul, Brazil, 2023.

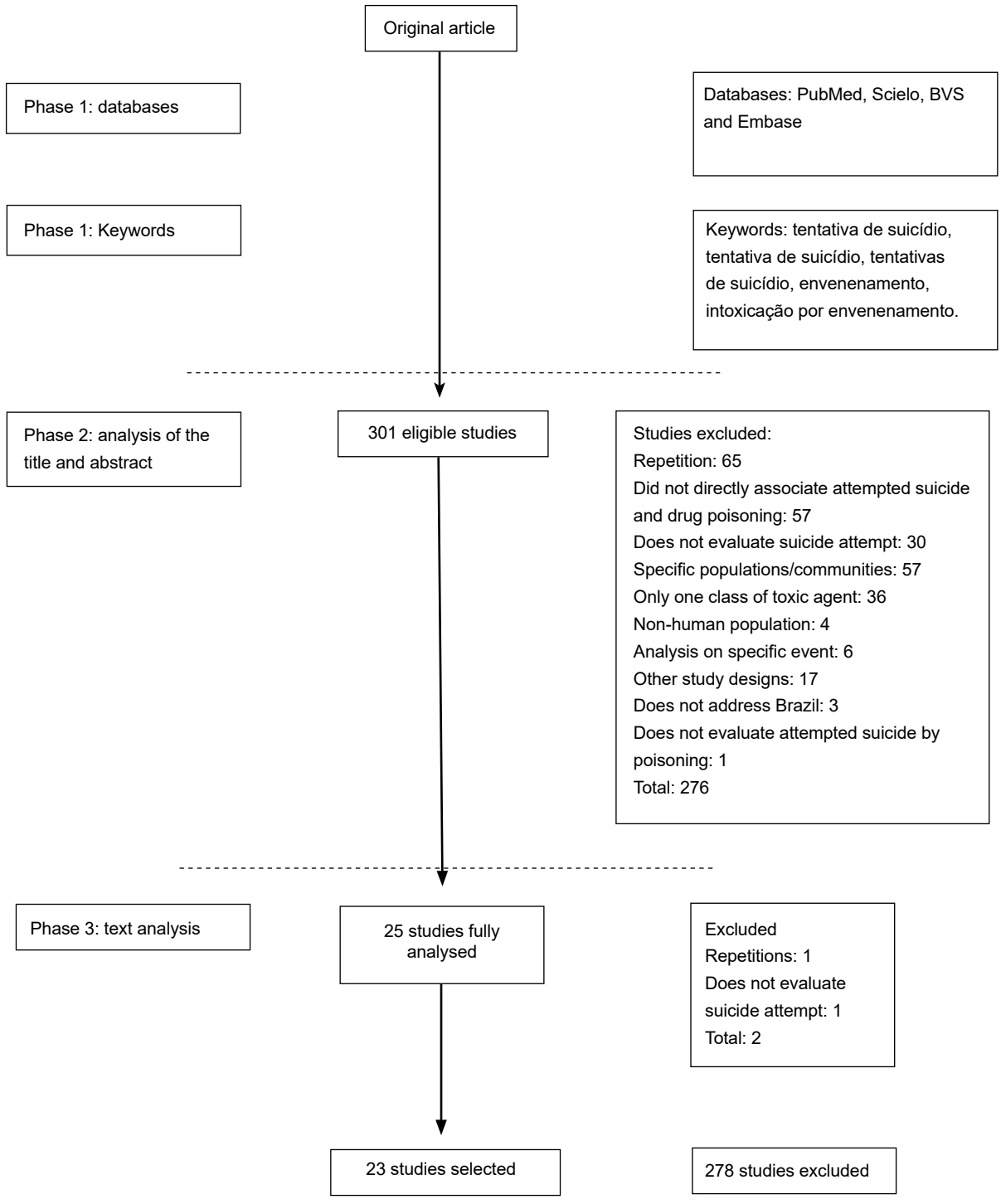
The keywords used, according to the health descriptors, were: "Suicide Attempt"; "Suicide"; "Intoxication"; "Use of Medication", and their equivalents in English, with the search strategy organized as follows: (Suicide Attempt) OR (Suicide) AND (Intoxication) OR (Use of Medication). The initial search found 301 articles, 135 from the Embase database, 76 from BVS, 72 from PubMed, and 18 from SciELO. These articles first underwent a title analysis by four researchers, then the "abstracts" were developed, which were analyzed by two independent researchers with greater theoretical and practical experience in critical scientific writing. When a discrepancy was found, an additional researcher, selected for having extensive experience in study selection, determined whether the article should be excluded or not.

