Original Article

Self-inflicted violence by exogenous poisoning in an emergency service

Violência autoinfligida por intoxicação exógena em um serviço de urgência e emergência

Violencia autoinfligida por intoxicación exógena en un servicio de urgencia y emergencia

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How to cite this article:
Veloso C, Monteiro CFS, Veloso LUP, Figueiredo MLF, Fonseca RSB, Araújo TME, et al. Self-inflicted violence by exogenous poisoning in an emergency service. Rev Gaúcha Enferm. 2017;38(2):e66187. doi: http://dx.doi.org/10.1590/1983-1447.2017.02.66187.

doi: http://dx.doi.org/10.1590/1983-1447.2017.02.66187

ABSTRACT

Objective: To analyze the self-inflicted violence by exogenous poisoning reported in a health service.

Methods: Epidemiological, retrospective and analytical study in an emergency care in the city of Teresina, Piauí. The study took place in January and February of 2015, upon review of all cases of self-inflicted violence by exogenous poisoning reported to the Information System on Diseases of Compulsory Declaration, from 2009 to 2014. The Pearson chi-square test was used for analysis.

Results: 277 victims of self-inflicted violence by exogenous poisoning were reported, with 10.5% having died by suicide. There was an association between death and the age, education, area of occurrence and type of exposure, as well as between the type of exposure and the amount of agents used.

Conclusion: The results help to define prevention strategies considering vulnerable groups and the complexity of the factors associated with self-inflicted violence.

Keywords: Violence. Suicide. Suicide attempted. Poisoning. Epidemiological surveillance.

RESUMO

Objetivo: Analisar as violências autoinfligidas por intoxicação exógena notificadas em um serviço de saúde.

Métodos: Estudo epidemiológico, retrospectivo e analítico realizado em um serviço de urgência e emergência do município de Teresina, Piauí. Procedeu-se nos meses de janeiro e fevereiro de 2015, mediante análise de todos os casos de violência autoinfligida por intoxicação exógena notificados no Sistema de Informação de Agravos de Notificação, no período de 2009 a 2014. O teste qui-quadrado de Pearson foi utilizado na análise.

Resultados: Foram notificadas 277 vítimas de violência autoinfligida por intoxicação exógena, sendo que 10,5% morreram por suicídio. Houve associação entre o óbito e as variáveis idade, escolaridade, zona de ocorrência e tipo de exposição, assim como entre o tipo de exposição e a quantidade de agentes utilizados.

Conclusão: Os resultados fornecem subsídios para a definição de estratégias de prevenção considerando os grupos vulneráveis e a complexidade dos fatores associados à violência autoinfligida.

Palavras-chave: Violência. Suicídio. Tentativa de suicídio. Envenenamento. Vigilância epidemiológica.

RESUMEN

Objetivo: Analizar las violencias autoinfligidas por intoxicación exógena notificadas en un servicio de salud.

Métodos: Estudio epidemiológico retrospectivo y analítico realizado en un servicio de urgencia y emergencia de la ciudad de Teresina, Piauí. Se procedió en los meses de enero y febrero de 2015, a través del análisis de todos los casos de violencia autoinfligida por intoxicación exógena notificados en el Sistema de Información de Agravios de Notificación, correspondiente a los años de 2009 a 2014. Se utilizó el test chi-cuadrado de Pearson para el análisis.

Resultados: Se notificaron 277 víctimas de violencia autoinfligida por intoxicación exógena y 10,5% murió por suicidio. Hubo asociación entre la muerte y las variables edad, educación, área de acontecimiento y exposición, así como entre la clase de exposición y la cantidad de agentes utilizados.

Conclusión: Los resultados proporcionan subvenciones para estrategias de prevención teniendo en cuenta los grupos vulnerables y la complejidad de los factores asociados a la violencia autoinfligida.

Palabras clave: Violencia. Suicidio. Intento de suicidio. Envenenamiento. Vigilancia epidemiológica.

