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VARIA

Updates in teenage acute intentional self-poisonings

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Abstract: *Acute intentional poisonings represent an important part of emergency pediatric pathology, as well as a psychiatric one, with an escalation tendency over the past years. The current paper consists of a descriptive prospective study, which took place over 12 months, and included 342 children within the age range 6-18 years, that presented in the Emergency Unit, being subsequently treated as in-patients of the Pediatric Poisoning Center of "Grigore Alexandrescu" Emergency Clinical Hospital for Children. The number of pediatric acute intentional poisonings hospitalized within the time frame of the study was 819 cases. Of these, 342 were intentional, which constitutes a percentage of 41.75%, and 477 were accidental, i.e. 58.24%. The etiology of the acute intentional poisonings is varied; however, medication (54.38%), ethanol (28.65%), and drugs of abuse (12.28%) were predominant. A higher frequency of acute intentional poisonings was noticed in girls (65.49%) as compared to boys (34.50%), probably due to the particularities the psychological profile of this sex shown at this age, i.e. higher emotional instability and display tendency. Out of the total number of acute intentional poisonings, we identified 20 cases of suicide attempts, which represent 5.83% of the total acute voluntary poisonings. Moreover, some of these cases constitute a repeated suicide attempts. The studied group included 30 cases of chronic substance abuse and 6 chronic alcohol abuse cases, with ages within the 13-17 years range, 12 of which were females and 24 males. Out of the 36 chronic substance/alcohol abuse patients, 4 were social cases. Pediatric acute intentional self-poisoning is an important public health issue, alarming through its consequences and its hidden neuropsychiatric and behavioral substrate. This is because adolescence is a period of marked emotional fragility, sensitive to all sorts of influences.*

Keywords: *self-poisoning, teenager, psychiatric disorders, alcohol, substances of abuse*

INTRODUCTION

The prevalence of teenage acute intentional self-poisoning is high since adolescence is a period of profound changes with visible effects on an individual's physical aspect, behavior, and relationships with the surrounding world. It features a personality focus on acquisitions and social statuses related to school life, family life, friend circle.

Adolescence constitutes a time frame of intense development, marked by a series of profound changes with visible effects on physical appearance, behavior, and relationships with the surrounding environment. Resorting to an extreme gesture, such as acute intentional self-poisoning, which puts one's life at risk, is often a potential exacerbation of a chronic psycho-social disorder [1, 2].

Teenage years are marked by intense developmental

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processes, on a sexual level included. Affectivity, relationships of all kinds begin to include the sexual identity and its integration in the self-image.

Drug abuse, juvenile delinquency, poor learning achievements, teenage pregnancy, sexually transmitted diseases, feelings of despair are frequent causes that lead teenagers to resort more and more often to suicide attempts through various acute self-poisonings. Between the ages of 13 and 16 years, adolescents are confronted with frequent and unexpected mood swings. Both the regression and the progression of the psychological age represent explanations regarding the unpredictability of teenagers, as well as the difficulty to sometimes understand them. Behavioral disorders occur, the greater part of which is induced by disturbances in the emotional development caused by family issues, parental conflicts, and splitting [3].

The lack of affection does not refer strictly to its absence concerning the adolescent, but also its misguidance in a direction that ignores the affective needs of the child. The lack of education prevents the adolescent from acquiring necessary social life skills. All these family issues are the source of teenager disorders that lead to powerful social inadequacy behaviors and antisocial acts [4]. The adolescent becomes introverted and develops inferiority complexes. It is important that parents combine proofs of affection with exigencies and demand respect, as well as teach their children the affinity towards imitating behaviors of individuals who distinguish themselves through moral and intellectual qualities [5].

Acute voluntary self-poisoning is a dynamic medical pathology that is often the result of a potential exacerbation of a chronic psychosocial disorder; frequently, patients have a personal history of various psychiatric disorders, such as emotional, behavioral, and personality disorders, depression, mental retardation [6].

The purpose of the study is to determine the frequency of acute intentional self-poisoning cases, to identify the most frequently used substances as the etiology of the self-poisoning, to plot the distribution according to sex, age, the month of the year, the presence of suicide-associated psychiatric pathology and to identify the age interval associated with the highest risk for this pathology.