The selected observational studies were those indexed between September 2012 and August 2022, in English or Portuguese, and which addressed the epidemiological profile of patients aged 13 years or older, victims of attempted suicide through exogenous poisoning in Brazil. Studies that addressed non-human populations and that analyzed only mortality related to suicide attempts were excluded, as they were not in line with the study's proposal. Also, based on the interest in collecting data focusing on the current profile of suicide attempts, studies whose analysis period was earlier than 2001 were not analyzed. Furthermore, studies that dealt only with specific groups and events, exclusively adolescents, exclusively elderly, exclusively women, and exclusively men, were discarded, as they would limit the epidemiological profile addressed (Figure 1).

According to the inclusion and exclusion criteria, 23 articles were selected for analysis, using descriptive and qualitative statistics, through the ATLAS.ti version 23 and Microsoft Excel version 365 programs, to obtain, organize, and categorize the results.

Therefore, as it contains data exclusively from scientific texts in the public domain, this integrative review is exempt from assessment by the Research Ethics Committee, as ensured by article 26 of Resolution No. 674/2022.

Figure 1 – Article selection flowchart



Source: Prepared by the authors.

RESULTS

The following table (Table I) was developed by the authors, aiming to categorize the 23 studies analyzed according to the following characteristics: authors, year of publication, location, design, and database used.

Table I – Characterization of selected studies according to location, design, year of publication and database. Porto Alegre, Rio Grande do Sul, Brazil, 2023.