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INTRODUCTION

Self-inflicted violence is that which occurs when a person practices a conscious action of self-destruction and can be subdivided into suicidal behavior and self-harm. The former includes suicidal thoughts, suicide attempts and actual suicides, while self-harm includes acts such as self-mutilation[1].

Suicide is characterized as a voluntary act by which the individual has the intention and causes their own death. A suicide attempt, in turn, is a potentially damaging self-inflicted behavior that results in a non-fatal outcome[2]. Both are complex and multifactorial phenomena that represent a major public health problem worldwide[3-4].

According to the World Health Organization, suicide is one of the three main causes of death among young people between 15 and 44 years in developed and developing countries. The global suicide rate is around 11.5 deaths per 100,000 inhabitants, and it is estimated that about 804,000 people committed suicide in 2012, representing one death every 40 seconds. In addition, it is assumed that until 2020, there may be a 50% increase in the annual rates of suicide deaths worldwide[4].

In Brazil, the suicide mortality rate is relatively low (5.3 deaths per 100 thousand inhabitants). However, between 2002 and 2012, there was an 33.6% increase in suicides, from 7,726 to 10,321 deaths. In this scenario, the Brazilian Northeast presents itself as the second Brazilian region with the largest increase in the number of suicides, well above the national average (51.7%). In this region, Teresina stands out as the capital with the highest rate of suicide (8.9 deaths per 100,000 inhabitants), the second in the national rank[5].

About suicide attempts, although there is no nationwide registry, it is estimated that these exceed the number of suicides in at least ten times[6]. Moreover, the literature indicates that the history of attempted suicide is presented as a risk behavior and a strong predictor of relapse and, subsequently, suicide[7].

The choice of medium used in the self – inflicted violence covers psychosocial aspects, gender, socio-cultural acceptability, and access[8]. National and international research indicate that exogenous poisoning is the primary means used in suicide attempts, and is among the three main methods of choice in cases of suicide[3,9-10].

In this sense, drugs and pesticides are implicated in about 70% of cases of exogenous self-poisoning[9]. A study about hospital admissions in the Unified Health System (SUS) arising from self-inflicted violence by exogenous poisoning found that, in the period from 2002 to 2013, 35,685 patients were hospitalized due to self-poisoning by drugs and 23,093 by pesticides and/or chemicals[3].

It is emphasized that self-inflicted violence with a non-fatal outcome is usually a medical emergency that requires precise and effective interventions, and that have short and medium-term effectiveness[11]. Thus, before the absence of systematic records about this phenomenon, emergency services are presented as an important source of information, essential to plan services and preventive actions.

Given the above, the following research question was formulated: what are the characteristics and factors related to self-inflicted violence by exogenous poisoning reported in a reference state hospital emergency room? Thus, this study aimed to analyze self-inflicted violence by exogenous poisoning reported at a health service.

METHODOLOGY

This is an epidemiological, retrospective and analytical study at the Núcleo Hospital de Epidemiologia (NHE – Epidemiology Hospital Center, in English) a reference in emergency service for the state of Piauí, located in the city of Teresina. The study population consisted of all victims of self-inflicted violence by exogenous poisoning reported in the health service from July 2009 to December 2014, totaling 277 victims.

Data collection was conducted in January and February 2015, through the analysis of individual investigation records related to exogenous poisoning found in the Information System on Diseases of Compulsory Declaration (SINAN). The study included all cases reported as self-inflicted violence by exogenous poisoning. The reporting forms related to exogenous poisoning by other exposure circumstances and those improperly filled out were excluded.

The instrument used for data collection consisted of a structured script type checklist, developed by the researchers based on exogenous poisoning research form SINAN, composed of the following variables: sex, age, education, occupation, place of residence, area of occurrence, exposure location, number of toxic agents involved, toxic agent used, exposure route and type and outcome.

Data were organized in spreadsheets using *Microsoft Office Excel* software and statistically analyzed using the *Statistical Package for Social Sciences* (SPSS) version 22.0.