Acute intentional self-poisoning is often associated with school dropouts or the patients are social cases. However, there are cases when the child is left unsupervised or cases when a teenager will abuse certain substances in a moment of emotional turmoil triggered by a conflict with her/his parents, guardians, or life partner [7].

A particular intentional self-poisoning in the 12-13 year age group (adolescents) is due to ethanol. Ethanol is one of the most frequent causes of acute intentional self-poisonings in teenagers. The abuse is usually acute and within a social context, unlike adult cases, where the most common causes of acute intentional poisoning are psychotropic medication and medication acting on the cardiovascular system. In addition, another objective of our study was the identification of the particularities of alcohol consumption in teenagers living in our country compared to European teenagers [3].

PATIENTS AND METHODS

The personal study was undertaken in the Pediatric Poisoning Center of "Grigore Alexandrescu" Emergency Clinical Hospital for Children, in Bucharest.

The present research is a descriptive, prospective study that took place for 12 months (1st of January 2017-31st December 2017), and included 342 children with ages in the 6-18 years range, who presented in the Emergency Unit and were subsequently treated as in-patients in the Pediatric Poisoning Center of "Grigore Alexandrescu" Emergency Clinical Hospital for Children.

The clinical cases selected for the study were treated as in-patients in the Pediatric Poisoning Center for acute voluntary self-poisoning with various substances. Out of the 2457 hospital admissions in the clinic, 342 cases fulfilled the inclusion criteria for the study.

Inclusion criteria for the study group:
- patients with acute intentional self-poisoning;
- under 18 years of age, or younger than 19, but still students.

Exclusion criteria:
- patients with accidental acute self-poisoning;

Studied parameters:
- patient identification data (age, sex);
- substances used as the etiology of acute intentional self-poisoning;
- motive for the acute intentional self-poisoning;
- number of suicide attempts;
- various chronic substances abuse;
- clinical picture;
- associated psychiatric disorders;

RESULTS

The number of acute poisonings in children treated as in-patients in the studied time frame was 819 cases. Out of these, 342 were intentional, representing 41.75%, and 477

were accidental, i.e. 58.24%.

In the studied group, which contained 342 patients, the etiology of acute voluntary self-poisonings is varied; however, medication (54.38%), ethanol (28.65%), and substances of abuse (12.28%) were predominant (Table 1). Statistical data withstand comparison to literature data - a study performed between 2003 and 2013 in the same clinic - the most common cause remains acute voluntary self-poisoning with medication [8].

Table 1: Case distribution as a function of the etiology of the acute intentional self-poisoning

Etiology	Cases	Percentage
Medication	186	54.38 %
Alcohol	98	28.65 %
Coffein, energy drinks	4	1.16 %
Tabacco	1	0.29 %
Substances of abuse	42	12.28 %
Household toxic substances	7	2.04 %
Pesticides/Insecticides	2	0.58 %
Caustic substances	1	0.29 %
Plants/mushrooms	1	0.29 %

As far as the distribution regarding the months of the year, the study pointed out a higher frequency of cases of acute intentional self-poisonings in January (11.69%), June (11.98%), November (10.88%), but also February (9.35%), March (8.47%), December (9.64%). A lower frequency was noted in April (4.97%), July (6.14%), August (5.55%), and September (6.14%). Most cases of acute intentional self-poisoning were noted in June, which coincides with the end of the school year, and the least cases were noted in the months which correspond to the summer school break.

A higher frequency of acute intentional self-poisoning was noted for females (224 cases, which represents 65.49%), as compared to males (118 cases - 34.50%), probably due to the particularities of the psychological profile of the gender shown at this age, i.e. higher emotional instability and display tendency [9, 10].

In the study group, we noticed that for female cases, the most frequent etiology for acute intentional self-poisoning was medication (70.5% of intentional self-poisonings in females), while for males, the most common etiology was alcohol (49.1% of the total self-poisonings in males), while the second most common one consisted of substances of abuse (23.7%) (Table 2).