Title	Authors / Year of Publication	Place	Design	Database Location
Analysis of Factors Associated with the Risk of Suicide in a Brazilian Capital: Cross-Sectional Study [5]	Mendes et al. 2021	Recife (PE)	Transversal	SIM
Assistance related to suicidal behavior at a mobile emergency service: Sociodemographic and clinical associated factors [18]	Ferreira et al. 2019	São Paulo (SP)	Quantitative e transversal	SAMU medical records
Clinical Features, Psychiatric Assessment, and Longitudinal Outcome of Suicide Attempters Admitted to a Tertiary Emergency Hospital [11]	Ferreira et al. 2016	Ribeirão Preto (SP)	Retrospective cohort	Ribeirao Preto Emergency Hospital
Different toxic agents used in suicide attempts in Recife [19]	Pires et al. 2017	Recife (PE)	Descriptive, quantitative and transversal	Restoration Hospital and CEATOX
Epidemiological Profile of Suicide Attempts and Deaths in a southern Brazilian City [33]	Ferreira et al. 2014	Southern region of Brazil	Descriptive	SINAN
Epidemiological profile of suicide attempts in a municipality in southwest Paraná, from 2017 to 2020 [20]	Biezus et al. 2022	Francisco Beltrão (PR)	Descriptive and quantitative	SINAN
Hospitalizations due to self-inflicted injuries - Brazil, 2002 to 2013 [21]	Monteiro et al. 2015	Brasil	Descriptive	SIH/SUS
Pre-hospital attendance to suicide attempts [23]	Magalhães et al 2014	Arapiraca (AL)	Transversal	SAMU pre-hospital care records
Prevalence and characteristics of self-inflicted exogenous violence and intoxication: a study from a database on notifications [24]	Maronezi et al 2021	Rio Grande do Sul (RS)	Transversal	SINAN
Profile of patients treated for attempted suicide in toxicology assistance center [12]	Moreira et al. 2015	Fortaleza (CE)	Descriptive, documentary and retrospective	CEATOX
Profile of patients treated for attempted suicide at a General Emergency Hospital in the state of Alagoas, Brazil [22]	Júnior et al. 2019	Maceió (AL)	Documentary, descriptive and retrospective	Dr. Oswaldo Brandão Vilela General Hospital
Profile of intoxications served at the 24-hour emergency service unit [25]	Palma et al. 2020	Divinópolis (MG)	Quantitative and retrospective	SIS
Risk indicators for attempted suicide for poisoning: A study case-control [26]	Pires et al. 2015	Recife (PE)	Case-control	Restoration Hospital and CEATOX
Self-inflicted violence by exogenous poisoning in an emergency service [27]	Veloso et al. 2017	Teresina (PI)	Analytical, epidemiological and retrospective	SINAN
Substâncias tóxicas e tentativas e suicídios: considerações sobre acesso e medidas restritivas [28]	Santos et al. 2023	Brasil	Descriptive and exploratory	SIM e SIH/SUS
Suicide and attempts suicide by exogenous intoxication in Rio de Janeiro: Analysis of data from official health information systems, 2006-2008 [29]	Santos et al. 213	Rio de Janeiro (RJ)	Descriptive and exploratory	CCin-Niterói,SINAN e SIM
Suicide attempts and suicides in the pre-hospital care [30]	Rosa et al. 2016	Maringá (PR)	Descriptive and transversal	SIATE
Suicide attempts by exposure to toxic agents registered in a Toxicological Information and Assistance Center in Fortaleza, Ceará, Brazil, 2013 [13]	Gondim et al. 2017	Fortaleza (CE)	Descriptive	CEATOX
Suicide attempts in an emergency hospital [31]	Alves et al. 2014	Arapiraca (AL)	Descriptive, quantitative and retrospective	Arapiraca Emergency Unit
Suicide attempts: epidemiologic trends towards geoprocessing [7]	Almeida et al. 2018	Campina Grande (PB)	Ecological and exploratory	CEATOX
Suicide attempts notified in a teaching hospital in the state of Rio Grande do Sul, 2014-2016 [14]	Grigoletto et al. 2020	Rio Grande do Sul (RS)	Descriptive, quantitative and retrospective	Sinan
The characteristics of suicide attempts assisted by first responders: A cross-sectional epidemiological study [32]	Oliveira et al. 2020	Alagoas (AL)	Transversal	7th Military Firefighting Group of the State of Alagoas
Trends in suicide attempts at an emergency department [9]	Alves et al. 2017	Arapiraca (AL)	Descriptive, quantitative and retrospective	Arapiraca Emergency Unit

Source: SIM – Mortality Information System; SAMU – Mobile Emergency Care Service; CEATOX – Toxicological Assistance Center; SINAN – Notifiable Diseases Information System; SIH/SUS – Hospital Information System of the Unified Health System; SIS – Integrated Health System; CCIN – Poison Control Center; SIATE – Integrated Emergency Trauma Care Service
Source: table prepared by the authors

Data Collection Bases

Of the 23 studies analyzed, 17 (73.9%) different databases were used to obtain information regarding suicide attempts due to exogenous poisoning[5,7,9,11-14,18-33]. Of these, only two (8.6%) collected information from more than one database[28,29], eight (34.7%) used data from the records of the institutions where the research was being conducted[9,11,19,22,23,26,31,32], six (26.0%) relied on the Injury Information System (SINAN)[14,20,24,27,29,33], three (13.0%) used data from the Mortality Information System (SIM)[5,28,29], five (21.7%) analyzed records from the Toxicology Information Center system of the region under study[7,12,13,19,26], two (8.6%) used the Hospital Information System of the Unified Health System (SIH-SUS)[21,28] and one (4.3%) collected data from the Integrated System. Health Department (SIS)[25].

Study Analysis Period

Regarding the time interval of data collection and analysis presented by the studies of 23 selected articles, all presented their study periods between the 1990s and 2020s. Based on this, one (4.3%) article presented its duration between the 1990s and 2000s (between 1998 and 2009)[28], four (17.3%) presented a study duration comprised in the 2000s (from 2000 to 2009)[11,19,26,29], six (26.0%) articles had their period between the 2000s and 2010s (between 2000 and 2019)[5,9,21,27,30,32], 11 (47.8%) presented a time comprised in the 2010s (from 2010 to 2019)[7,12-14,18,22-25,33] and, finally, one (4.3%) article presented a period between the 2010s and 2020 (between 2010 and 2022)[20].