Categorical and categorized variables are presented in absolute and relative frequencies. Furthermore, an association test (chi-square test) was held between the dependent variable (evolution – discharge or death) and the independent variables (sociodemographic and those related to the circumstances of the occurrence), adopting a confidence interval of 95% , and significance level of 5% ($p \leq 0.05$).

The study was approved by the Research Ethics Committee of the Universidade Estadual do Piauí, under number 887,220. In order to meet the ethical issues contained in Resolution 466/12 of the Brazilian National Health Council[12], the researchers ensured the confidentiality and anonymity of victims reported in the health service, and held themselves responsible for the reliability of transcribed data present in the notification forms, by signing the Data Use Commitment Agreement.

RESULTS

Between July 2009 and December 2014, 277 reports were filed regarding self-inflicted violence by exogenous poisoning. Most (58.8%) were for attempted suicide and evolved into discharge, 10.5% died (suicide), 7.9% were transferred to other health services and in 6.9% of cases there was segment loss. It is noteworthy that 15.9% of the notification forms had no record about the evolution of the case.

As for sociodemographic characteristics, the predominance of female victims (57.0%), aged between 20 and 29 years (34.7%), with primary education (52.4%) in labor activity (41.9%) and in the urban area (80.1%) was observed (Table 1).

Regarding the characterization of occurrences of self-inflicted violence by exogenous poisoning, most exposures occurred in the urban area (77.6%), at home (89.9%) and by using only one toxic agent (68.6%), especially medicinal products (59.5%) and raticides (18.4%). Acute exposure (78.0%) and the use of the gastrointestinal tract (98.5%) were predominant (Table 2).

Table 3 describes the associations between the evolution of the cases and the relevant characteristics of victims and occurrences of circumstances. Therefore, only discharges and deaths (suicide attempts and suicides) were considered, since the transfer and segment loss cases did not allow a conclusion as to a fatal or non-fatal outcome.

It was found that, although the female victims are more prevalent in suicide attempts (59.5%), males were more frequent in deaths by suicide (58.6%). The progression to death was significantly associated with illiterate victims ($\chi^2 = 16.091$; $p = 0.001$) and aged over 50 years old ($\chi^2 = 10.533$; $p = 0.032$).

In considering the circumstances of the occurrence, it was found that, in cases of suicide, the predominance of drugs (43.5%) and pesticides (26.1%) was observed. It is emphasized that repeated exposure ($\chi^2 = 4.778$; $p = 0.029$) and suicide attempts in rural areas ($\chi^2 = 6.870$; $p = 0.009$) were statistically associated with death.

Furthermore, although a significant association was not established with the development of cases, being of the

Table 1 – Socio-demographic characteristics of victims of self-inflicted violence by exogenous poisoning reported in emergency care, from July 2009 to December 2014. Teresina, Piauí, Brazil.

Variable	Frequency	
	Absolute (n)	Relative (%)
Gender		
Male	119	43.0
Female	158	57.0
Age		
Up to 19 years old	66	23.8
20 to 29 years old	96	34.7
30 to 39 years old	60	21.7
40 to 49 years old	33	11.9
50 to 59 years old	14	5.1
60 years or more	08	2.9
Education		
Illiterate	21	7.6
Elementary School	145	52.4
High school.	89	32.1
Higher education	13	4.7
Not informed	09	3.2
Occupation		
Student	87	31.4
Active	116	41.9
Retired	08	2.9
Unemployed	66	23.8
Area of residence		
Urban area	222	80.1
Countryside	55	19.9

Source: Research data, 2015.

Table 2 – Characterization of occurrences of self-inflicted violence by exogenous poisoning reported in emergency care, from July 2009 to December 2014. Teresina, Piauí, Brazil.