A predominance of acute intentional self-poisonings in children was noticed for the age interval 15-16 years (50.58%), which corresponds to adolescence, a period of marked emotional fragility towards all kinds of influences (Table 3).

Table 2: Case distribution according to etiology and sex

Etiology	Female	%	Male	%
Medication	158	46.19%	28	8.18%
Alcohol	40	11.69%	58	16.95%
Coffein, energy drinks	4	1.16%	0	0%
Tabacco	0	0%	1	0.29%
Substances of abuse	14	4.09%	28	8.18%
Household toxic substances	7	2.04%	0	0%
Pesticides/ insecticides	2	0.58%	0	0%
Caustic substances	0	0%	1	0.29%
Plants	1	0.29%	0	0%

Table 3: Case distribution concerning age

Age	No. of Cases	Percentage
<10 years	2	0.58%
10-14 years	100	29.23%
15-16 years	173	50.58%
17-18 years	67	19.59%

The study group (342 cases) comprised patients with ages within the range of 6 to 18 years. For both sexes, a predominance in the age interval 15-16 years was noted: females (32.74%), males (17.83%) (Table 4).

Table 4: Case distribution according to age and sex

Age	Female	Percentage	Male	Percentage
<10 y.	0	0%	2	0.58%
10-14 y.	75	21.92%	25	7.30%
15-16 y.	112	32.74%	61	17.83%
17-18 y.	37	10.81%	30	8.77%

There were 100 patients in the 10-14 years age group. 75% were girls.

There were 173 patients in the 15-16 years age group. 65.73% were girls.

There were 67 patients in the 17-18 years age group. 55.22% were girls.

The highest incidence in girls was noted in the 10-14 years age group and we noticed that as adult age is approached, the sex distribution tends to be equal for girls and boys.

In the study group, 79 children (42.47%) presented medication used in the treatment of CNS disorders as the etiology of acute intentional self-poisoning. 49 children ingested Acetaminophen (26.34%) and 19 children (10.21%) used medication acting on the cardiovascular system for

intentional self-poisoning (Table 5). Out of the medication acting on the CNS, patients used carbamazepine, benzodiazepine, valproic acid, levetiracetam, sertraline, risperidone, extraveral, cipralex (escitalopram).

Table 5: The distribution of cases according to medication types as etiology for acute intentional poisonings

Medication class	Cases	Percentage
Medication used in the treatment of cardiovascular disorders	19	10.21%
Medication used in the treatment of central nervous system disorders	79	42.47%
Aspirin	11	5.91%
Acetaminophen	49	26.34%
Antibiotics	10	5.37%
Oral antidiabetics	4	2.15%
Opioids (Morphine)	1	0.53%
Antiemetics	5	2.68%
Vitamins	4	2.15%
Antidiarrheals	3	1.61%
Anti-acne medication (Roaccutane)	1	0.53%

In our study, we noted that, concerning medication self-poisonings, single-medication poisonings were the most frequent type: 63.44%, while multiple-medication poisonings represented 36.55%. Among the combinations encountered, we mention acetaminophen + CNS-acting medication, aspirin + cardiovascular acting medication or blood pressure-lowering medication, carbamazepine + euthyrox + omeprazole, aspirin + acyclovir.

Pediatric acute intentional self-poisoning of alcohol-related etiology was caused by the consumption of vodka (20 cases), wine (17 cases), and whiskey (9 cases). Distilled drinks are predominant in the etiology of alcohol ingestion in the adolescents included in the study (Table 6). Moreover, the study showed several 26 cases of unknown etiology (the substance of abuse was either unknown or undeclared). Our results are different from those reported by other European countries [11].

Most of the cases of alcohol ingestion took place in a social context, most often in the company of friends, but also with family.

As far as the context in which the acute intentional poisoning took place, most often socializing in a public space or at home with friends determined the occurrence of the poisoning, according to literature as well [12, 13]. In 46 cases, the reason for the ingestion/abuse remained unknown or could not be classified in one of the previously mentioned categories. In 7 of the cases, the etiology of the acute intentional self-poisoning was the combination of medication and alcohol (4 girls/3 boys), and in other 7 cases, the poisoning occurred through the consumption of both alcohol and substances of abuse (3 girls/4 boys).

