

# Voluntary self-poisoning in children – a silent call for help

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## ABSTRACT

**Introduction.** Voluntary self-poisoning represents nowadays a public health issue, being one of the main causes of morbidity and mortality in pediatric patients. The psychological burden some children have to carry becomes heavier than their strength, fact that determine them to make their voices heard through self-hurting.

**Aim.** The current study proposed to raise awareness upon the multiple cases of voluntary ingestions between children, to assess the reasons and, consequently, to find solutions to support our future generations.

**Materials and methods.** This is an observational retrospective study performed by analyzing the medical data of the patients admitted to the Department of Pediatrics I, from the Clinical County Emergency Hospital Targu Mures, with the diagnostic of toxic substance ingestion, between 1st of January 2019 and 31st December 2022. The study group comprised of 204 children, who were exposed to harmful chemicals, 68 of them being voluntarily involved.

**Results.** A slight increase in the number of cases have been observed during SARS-CoV-2 pandemic. Additionally, we identified that teenage girls were more prone to self-poison than pre-school boys, who were more susceptible to unintentionally ingest toxics. Low family income, abandon, scholar difficulties, use of alcohol and pregnancy were only some of the causes of producing emotional instability. Furthermore, the most preferable substances to consume were pharmaceuticals, especially psychotropics.

**Conclusion.** The study is emphasizing the necessity to establish mental support systems for the children who struggle with past traumas. Founding trustful connections between the child and its family, school and health care professionals can help reduce the self-harm cases and even develop a much more emotionally stronger society.

**Keywords:** children, self-poisoning, pharmaceuticals, psychological burden

## INTRODUCTION

According to World Health Organisation, voluntary poisoning represents the act of deliberate exposure to a harmful substance of which quality and/or quantity becomes toxic to the human body, leading to severe or even life-threatening symptoms [1]. Unfortunately, acute poisoning has become a public health issue, being one of the main causes of morbidity and mortality in children worldwide [2]. While the accidental toxic ingestions are caused by the lack of a proper adult supervision, the voluntary ones are due to psychological burdens carried silently by the child itself.

The most vulnerable paediatric age group is the adolescence, when the puberty changes alongside family conflicts, school bullying, relationships and low self-esteem determine the child to easily accept death as a solution to their struggles [3]. A higher rate of self-harm was observed in female patients, which could be explained by the pronounced emotional instability and a particular psychological profile this gender manifests in adolescence [4].

Some of the most frequently ingested toxic agents as a poisoning purpose are either household substances, alcohol or drugs gathered from their own medical prescription or from family members [5].

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*Article History:*  
Received: 22 August 2024  
Accepted: 27 September 2024

Children's willingness to draw attention to their inner suffering by consuming toxic substances can sometimes have short-term consequences such as severe clinical manifestations with disfunction of vital organs and even death, or long-term neurological implications.

The International Programme on Chemical Safety (IPCS) and the Swedish Poisons Information Service, under the support of the European Association of Poisons Centres and Clinical Toxicologists and the European Commission (EAPCCT) have developed The Poisoning Severity Score which is a standardised scale for grading the severity of poisoning depending on the signs and symptoms of the patient in cause. It consists of 5 severity grades, from none (scored: 0) to fatal (scored: 4), allowing a better evaluation of the following risks and morbidity [6].

Intentional poisoning could be eventually diminished if us as adults could make children's environment safer for their development. The improvement of communication skills, the ability to perceive children's needs, an emotional support system should be adopted by all the people who take part of a child everyday life, starting from family, to school and healthcare workers, in order for us to have a healthy future generation on which the entire community can count on.

## AIM

The aim of this study is to raise awareness upon the frequency of voluntary poisoning in paediatrics, as a form of manifesting their desperate need of emotional support. Recognising the most vulnerable age group and gender, the risk factors and the toxic substances children usually attempt to use, could help us understand the deepest roots of this public health issue and, consequently, to develop both a better management of the present situation and preventive measures for the children at risk.

## MATERIAL AND METHOD

We conducted an observational retrospective study performed by analysing the medical data of the patients admitted to the Department of Paediatrics I, from the Clinical County Emergency Hospital Targu Mures, with the diagnostic of toxic substance ingestion. The research was elaborated throughout a period of 4 years, from 1st of January 2019 to 31st December 2022. The study group comprised of 204 patients who were exposed to harmful chemicals, 68 of them being voluntarily involved.

The exclusion criteria were represented by children under the age of 12 months, the ones who developed allergic reactions after administrating the medication in therapeutic purposes and the patients

who were exposed to toxic substances through other ways than oral ingestion.