Suicide Attempts

The studies showed considerable divergence in absolute numbers, with the largest presenting 79,418 suicide attempts due to exogenous poisoning[28], and the smallest with 44 reported cases[23], as per Table II:

Table II – Characterization of selected studies according to period, number of suicide attempts by poisoning and total, sex, age group, marital status, education, and occupation. Porto Alegre, Rio Grande do Sul, Brazil, 2023.

Article Title	Period	Suicide Attempts by Poisoning	Total Number of Suicide Attempts	Gender	Age range	Marital status	Education	Occupation	Racial Identification
Analysis of Factors Associated with the Risk of Suicide in a Brazilian Capital: Cross-Sectional Study[5]	2007 to 2017	3.817	4.495	Feminine: 3150 (70.1%)	20 to 39 yeard: 2257 (50.2%)	Single 2384 (53%)	Not informed	Not informed	Not informed
Assistance related to suicidal behavior at a mobile emergency service: Sociodemographic and clinical associated factors[18]	2014	230	313	Feminine: 188 (60.1%)	20 to 59 years: 233 (74.5%)	Not informed	Not informed	Not informed	Not informed
Risk indicators for attempted suicide for poisoning: a study case-control[26]	2007 to 2017	110	110	Feminine: 78 (70.9%)	Average age: 28.9	Marital cohabitation: 44 (40%)	Education level lower than complete primary school: 45 (40.9%)	Not informed	White or brown ethnicity: 81 (73.6%)
Clinical Features, Psychiatric Assessment and Longitudinal Outcome of Suicide Attempters Admitted to a Tertiary Emergency Hospital[11]	January 2006 to December 2007	346	534	Feminine: 242 (58.7%)	Average age (years): 32.6	Single: 64.8%	Minimum of 8 years of schooling: 81.8%	Unemployed: men (54.7%) and women (22.3%)	76.5% Caucasian, 23.5% African descent.
Different toxic agents used in suicide attempts in Recife[19]	December 2008 to August 2009	77	110	Feminine: 78 (70.9%)	Average age (years): 2.9	Marital coexistence: 44 (40%)	Incomplete elementary school: 45 (40.9%)	Not informed	73.0% white or brown
Epidemiological profile of suicide attempts in a municipality in southwest Paraná, from 2017 to 2020[20]	2017 to 2020	258	382	Feminine: 274 (71.7%)	8 a 17 years: 104 (71.7%)	Single: 182 (47.6%)	Not informed	Not informed	White: 295 (77.2%). Mixed race: 56 (14.7%). Other: 31 (8.1%).
Hospitalizations due to self-inflicted injuries – Brazil, 2002 to 2013[21]	2002 to 2013	35.685	105.097	Masculine: 63.468 (60.4%)	30-39 years (most prevalent)	Not informed	Not informed	Not informed	Not informed
Profile of patients treated for attempted suicide at a General Emergency Hospital in the state of Alagoas, Brazil[22]	2015 to 2017	682	824	Masculine: 522 (63.3%)	15-29 years: 413 (50.1%)	Not informed	Not informed	Not informed	Not informed
Pre-hospital attendance to suicide attempts[23]	2011	70	80	Feminine: 44 (55%)	Average age (years): 29.1	Not informed	Not informed	Not informed	Not informed