Table 6: Case distribution according to the etiology of acute intentional alcohol self-poisonings

Etiology	No. of cases	Percentage
Wine	17	17.34%
Vodka	20	20.40%
Whiskey	9	9.18%
Beer	6	6.12%
Champagne	2	2.04%
Distilled drinks	7	7.14%
Fruit-flavored distilled drinks	4	4.08%
Tequila	2	2.04%
Medical-use alcohol	1	1.02%
Ethylenglycol-antifreeze	4	4.08%
Unspecified etiology	26	26.53%

In the studied group: 98 of the cases of acute intentional self-poisoning presented alcohol as etiology; 60 cases showed no coma; 17 cases were complicated by 2nd-degree coma; 12 cases showed 1st-degree coma and only 9 cases showed 3rd-degree coma.

Out of 38 cases that presented with coma, 15 were females (39.47%) and 23 were males (60.52%).

Out of 98 cases of an acute intentional poisoning with alcohol, most cases ingested a quantity of alcohol below 500 ml, 8 cases ingested between 500 and 1000 ml (Table 7). Only one case ingested 3,000 ml of alcohol (wine).

Table 7: Case distribution according to the quantity of alcohol ingested

Quantity of alcohol ingested	No. of cases	Percentage
<500 ml	10	10.2%
500-1000 ml	8	8.16%
1000-3000 ml	1	1.02%
Not specified	79	80.61%

Coma occurred most often with the consumption of wine or vodka. In 7 cases, the type of alcohol ingested could not be precisely determined (Table 8).

In the case of acute intentional poisonings with substances of abuse, the study showed that the most frequently used substances were cannabis and the new psychoactive substances (Table 9). The consumers of substances of abuse were in the 11-18 years old range, the ratio of girls over boys being 1/2.

Acute intentional self-poisonings, especially in the case of adolescents, occur most often with display purposes (parasuicide) or suicide purposes in the context of family disputes. Most are meant to attract attention, few are actual

suicide attempts [14, 15].

Table 8: Case distribution according to the type of alcohol consumed that precipitated the occurrence of coma

Substance	No. of cases	Percentage
Distilled drinks	4	10.52%
Wine	10	26.31%
Vodka	8	21.05%
Whiskey	6	15.78%
Beer	2	5.26%
Fruit-flavored distilled drinks	1	2.63%
Unspecified	7	18.42%

Table 9: Case distribution according to the abuse-substances used as etiology in acute intentional self-poisonings

Substance of abuse	No. of cases	Percentage
Canabis/Marijuana	24	57.14%
Glue	4	9.52%
Heroin	1	2.38%
New psychoactive substances	13	30.95%

In this study, we have noted 20 cases of suicide attempts. We noted 10 cases at the 2nd suicide attempt, 6 cases at the 1st suicide attempt, 2 cases at the 5th attempt (Table 10).

Tabel 10: Case distribution according to the number of suicide attempts, as a function of the total number of patients

No of suicide attempts	No of cases	Percentage
1	6	1.75%
2	10	2.92%
3	1	0.29%
4	1	0.29%
5	2	0.58%

Out of the total number of acute intentional self-poisonings, we pointed out 20 cases of suicide attempts in our study, which represent 5.83% of the total cases. Moreover, we noticed a part of these were not the 1st attempt. The age of patients with a suicide attempt was in the 14-18 years interval; the ratio of female/male was 3/1 (15 girls/5 boys). The majority of patients suffered from psychiatric disorders such as depressive disorder (4 cases), behavior disorders (5 cases), personality disorders (2 cases), conversion disorders (1 case), emotional disorders (5 cases).

The etiology of suicide attempts consisted of multiple drugs in 9 cases, single-drug in 10 cases (CNS-acting drugs, acetaminophen, ibuprofen, blood pressure-lowering drugs), and in one case the etiology was chlorine ingestion.

54.39% of the patients with acute intentional poisonings could be placed in a category of psychiatric disorders, with the help of the extended team of a psychologist and a psychiatrist, after stabilizing the patient. The rest, 45.61% of the patients, were cases of acute intentional poisonings with no psychiatric involvement (Table 11).