The medical data we collected from the patient's files were: gender, age, environment, date of admission, type of ingestion (voluntary/ accidentally), types of toxic substances, dosage, source, consciousness status, signs and symptoms, therapeutic management, particular reasons, the existence of a suicidal attempt history.

A database was created via Microsoft Excel 2010 and, for the statistic evaluation, we used SPSS 25.0 (Statistical Package for the Social Sciences). The  $p$  values  $<0,05$  were considered statistically significant. The results were expressed in a numeric or percentage form.

For privacy reasons, we didn't include any personal data such as name, date of birth, residence or other possible sources of identification of the patients included in the study.

## RESULTS

During the time we conducted the study (from the 1st of January 2019 until the 31st December 2022), a total number of 4411 patients were admitted to our clinic, of which 204 were confirmed to have ingested toxic substances. In comparison to other diagnostics, acute poisoning had a slight increase between 2020-2021, period marked by the start of the SARS-CoV-2 pandemic. (Figure 1)

Regarding the type of the poisoning, the number of the voluntary ingestions (68 children) were two times less than the accidental ones (136 children). Furthermore, the correlation between the type of the poisoning and the gender of the participants showed a statistically significant difference in children's attitudes towards self-poisoning ( $p= 0,0001$ ), indicating that the voluntary ingestion is much more common in female paediatric patients than in males, who predominated in the involuntary cases, as can be seen in Figure 2.

On the other hand, another correlation was made between the gender, type of intoxication and age. Hence, a statistically significant difference ( $p= 0,0001$ ) was obtained, showing that voluntary poisoning in teenage girls, aged between 15 and 18 years old was much more frequent than for the other gender or developmental stages (Table 1). Additionally, the youngest patient of our study to have consumed toxic substances for suicidal purposes was an 11 old girl.

Concerning the environment, there was a slight difference between the urban (57,35%) and the rural (42,64%) areas.

In terms of purpose, the children mostly resorted to consume toxic substances for self-harming reasons (75%) and only a few for analgesic (4,41%), recreational (1,47%) or other motives (19,11%).