Prevalence and characteristics of self-inflicted exogenous violence and intoxication: a study from a database on notifications[24]	2013 to 2017	5.624	18.544	Feminine: 12.425 (67%)	30-59: 8.602 (46.4%)	Not informed	Complete/ incomplete elementary education: 7.355 (58.3%)	Not informed	White: 15.292 (86%). Other: 2.496 (14%).
Self-inflicted violence by exogenous poisoning in an emergency service[27]	2009 to 2014	163	277	Feminine: 158 (57%)	Up to 19 years old: 66 (23.8%)	Not informed	Elementary education: 145 (52.4%)	In activity: 116 (41.9%)	Not informed
Poisoning and suicide attempts and suicides: considerations on access and restrictive measures[28]	1998 to 2009	79.418	79.418	Masculine: 44.828 (56.4%)	20 to 29 years: 22.112 (27.8%)	Not informed	Not informed	Not informed	Not informed
Suicide and attempts suicide by exogenous intoxication in Rio de Janeiro: analysis of data from official health information systems, 2006□2008[29]	2006 to 2008	907 (CCIn)	907 (CCIn)	Feminine: 618 (68.2%)	30 to 39 years: 304 (34%)	Not informed	Not informed	Not informed	Not informed
Suicide attempts by exposure to toxic agents registered in a Toxicological Information and Assistance Center in Fortaleza, Ceará, Brazil, 2013[13]	2013	409	409	Feminine: 230 (56.2%)	20 a 29 years: 135 (33.3%)	Not informed	Not informed	Student: 62(19.7%) Other: 144 (45.7%)	Not informed
Suicide attempts and suicides in the pre-hospital care[30]	2005 a 2012	44	257	Masculine: 170 (66.4%)	20 to 39 years	Not informed	Not informed	Not informed	Not informed
Suicide attempts: epidemiologic trends towards geoprocessing[7]	2010 to 2013	446	446	Feminine: 296 (6.4%)	30 or less: 278 (62.3%)	Not informed	Not informed	Not informed	Not informed
Suicide attempts notified in a teaching hospital in the state of Rio Grande do Sul, 2014-2016[14]	2014 to 2016	186	344	Feminine: 224 (65.1%)	25 to 59 years: 234 (67.7%)	Single: 147 (42.7%)	Incomplete elementary education: 103 (29.9%) Ignored: 117(34%)	Ignored: 189 (55%)	White: 291 (84.6%). Black: 24 (7%). Browns: 22 (6.4%). Indígenous: 01 (0.3%). Ignored: 6 (1.7%). Yellow: 0 (0%).
Trends in suicide attempts at an emergency department[9]	2009 to 2012	475 (2012)	496 (2012)	Feminine: 342 (69%)	Average age (years): 28.76	Not informed	Not informed	Not informed	Not informed
The characteristics of suicide attempts assisted by first responders: a cross-sectional epidemiological study[32]	2000-2017	73	144	Masculine: 73 (50.7%)	Average age (years): 30.7	Not informed	Not informed	Not informed	Not informed
Epidemiological Profile of Suicide Attempts and Deaths in a Southern Brazilian City[33]	August 2010 to August 2012	137	164	Feminine: 133 (81%)	30 to 40 years: 41 (25%)	Married / Stable union: 75 (45.7%)	Fifth to eighth grade incomplete: 34	Not informed	White: 142 (86.59%).
Profile of Patiens Treated for Attempted Suicide in Toxicology Assistance Cente [12]	2010	409	409	Feminine: 238 (58.2%)	20 to 40 years: 257 (6.8%)	Not informed	Not informed	Other: 63 (15.4%) Ignored: 115 (28.2%)	Not informed

Sociodemographic Data

Regarding the sex of patients involved in suicide attempts, men represented 39.28% and women 60.04% in all articles analyzed (Table III). Unfortunately, data regarding the profile of the patients involved were not collected satisfactorily in the selected studies. The age range of 20 to 59 years seems to prevail in most studies, with some exceptions, but there is no standard in the classification of age groups, which makes analysis difficult. Most patients were not in a stable relationship at the time of their suicide attempts, so, through the analysis of the five (21.7%) articles, which explained marital status and based on the arithmetic mean, it was found that approximately 48.2% of the people were single[5,11,14,20,33]. Few articles analyzed here investigated the years of study of the patient who had attempted, however, using data from six (26.0%) articles that addressed years of schooling, an arithmetic mean was predicted that 50.4% of people had schooling up to elementary school, demonstrating that those individuals with complete/incomplete elementary school were more prevalent[11,14,19,24,26,27]. Moreover, unemployment was observed in two (8.6%) articles as a relevant variable, since at least 31.15% of self-extermination attempts were committed by unemployed people[9,27]. In three (13.0%) articles, female students comprised 20.37% of the population analyse [14,27,29]. Only seven articles (30.4%) cited in this review shared data on the racial identification of the patients involved. Among these, the white race was prevalent, by the arithmetic mean calculation, at 79.64%[11,14, 20, 24, 26, 33].