Tabel 11: Case distribution according to associated psychiatric disorders

Psychiatric disorder	No. of cases	Percentage
Behaviour disorder	30	8.77%
Depression	40	11.69%
Conversion disorder	1	0.29%
Emotional disorder	101	29.53%
Mental retardation	3	0.87%
Personality disorder	10	2.92%
Tourette syndrome	1	0.29%
No psychiatric disorder	156	45.61%

Out of the 342 acute intentional poisonings, 36 cases of chronic consumers of substances of abuse/alcohol were noted, representing 10.5% (Table 12). This is a worrisome percentage, bearing in mind the age group, i.e. less than 18 years. It is an alarm signal, which imposes the application of urgent measures, on a national level.

Table 12: Case distribution according to the chronic consumption of different substances

Chronic consumption	No. of cases	Percentage
Alcohol	6	1.75%
Substances of abuse	30	8.77%

The study group contained 30 cases of chronic consumers of substances of abuse and 6 cases of chronic alcohol consumption, with ages in the interval 13-17 years, 12 female patients, and 24 male patients. Out of the 36 cases of chronic substances of abuse/alcohol consumption, 4 were social cases.

The clinical study showed 30 social cases (low economical status, neglected child, disorganized families, domestic violence, children left in the care of relatives or institutionalized) and 11 patients who dropped out of school.

In 2 cases, patients aged 16, presented with evolving pregnancy. The etiology of the poisoning was medication-related: vitamins and ketoprofen were the culprits.

DISCUSSION

In the studied group, consisting of 342 patients, the etiology of acute voluntary self-poisonings varied, but medication, ethanol, and substances of abuse were predominant. Statistical data withstand comparison to literature data - a study performed between 2003 and 2013 in the same clinic; the most common cause remains acute voluntary self-

poisonings with medication.

Out of the 342 children with acute intentional self-poisoning, the ratio of girls/boys is 1.89/1. A higher frequency of acute intentional self-poisoning was noted in females (65.49%), as compared to males (34.50%), probably due to the psychological profile of this gender at this age, i.e. higher emotional instability and display tendency. The psycho-behavioral features of the adolescents of the new generation make them vulnerable to life problems.

In the study group, we noticed that for female cases, the most frequent etiology for acute intentional self-poisoning was medication (70.5% of intentional self-poisonings in females), while for males, the most common etiology was alcohol (49.1% of the total self-poisonings in males) and the second most common one consisted of substances of abuse (23.7%).

A predominance of acute intentional self-poisonings in children was noticed for the age interval 15-16 years (50.58%), which corresponds to adolescence, a period in which the changes produced by growth, biological function changes; not only does it affect the behavior, but also the inner feelings of the adolescent. Poisoning is a common reason for presentation to hospitals and one of the top five acute medical presentations. The peak age groups are teenagers and young adults.

The highest incidence in girls was noted in the 10-14 years age group and we noticed that as adult age approaches, the sex distribution tends to be equal for girls and boys. This can be explained through the emotional particularities concerning age in girls. To lower the incidence of acute poisonings, educational prophylactic measures must be applied in schools, beginning at the age of 10, an age that corresponds to the fifth year within the gymnasium educational period.

In the study group, 42.47% of cases presented medication used in the treatment of CNS disorders as the etiology of the acute intentional self-poisoning. 26.34% of children ingested Acetaminophen and 10.21% used medication acting on the cardiovascular system for intentional self-poisoning. Out of the medication acting on the CNS, patients used carbamazepine, benzodiazepine, valproic acid, levetiracetam, sertraline, risperidone, extraveral, cipralex (escitalopram). Medication self-poisonings were the most frequent type of acute intentional self-poisonings (63.44%).

Pediatric acute intentional self-poisoning of alcohol-related etiology was caused by the consumption of vodka (20.4%), wine (17.3%), whiskey (9.1%). Distilled drinks are predominant in the etiology of alcohol ingestion in the adolescents included in the study. The results of the study performed in our country are different from the data obtained in other European adolescent populations [10]. According to literature, the drink preferred by European adolescents is beer (47%), followed by wine and distilled drinks (37-38%), cocktail drinks (32%), and cider (27%). As far as the context in which the acute intentional poisoning took place, most often socializing in a public space or at home with friends determined the occurrence of the poisoning.