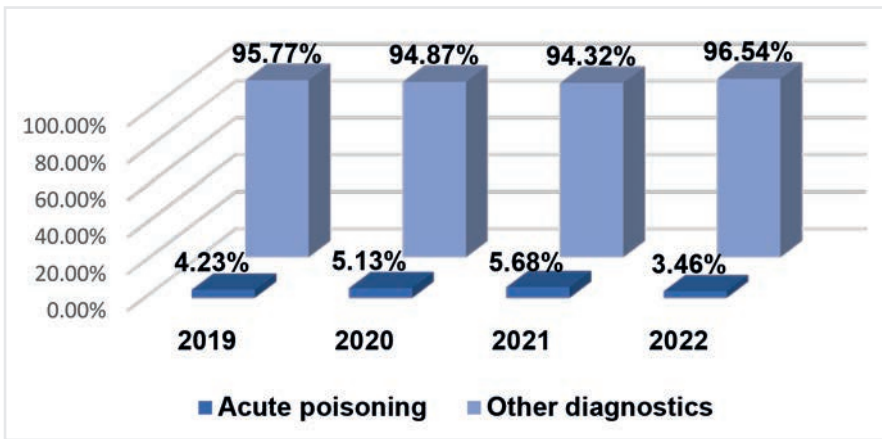


FIGURE 1. The parallel between acute poisoning and other diagnostics

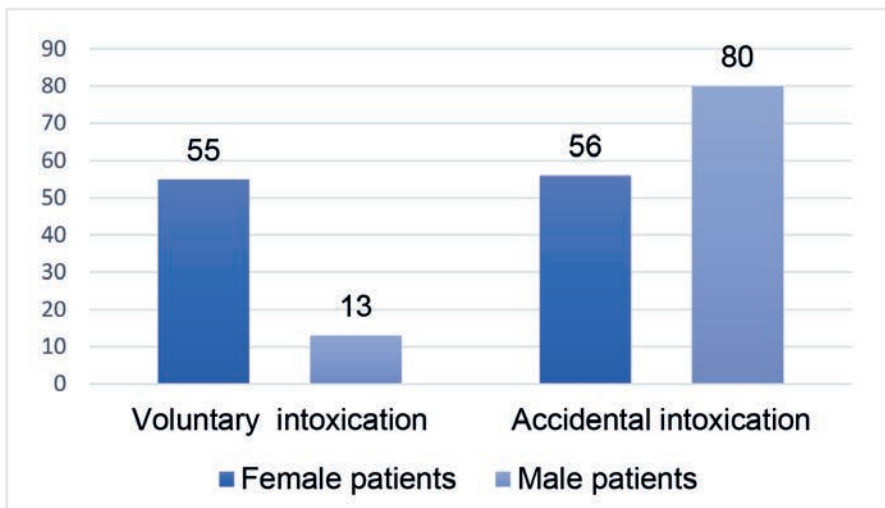


FIGURE 2. The correlation between the type of the ingestion and gender

TABLE 1. The correlation between the type of ingestion, gender and age

p=0,0001		Age group	Voluntary ingestion	Accidental ingestion	Total
Gender	Female patients	1-4 years	0 (0%)	37 (18,4%)	37 (18%)
		5-9 years	0 (0%)	10 (4,90%)	10 (5%)
		10-14 years	30 (14,71%)	8 (3,92%)	38 (19%)
		15-18 years	25 (12,25%)	1 (0,49%)	26 (13%)
	Male patients	1-4 years	0 (0%)	60 (29,41%)	60 (29%)
		5-9 years	0 (0%)	11 (5,39%)	11 (5%)
		10-14 years	5 (2,45%)	6 (2,94%)	11 (5%)
		15-18 years	8 (3,92%)	3 (1,47%)	11 (5%)
Total			68 (33,33%)	136 (66,67%)	204 (100%)

18 out of 47 patients who committed self-poisoning for self-harming reasons, confirmed childhood trauma such as low family income (27,77%), abandon (22,22%), scholar difficulties (16,66%), use of alcohol (5,55%), pregnancy (5,55%) and others.

Additionally, 15,87% of the patients included in the study had previous suicidal attempts. Furthermore, by the time of the admission to our clinic, 19 out of 68 patients had self-inflicted wounds.

A correlation between the type of the ingestion and family history showed a significant statistical difference ( $p < 0,0001$ ), emphasising that children with a negative family background have a higher tendency to voluntarily consume toxic substances than the other group. (Table 2)

Analysing the type of the toxic involved, the drugs from the family's own deposit were the most frequently used substances for self-harming (86,76%),

**TABLE 2.** The correlation between the type of the ingestion and family history

p=0,0001	Traumatising family history	Without traumatising family history	Total
Voluntary ingestion	22 (10,78%)	46 (22,55%)	68 (33,33%)
Accidental ingestion	0 (0%)	136 (66,67%)	136 (66,67%)
Total	22 (10,78%)	182 (89,22%)	204 (100%)

only a few of the children admitting to have consumed other toxics (13,23%).

The medicines patients preferred to use were psychotropic drugs (49,15%), followed by analgesics (30,5%), antibiotics (5%), vitamins and supplements (5%), cardio-vascular medication (3,38%), antihistamines (1,69%) and others (5%). On the other hand, the ones who ingested another toxic chemical, chose mostly alcohol (44,44%) and corrosive substances (44,44%), while 11,11% consumed insecticides.

It has been observed that 57,62% of the voluntary ingestions were with multiple substances rather than only one.

By the time of the admission to our clinic, the consciousness state of our patients was mostly preserved (89,7%). Conversely, one of the children had altered status (1,47%, Glasgow Coma Scale 12-9) and 6 of them comatose state (8,82%, Glasgow Coma Scale between 8-3). 7,35% of the patients were admitted directly to the intensive care unit, after consuming alcohol, corrosive substances, analgesic, antihistaminic or psychotropic medication.

Overall, the symptoms patients presented at the admission were linked to the type of the toxic they ingested. Consequently, while 23,72% of them remained asymptomatic, the rest of the patients who consumed drugs manifested mostly somnolence