Place of Occurrence

Of the 23 studies, only four (17.3%) analyzed the location of suicide attempts by poisoning[4,12,13,14]. Most cases occurred in urban areas, with the least study reporting around 74.4% [4] in this environment, and the main one reporting

a percentage of 94.9%[13]. Finally, one (4.3%) study found the existence of hot spots, specific regions where there would be a greater risk of committing suicide when compared to other locations[7]. This same article also concluded that neighborhoods with a lower quality of life index had an increased rate of suicide attempts, compared to the rate of suicide attempts in regions with higher conditions [7].

Agents Used in Poisonings Due to Suicide Attempts

Of the 23 articles analyzed, 15 (65.2%) specified the type of agent used in the poisoning, and, in all studies, medications were mentioned as the principal agent[5,7,11-14,18,23,25-27,29-31,33]. Only five (21.7%) studies detailed the types of medications used[5,7,12,13,29]. Although they were not the only medications mentioned, psychotropic drugs were the most common in cases of suicide attempts analyzed in the five studies. The second most mentioned agent was chemicals (cleaning products, industrial chemicals, unspecified chemicals), which appeared in 11 (47.8%) of the articles surveyed[5,7,12-14,23,25,26,29-31]. Drugs of abuse (illicit drugs, psychoactive drugs, and alcohol) were identified as agents in seven (30.4%) studies[5,7,12,13,29-31]. Pesticides (domestic and agricultural) were mentioned in six (26.0%) articles as poisoning agents[7,12,13,29-31]. Rodenticides were cited in six (26.0%) studies[7,12,13,29-,31], while pesticides were mentioned in four (17,3%)[12,13,29,31]. Veterinary products were mentioned in three (13.0%) surveys[5,7,31]. Cosmetics were identified as agents in three (13.0%) articles[5,7,31]. Three (13.0%) studies cited unidentified harmful/biological substances as a means of poisoning[5,7,31]. The least cited agents were food, mentioned in two (8.6%) articles. Metals were identified in one article, and hygiene products were identified in only one (4.3%) article. In six (26.0%) of the selected articles, on average, 64% of suicide attempts by exogenous poisoning were carried out with medications[19,22-25,27].

DISCUSSION

The study of suicide attempts is a challenge for researchers due to the difficulty in recognizing non-lethal cases as attempts, since many patients choose not to seek health services, possibly motivated by fear and shame. Many patients internalize the social belief that a diagnosis of a psychiatric disorder is synonymous with weakness of character, causing shame and denial of their symptoms[38].

The stigma surrounding psychiatric patients does not exclude healthcare professionals. A 2021 study found that 40% of physicians surveyed believed that a doctor with a history of depression and anxiety was less competent, and 47% reported being less likely to recommend a colleague with a prior psychiatric history[39]. These patients are viewed by both the general population and healthcare professionals as unpredictable, aggressive, and difficult[40]. Research indicates that stigma causes more harm than merely not reporting suicide attempts; it even compromises the medical treatment that patients receive. According to an article published in 2012, doctors are less likely to refer patients with mental disorders for mammograms, hospitalization for diabetic crises, and cardiac catheterization compared to the rest of the population[40].

Furthermore, the lack of standardization of suicide attempt notifications creates a gap in the study of the epidemiological profile of the patients involved, since little data is collected in each notification, and there is also high divergence in the way each database structures its analyses. Notably, and due to such difficulties, the establishment of the profile of the patients involved is impaired, enabling erroneous interpretations and preventing the establishment of specific prevention measures targeted at patients at highest risk.

In this review, the selected articles included data collected from five different databases (SINAN, SIM, SIH-SUS, SIS, and the toxicological information center system of each region). Each database exposed different information about each suicide report, which was a barrier to the interpretation of the data in this study.