Variable	Frequency	
	Absolute (n)	Relative (%)
Place of exposure		
Residency	249	89.9
Public road	10	3.6
Workplace	06	2.2
Others (1)	05	1.8
Not informed	07	2.5
Number of agents		
Just one	190	68.6
More than one	66	23.8
Not informed	21	7.6
Toxic agent (2)		
Drugs	194	59.5
Raticide	60	18.4
Chemical products for industrial use	30	9.2
Chemical products for residential use	15	4.6
Pesticides	27	8.3
Exposure		
Digestive	273	98.5
Parenteral	01	0.4
Not informed	03	1.1
Type of exposure		
Single acute	216	78.0
Repeated acute	34	12.3
Not Informed	27	9.7
Area of occurrence		
Urban area	215	77.6
Rural area	58	20.9
Not informed	04	1.5

Source: Research data, 2015.
(1) Comprises locations with a frequency under two occurrences.
(2) Some victims used more than one toxic agent (n = 326)

male sex (p = 0.069) and the use of pesticides as a toxic agent (p = 0.069) showed a trend towards effecting a fatal outcome (suicide).

Figure 1 shows a statistically significant association between the type of exposure and the number of toxic agents used in self-inflicted violence, and acute exposure was associated with only one agent and repeated exposure with more than one agent ($\chi^2 = 7.023$; p = 0.008).

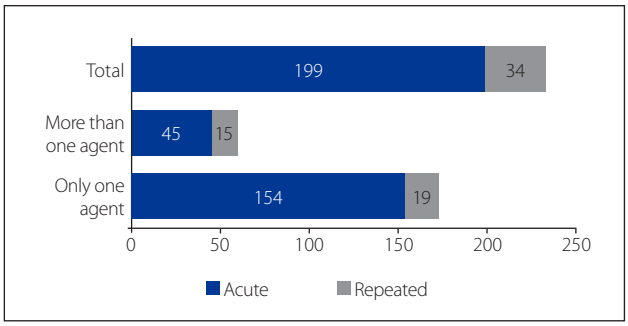

Figure 1 – Association between the type of exposure and the number of agents used in self – inflicted violence by exogenous poisoning reported in emergency care. Teresina, Piauí, Brazil.

Source: Research data, 2015.
p = 0.008 (Pearson chi-square test)

DISCUSSION

Self-inflicted violence is considered a major public health problem because it is an indicator of discomfort and suffering in individuals whose action is generally related to a feeling of inability to identify viable alternatives for solving their conflicts. In this scenario, exogenous poisoning stands out for being the main method used in suicide attempts and ranks among the top three causes of suicide in the world population[1,3,10].

Of the 277 patients reported in the service due to exogenous self-poisoning, 29 died, characterizing suicide. Thus, there was a 10.5% mortality coefficient, a high number when compared to national statistics. An investigation carried out in the context of Brazilian hospital services showed that between 1998 and 2009, the lethality of self-harm by exogenous poisoning was 3.0%[9].

This study found that most suicide attempt victims reported by the service were young adults and adolescents, supporting the literature[4,13]. Suicidal behavior among young people and adolescents involve complex motivations, including depressive humor, substance abuse, emotional, family and social problems, family history of psychiatric disorders, family rejection, neglect, and physical and sexual abuse during childhood[14-15].

There was a statistically significant association between age and the fatal outcome. Victims aged over 50 years were more effective, confirming a study in the state of Minas

Table 3 – Association between the evolution of self-inflicted violence by exogenous poisoning reported in emergency care and characteristics of victims and exposures. Teresina, Piauí, Brazil.