In 7 of the cases, the etiology of the acute intentional self-poisoning was the combination of medication and alcohol (4 girls/3 boys), and in 7 other cases, the poisoning occurred through the consumption of both alcohol and substances of abuse (3 girls/4 boys). In the study group, acute intentional poisonings using substances of abuse were most often determined by the consumption of cannabis (57.14%) and new psychoactive drugs (30.95%), less often heroin (2.38%) or glue (9.52%). Out of the 42 cases, 14 were females and 28 were males, with ages within the 11-18 years interval, the ratio of girls/boys was 1/2.

Acute intentional self-poisonings, especially in the case of adolescents, occur most often with display purposes (parasuicide) or suicide purposes in the context of family disputes. Most are meant to attract attention, few are actual suicide attempts. Out of the total number of acute intentional self-poisonings, we pointed out 20 cases of suicide attempts in our study, representing 5.83% of the total acute intentional poisonings. Moreover, we noticed a part of these was not the first attempt. The age of patients with a suicide attempt was in the 14-18 years interval; the ratio of female/male was 3/1 (15 girls/5 boys). The majority of patients suffered from psychiatric disorders such as depressive disorder, behavior disorders, personality disorders, conversion disorders, emotional disorders. Adolescents and young adults are the age group at highest risk for the first onset of commonly occurring mental disorders. This life stage has also been identified as a critical period for the onset of the first suicide attempt [16].

54.39% of the patients with acute intentional poisonings could be placed in a category of psychiatric disorders, with the help of the extended team of a psychologist and a psychiatrist, after stabilizing the patient. The fact that there are patients with recurrent suicide attempts proves the inefficacy of the psychiatric treatment and the lack of psychological support after the period of hospitalization.

CONCLUSIONS

The clinical study showed a lot of social cases (low economic status, neglected child, disorganized families, domestic

violence, children left in the care of relatives or institutionalized) and 11 patients who dropped out of school, 30 cases of chronic consumers of substances of abuse, with ages within the 11-18 years interval and 6 cases of chronic alcohol consumption. In addition, for two of the female patients, a diagnosis of evolving pregnancy was established. Reducing socio-economic deprivation and its associated problems may be an important strategy in the prevention of suicidal behavior, especially in young people.

Out of the 342 acute intentional poisonings, 36 cases of chronic consumers of substances of abuse/alcohol were noted, representing 10.5%. This is a worrisome percentage, bearing in mind the age group, i.e. less than 18 years. It is an alarm signal, which imposes the application of urgent measures, on a national level.

Pediatric acute intentional self-poisoning is an important public health issue, alarming through its consequences and its hidden neuropsychiatric and behavioral substrate. This is because adolescence is a period of marked emotional fragility, sensitive to all sorts of influences [17, 18].

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Author's contribution

SS contributed to the conception and design of the study, the acquisition, analysis, and interpretation of data of the study. She also contributed to the drafting of the work and its critical revision for important intellectual content. IB contributed to the acquisition, analysis, and interpretation of data of the study, to the drafting of the work, and its critical revision for important intellectual content. HTS contributed to the conception and design of the study, the acquisition, analysis, and interpretation of data of the study, contributed to the drafting of the work and its critical revision for important intellectual content. CD contributed to the conception and design of the study, the acquisition, analysis, and interpretation of data of the study, contributed to the drafting of the work and its critical revision for important intellectual content. MM contributed to the design of the study and the drafting of the study and its critical revision for important intellectual content. ACT contributed to the analysis and interpretation of data of the study, to the drafting of the work, and its critical revision for important intellectual content. All authors read and approved the final version of the manuscript and agreed to be accountable for all aspects of the study in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Conflict of interests

It is not declared by the authors.

Ethics approval and consent to participate

This study adhered to the tenets of the Declaration of Helsinki and was approved by the Ethics Committee of our hospital, "Grigore Alexandrescu" Clinical Emergency Hospital for Children (Bucharest, Romania).

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