Women are predominant among patients treated for attempted suicide[5,7,11,14,18,19]. The presence of a higher number of suicide attempts by women is a well-established pattern in the literature and was replicated in this study. This finding may be related to gender disparities and their effects on the mental health of those affected. Living in an environment dominated by structural machismo can represent an aggravating factor for women's suicide attempts, mainly due to difficulties related to the perception of women as responsible for taking care of the home and children – despite their increased presence in the job market –, sexual violence in different degrees and gender pay gap. This cumulative victimization is related to an increase in suicidal ideation in women, which is not seen in men to the same extent[41].

Only five of the studies analyzed demonstrated a higher prevalence in men, who presented more severe symptoms after suicide attempts[21-23,28,32]. In addition, men account for the majority of deaths by suicide, as well as patients who had to be hospitalized as a result of a suicide attempt[34,36]. Men tend to make more violent suicide attempts that result in death more frequently, which may explain why there is this difference between the genders. Furthermore,

it is noted that studies that evaluated suicide attempts in hospitalized patients may have a higher number of men in their analyses, as these would culminate in medical intervention more frequently due to the intensity of the attempt. In 2020, men died by suicide at a rate four times higher than women. It is related to the fact that men seek mental health services less than women. This problem can be partially explained by men's subjection to a culture of masculinity that values dominance and strength, making it difficult to express emotions and seek help[38].

The age group that prevailed in reports of suicide attempts was 20 to 30 years, which is consistent with other studies conducted in the past[21,36,37]. The Elderly may have a lower prevalence in these data, as their attempts tend to be fatal in a higher number of cases, which explains the high suicide mortality rates in this age group, and the lower percentage of suicide attempts was recorded[21]. Furthermore, it is estimated that hospitalizations due to suicidal behavior in children also represent a significant number, although these were not included in the present analysis [21].

Marital status represents a relevant risk for suicide, with cases involving single, divorced, and widowed individuals prevailing in previous research[34]. This finding may be related to the fact that social isolation is associated with an increased risk of suicide. Social isolation can be described as a state in which interpersonal contacts and relationships are compromised or non-existent[42]. This same finding also contributes to a higher suicide rate among elderly individuals, given that aging is accompanied by the loss of interpersonal relationships, as well as the loss of spouses[42].

Only seven publications analyzed racial identification as a variable. Among these articles, four evaluated data related to the southern states of Brazil, where, admittedly, most of the population identifies as white. This information may be related to the results that associate a higher proportion of self-declared Caucasians among the individuals participating in the studies. On the other hand, it is worth noting that 45.3% of the population is self-declared as brown and 43.5% as white, according to the 2022 Brazilian demographic census[11,14, 20, 24, 26, 33].

Few articles investigated the years of study of the patient who had attempted; however, an average of 50.4% of people with education up to elementary school were predicted, demonstrating that those individuals with complete/incomplete elementary school education were more prevalent among patients[11,14,19,24,26,27]. This conclusion is corroborated by other studies that report a higher number of suicide attempt cases among individuals with less than 12 years of education[37]. These data can be explained by the inherent difficulties of more disadvantaged social classes, in which higher education was not possible, or was not encouraged, resulting in lower income, lower quality of life, and a higher number of barriers to accessing mental health services and specialized medical care. However, some studies find divergent results, in which higher levels of education were directly related to a greater chance of death by suicide than by natural causes[43]. These authors argue that individuals who have achieved high levels of education have a greater expectation of success, making any adversity a higher source of social pressure and psychological stress[43].