Variable	Evolution (1)			p-value
	Discharge	Death	Total	(2)
	n (%)	n (%)	n (%)	
Gender				0.069
Male	66 (40.5)	17 (58.6)	83 (43.2)	
Female	97 (59.5)	12 (41.4)	109 (56.8)	
Age				0.032
Up to 19 years old	42 (25.8)	06 (20.7)	48 (25.0)	
20-29 years	62 (38.0)	07 (24.1)	69 (35.9)	
30-39 years	36 (22.1)	06 (20.7)	42 (21.9)	
40-49 years	15 (9.2)	04 (13.8)	19 (9.9)	
50 years or more	08 (4.9)	06 (20.7)	14 (7.3)	
Education				0.001
Illiterate	10 (6.3)	07 (26.9)	17 (9.1)	
Elementary School	90 (56.3)	07 (26.9)	97 (52.2)	
High school.	56 (35.0)	10 (38.5)	66 (35.5)	
Higher education	04 (2.5)	02 (7.7)	06 (3.2)	
Occupation				0.162
Student	56 (34.4)	06 (20.7)	62 (32.3)	
Active	65 (39.9)	18 (62.1)	83 (43.2)	
Retired	02 (1.2)	-	02 (1.0)	
Unemployed	40 (24.5)	05 (17.2)	45 (23.4)	
Area of Occurrence				0.009
Urban area	130 (80.7)	17 (58.6)	147 (77.4)	
Countryside	31 (19.3)	12 (41.4)	43 (22.6)	
Place of exposure				0.533
Residency	142 (89.3)	27 (93.1)	169 (89.9)	
Other locations	17 (10.7)	02 (6.9)	19 (10.1)	
Number of agents				0.406
Just one	114 (76.5)	21 (84.0)	135 (77.6)	
More than one	35 (23.5)	04 (16.0)	39 (22.4)	
Toxic agent				0.069
Drugs	72 (49.0)	10 (43.5)	82 (48.2)	
Raticide	42 (28.6)	04 (17.4)	46 (27.1)	
Chemical products for industrial or residential use	21 (14.3)	03 (13.0)	24 (14.1)	
Pesticides	12 (8.2)	06 (26.1)	18 (10.6)	
Type of exposure				0.029
Single acute	137 (91.3)	20 (76.9)	157 (89.2)	
Repeated acute	13 (8.3)	06 (23.1)	19 (10.8)	

Source: Research data, 2015.
Observation: Conventional sign used: – Numeric data not equal to zero due to rounding.
(1) Excludes data on transfers and segment losses, as these preclude the conclusion as to a fatal or non-fatal outcome. (2) Chi-square test of Pearson, using a 95% confidence interval and a significance level of 5% ($p \leq 0.05$).

Gerais that detected a significant association between suicide and older adults and the elderly[16].

One of the most consistent findings in the literature is that women have a higher number of suicide attempts than men, a trend observed in the present study. Among the factors that make women more susceptible to suicidal behavior are domestic violence, greater exposure to childhood sexual abuse, vulnerability to psychosocial stressors and the development of psychopathologies, as well as cultural aspects related to gender equality[14].

However, while the females sex has been more common in suicide attempts, 58.6% of deaths from exogenous self-poisoning corresponded to males, corroborating the study conducted nationally. Thus, aggressiveness, impulsiveness, increased access to lethal technologies, greater sensitivity to economic instability and delay in seeking help are seen as behaviors that predispose men to a fatal outcome[9].

Other data found and also in line with other research were the predominance of victims who reside in urban areas and have a low degree of education, in addition to the high number of students and unemployed individuals[13,16-17]. However, suicide attempts in the rural area were significantly associated with suicide, which may be related to more difficult access to health services, facility to obtain toxic agents and a lower degree of education.

The low educational level, especially illiteracy, is presented as a risk factor for self-inflicted violence by exogenous poisoning. Lack of schooling is usually related to socioeconomic difficulties and can result in major damage to the quality of individual and family life and thus increase the risk of suicidal behavior[18].

Moreover, even with the prevalence of victims in labor activity, many students and unemployed individuals were identified. This result is similar to that found in a study conducted in the state of Ceará that affirms that a possible precarious economic situation, demonstrated by the high number of unemployed and students and low education of the victims, may influence the occurrence of self-inflicted violence by exogenous poisoning[13].

Regarding the toxic agents used, drugs prevailed both in non-fatal and fatal cases. In addition, there was a high number of cases involving rat poison and chemical products for industrial and domestic use, a result also found in other national studies[13,18].

In this view, although a statistical significance between the evolution of the cases and the agents used was not detected, it was observed that the use of pesticides has an increased tendency to develop into a fatal outcome when compared to drug use. Corroborating this finding, a nationwide study on self-inflicted violence by exogenous poisoning between 1998 and 2009 found that drugs were the most used substance in cases of suicide attempts, while pesticides were prevalent in suicides[9].