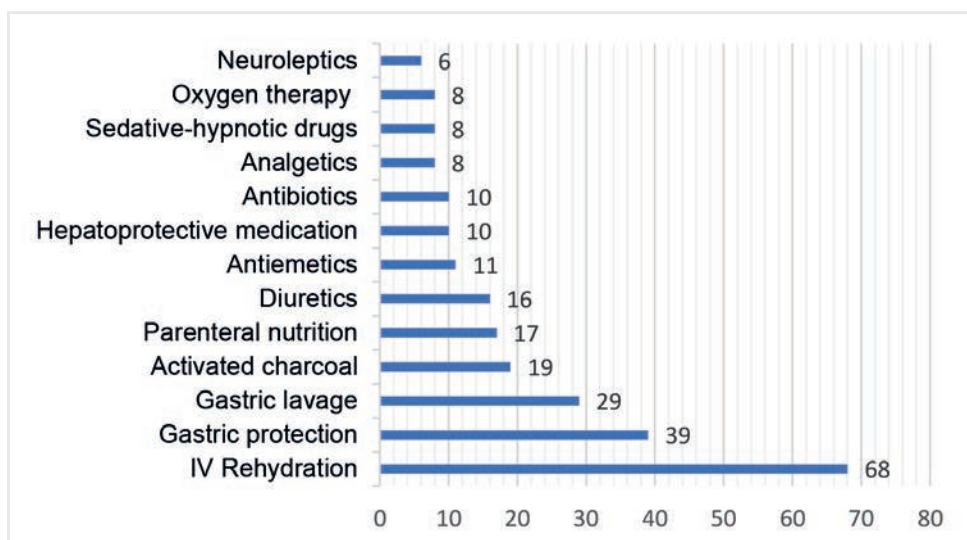
(38,98%), dizziness (16,94%), nausea (35,59%), vomiting (28,81%), abdominal pain (16,94%), headache (13,55%), cardiac distress such as tachycardia (18,64%) or bradycardia (5%), hypertension (3,38%) or hypotension (3,38%), and only a few, neurologic symptoms (6,77%). On the other hand, children who ingested other toxics tended to have predominantly somnolence and digestive problems (33,33%) such as nausea, vomiting, abdominal pain, with less cardiologic and neurologic impairment (1,69%).

The laboratory findings showed modifications in haemoglobin (25%), coagulation (30,88%), transaminase (8,82%), urea (8,82%), creatinine (4,41%), ions such as Na<sup>+</sup> (11,76%), K<sup>+</sup> (14,7%), Cl<sup>-</sup> (10,29%). 4,41% of patient presented with acidosis, while 1,47% with alkalosis. The toxicological test turned out to be positive for only 8 out of 68 patients.

Regarding the physical exam and the blood tests, our patients had the following secondary diagnostics: reactive behaviour disorder (47,05%), depressive disorder (20,5%), hydroelectrolytic imbalance (33,82%), dehydration (30,88%), anaemia (13,23%), gastritis (13,23%). Very few developed liver dysfunction (1,47%), renal dysfunction (2,94%), anxiety disorder (2,94%) or even altered mental status (5,88%).

The therapeutic management focused generally on intravenous rehydration, gastric protection, parenteral nutrition, antiemetics, hepatoprotective medication, analgesics, sedative-hypnotic drugs, neuroleptics, diuretics, oxygen therapy. (Figure 3)

Particularly, the voluntary ingestions with drugs required the use of specific antidotes such as n-acetylcysteine, for acetaminophen overdose, or flumazenil, for benzodiazepine excess. Also, gastric lavage and activated charcoal were preferred for pharmacological ingestions, whereas antibiotics were mostly used in non-pharmacological poisoning treatment.

**FIGURE 3.** Therapeutic management of voluntary ingestions

By the time of the discharge, the majority of the patients had an improved general status (78,26%), while few of them remained stationary (19,11%). One death has been registered after self-poisoning with corrosive substances.

## DISCUSSIONS

America's Poison Centers published its 40th annual report in 2022, a collection of data regarding the exposure to toxic substances of the general population, gathered by the National Poison Data System (NPDS). This report contains information about poisoning in the United States of America, based on the calls the organisation receives annually from the people in need. In 2022, it has been registered a total number of 2.064.875 human exposures, noticing a 0,771% decrease from 2021. [7] Similarly, on a narrower scale, the percentage of the cases admitted to our clinic in 2022 dropped with 2,22% from 2021. Nevertheless, a slight rise in the numbers of the cases was observed between 2020-2021, during SARS-CoV-2 quarantine, explained by the loneliness, family disputes, loss of loved ones people generally had to put up with in that time of restrictions [8].

Depending on the cause and intention, poisoning is divided into two main categories such as accidental and voluntary. A study conducted in Poland in 2021 illustrates that unintentional poisoning is much more often than the intentional one, because in most cases happens at a younger age, when, without a proper adult supervision, accidents are often imminent [9]. Likewise, in our clinic the number of voluntary ingestions was only one quarter of the study group.

The correlation between the type of the ingestion and gender revealed that boys are more likely to unintentionally self-poison than girls, who predominantly commit intentional consume of toxics ( $p=0,0001$ ). Furthermore, adding the age as another variable to our correlation, it is also statistically proven ( $p=0,0001$ ) that teenage girls have a higher tendency for self-harm than preschool-boys. This predilection has been studied and the outcomes proved that even though all the adolescents have to confront emotional problems, the lack of family support and intense use of social media have become the most fearful causes for females' psychological damage [10]. Nevertheless, another study claims that criteria for depression were much more often found in girls who committed suicide than in boys [11].