Only five of the studies in this review reported the occupation of patients treated for attempted suicide[11,13,14,27,33]. From the analysis of these articles, we can see a higher prevalence of suicidal behavior among the unemployed, students, and housewives. Unemployment is one of the factors that has consistently been associated with higher risks of suicide in the scientific literature [35]. Thus, the importance of labor laws is highlighted as a way of protecting workers, preventing unfair, unjustified, or illegal dismissals. However, a large part of the Brazilian population works informally, without a guarantee of labor rights, which can further amplify the undesirable effects of a dismissal. The manifestation of suicidal behavior is related to different risk factors, which can be primary (such as the presence of a psychiatric condition and other somatic illnesses), secondary (adverse life situations and psychosocial factors), and tertiary (demographic factors such as gender and age). Thus, the importance of labor laws is highlighted as a way of protecting workers, preventing unfair, unjustified, or illegal dismissals. However, it is known that a large part of the Brazilian population works informally, without guarantee of labor rights, which can further amplify the undesirable effects of a dismissal. In this context, the economic stress caused by unemployment is directly related to suicidal ideation[44].

Psychotropic drugs were the major agents used by patients treated for suicide attempts. Exogenous intoxication is the principal method involved in suicide attempts for both sexes, with medications being the major agents involved, according to previous research reports[21,36]. The fundamental role of the quality of the doctor-patient relationship as a factor in preventing suicide attempts is highlighted[36], as well as the importance of a thorough evaluation of the patient before prescribing medications with a high potential for toxicity. Thus, it is clear that the indiscriminate prescription of psychotropic drugs can be a risk factor for a future suicide attempt, highlighting the importance of monitoring in Psychosocial Care Centers (CAPS) and Health Units (US) for the rational and individualized use of medications, avoiding self-medication without medical guidance.

It is also worth noting that only two of the articles analyzed included data from Brazil[21,28]; the other studies used data from a specific state or municipality. It is important to note that there are variations between the rates of suicidal

behavior in different regions of Brazil, associated with factors specific to each location[21]. Thus, rural residents are at-risk populations due to greater pesticide exposure, which becomes a relevant issue in states such as Rio Grande do Sul, where agriculture signifies a pertinent occupation. In the center-west of the country, indigenous populations are at greater risk as a result of cultural disintegration, marginalization, and alcoholism[35]. These data show the importance of conducting regional studies that seek to identify the specific populations at risk in that location.

This review, therefore, understands the analysis by database as a positive point, evidencing a predilection of studies to use information from only one database, so that only two (8.6%) collected data from more than one database[28,29], which may lead to results that are not as plausible with reality due to information coming from single centers. We sought confirmation of the predominant profile of patients who were victims of attempted self-extermination, as well as new information by analyzing the gaps in many studies carried out. In addition, different views were sought, such as by regions, periods, and databases, helping to bring little-discussed data on spatial, temporal, and selection views of research sources for observational studies on attempted self-murder by exogenous poisoning.

The limitations of this review are because of it does not consider non-indexed studies, the absence of articles that address the Central-West and North Regions, which are based mainly on works from the Northeast Region, besides the analysis restricted to studies focused only on the theme of exogenous intoxication attempts in Brazil, and not internationally. Finally, some studies, with a small number of selected participants, may be associated with large confidence intervals, which reduces the accuracy of the results.

CONCLUSION

Suicide attempts by exogenous poisoning in Brazil are significant, and understanding the associated factors, such as prevalence among women, unemployed people, single people, individuals with low levels of education, adolescents, and young adults, demonstrates an epidemiological profile of greater risk. Furthermore, poisoning is the most common method for attempted suicide, especially concerning medications, which, due to their widespread use and easy access by the population, make it difficult to prevent such intentional events. Finally, understanding the Brazilian reality, including cultural habits, stressors, marginalized groups, and economic, racial, regional, and gender inequalities, is fundamental to the search for public health measures aimed at preventing attempts at self-extermination. More research is needed to develop deeper into this topic, especially research that can detect minor regional and temporal variations, always seeking to prevent suicides.

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest related to this work.

CONTRIBUTIONS

Alfredo Cataldo Neto contributed to the elaboration, study design, and revision of the manuscript**. Alessandro Batista Soares, Ana Laura Avila Caumo, Gabriela Pinho Fillmann, and Marina Tonin** contributed to the elaboration, study design, acquisition, analysis, and interpretation of data, writing, and revision of the manuscript**. Luísa Mostardeiro Tabajara Franche and Rodrigo Chultz** contributed to the elaboration, study design, acquisition, analysis, and interpretation of data.

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