The great diffusion of exogenous poisoning as a means used in suicidal behavior may be related to the wide availability of drugs and toxic substances such as pesticides and raticides, to which people have access today. A comparative analysis performed before and after a regulatory action that culminated in the ban of a major pesticide (paraquat) in an Asian country showed that after this measure there was a 37% reduction in mortality rates by self-inflicted exogenous poisoning[19].

According to the literature, much of exogenous poisoning occurs in the victim's own residence, and the agents used are available on site, whether for rational use of the victims themselves or use by a family member[10,13]. In the present study, the residence was the main place of choice of exogenous self-poisonings (89.9%), which was similar to that found in similar studies conducted in Brazil and in South Korea, where the percentage of exposures at home amounted to 74.4 % and 83.1%, respectively[10,18].

As for the route of exposure, it was found that almost all of the individuals used the digestive/oral tract for self-poisoning (98.5%), which confirms the results found in other studies[13,20]. Moreover, the exposure was characterized as repeated in 10.8% of cases, and a significant portion of the victims who had attempted suicide previously died, resulting in a significant association between repeated exposure and suicide.

Thus, the history of attempted suicide is presented as a crucial factor associated with future suicide, so that the risk of suicide increases with the number of previous attempts and is also related to shorter time intervals between these events. It is estimated that among patients treated in emergency centers for attempted suicide, 30% to 60% had previous attempts and 10% to 25% try again within one year[7,16].

Another finding of this study that is consistent with the literature is the use of only one toxic substance by the majority of victims, apart from the fact that the number of agents was not associated with the success or lack thereof regarding self-inflicted violence[18]. However, there was no statistically significant difference between the number of agents used and the type of exposure, showing that repeated exposure is associated with the use of more

than one toxic agent during the execution of exogenous self-poisoning.

CONCLUSION

The findings in this study indicate that victims of self-inflicted violence by exogenous poisoning who died by suicide differ from those with a non-fatal outcome, particularly in terms of age. It was observed that although teenagers and young adults are more likely to attempt suicide by exogenous self-poisoning, there is a tendency that shows the oldest adults and the elderly are able to carry out suicide.

Moreover, being illiterate was another sociodemographic characteristic which was significantly associated with a fatal outcome. As for the characteristics considered relevant to the circumstances of exposure to toxic agents, the type of repeated exposure and the realization of self-inflicted violence in rural areas are also statistically associated with death. It is noteworthy that repeated exposure is associated with the use of more than one toxic agent during the execution of this type of violence.

Although the study was developed in the main hospital with emergency care in the state of Piauí, a reference in the Brazilian North-Northeast region, a limitation observed refers to not inserting existing peripheral services in the city of Teresina, which possibly reduced the number of exogenous self-poisonings analyzed in the period.

Another important aspect is the fact that the records of the Information System on Diseases of Compulsory Declaration (SINAN) refer only to self-inflicted violence by exogenous poisoning requiring hospital care, which implies the loss of information on other less serious cases that do not reach the health service. This fact, combined with a possible underreporting and inadequate completion of records in health services, makes it difficult to obtain information that portrays the true reality of the city such as the suicidal behaviors regarding the use of toxic agents.

However, this study reached its goal and is relevant to present the main characteristics and factors related to cases of self-inflicted violence by exogenous poisoning. Thus, it provides information that can support nurses and other health professionals about the preventive practice and management of exogenous self-poisoning, and encourage discussions on the need for restrictive measures to be applied to toxic agents used by the victims.

Given the above, the development of new epidemiological studies on self-inflicted violence by exogenous poisoning in other realities is suggested, in order to consolidate information that provides for the creation and strengthening of preventive strategies and policies by the public managers. In addition, it is recommended that a qualitative research aimed at understanding the problem in question regarding other triggering factors and the main needs of victims from health services and the community be performed.

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Received: 07.14.2016
Approved: 03.28.2017