The difference in self-poisoning between the rural and urban areas was only of 15%, showing that the habitat doesn't represent a risk factor for self-poisoning in paediatric patients.

The reason for consuming toxic substances was mostly for self-harming (75%), although some of the

children used drugs for analgic or recreational purposes.

Psychologists say that children who commit voluntary intoxication suffer an emotional reaction, translated as an aggressive-impulsive act consequently to both age vulnerability and stress factors. Lack of family unity and support, bullying, inadaptability in school, breakups, death of a close relative or friend are only some of the causes that make adolescents not to see a brighter future ahead [12,13]. Similarly, the children who took part in our study recognised as stressors, from worst to least, the following: low family income, abandon, scholar difficulties, use of alcohol, pregnancy and others.

The Spanish Society of Paediatric Emergency Medicine conducted a prospective study in 2021 analysing different patterns of the children admitted to the emergency department after ingestion of toxic substances. Hence, it was found that half (57,7%) of the examined group of 281 patients had attempted suicide before [14]. With regards to our study, 15,87% of our participants had already tried to commit self-murder.

Self-cutting represents the most common type of self-harm. Simultaneously, self-harm is the most important risk factor for a future suicide attempt. As a consequence, self-inflicted wounds frequently coexist with self-poisoning, as it happens in our study where 19 out of 68 children presented self-cutting wounds at the admission [15].

It has been statistically proven that a traumatising family history is directly linked to a predisposition to voluntary ingestions ( $p=0,0001$ ). Exposure to childhood adversity such as physical or emotional abuse, violence between the members of the family, cohabitation with someone with a mental illness or who have committed suicide, parental death or divorce is strongly associated with a high risk of self-poisoning [16].

The toxic substances our patients used for self-harming consisted mostly of pharmaceuticals, rather than non-pharmaceutical products, fact presented in approximately the same amount in an Italian study conducted in 2020 [17].

The Standardised Clinical Protocol of Acute Poisoning in Children published in 2021 by the Ministry of Health in Moldova stated that drugs are the most preferred substances for voluntary acute ingestions, followed by household and industrial chemicals [18]. In resemblance to our study, the pharmaceutical substances children usually use are psychotropic drugs, followed by analgesics, cardiovascular medication, antibiotics, vitamins and supplements. On the other hand, the non-pharmaceuticals children consider as an option would be alcohol, household toxic substances, pesticides and insecticides [4].

By the time of the admission, the majority of the children presented a preserved general state, only one being unconscious and other 6 in comatose state.

Regarding the symptoms our patients presented with, we could observe that despite of the type of the product they ingested, the leading symptoms were somnolence and digestive problems. Other manifestations which appeared mostly in drugs use were headache, cardiac and blood pressure distress or neurologic symptoms.

The therapeutic management consisted mostly in intravenous rehydration and gastric protection, further, the treatment being adapted to the toxic ingested. Antidotes for specific substances, gastric lavage and activated charcoal were preferable to treat drug intoxications, while antibiotics were much more of use in the non-pharmaceutical ones. A proper rehydration therapy, an immediate correction of the modified vital functions and, in some cases, the right antidote should be initiated immediately in acute poisoning cases [19].

By the time of the discharge the general state of the majority of the patients was improved and only a few of them remained in a stationary condition. A single death has been registered in our study, due to consume of corrosive substances.

All the cases of voluntary self-poisoning can be prevented by implementing several strategies. Special programs should be established for the parents or caregivers in order for them to be capable to see the signs of depression in their children and to learn how to offer emotional support when needed. On the other hand, children themselves should be taught how to talk about their restless thoughts and

fears, who to talk to and how to control these emotions by themselves. Nevertheless, pharmaceuticals, alcohol and household substances should be safely stored in locked up places in the house which are strictly monitored [20].

## CONCLUSIONS

Self-poisoning became a public health issue through the numerous cases of suicide attempts registered every year in paediatric population. The lack of emotional support from the family members, the continuous exposure to social media, the violent environment, the loss of a loved one are only some of the most important factors that contribute to the child's psychological disturbance. Alongside these variables, the feminine gender and the age of adolescence are statistically the most important risk factors for self-poisoning during childhood. Both the voluntary ingestion with pharmaceuticals or non-pharmaceuticals are dangerous and have to be treated immediately in order to re-establish the homeostasis of the patient and to help eliminate or combat the specific toxic. In order to help the young generations, a strong emotional support system should be created by the community, in which the family, school and health care workers are taught to assess immediately the subtle signs of the children psychological instability and to take preventive measures. The future adults have to have a trustful mindset in order for them to build the society we're aspiring to.

*Conflict of interest:* none declared

*Financial support:* none declared

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