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## Poisonings among children – current problem in paediatric practice

### Zatrucia wśród dzieci – aktualny problem w praktyce pediatrycznej

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#### ABSTRACT

**Introduction:** Poisonings among children are a serious threat to the health and life of young patients, and also they constitute a fundamental social problem.

**Aim:** The aim of the study was to analyse the number and type of poisonings among the patients hospitalised in the Paediatric Clinic, Medical University of Lublin in 2009.

**Material and method:** The research was based on the medical documentation of the patients hospitalised for accidental or intentional poisonings in the Paediatric Clinic. The study group comprised 164 children aged 1–17, including 83 girls (50.61%). The statistical analysis was carried out by Statistica 8 software.

**Results:** In the period from the 1st January to the 31st December 2009, 164 children (13.06% of all patients) were admitted to the Paediatric Clinic for poisoning. 73 children aged six years or younger were hospitalised (44.51%). In this age group 100% of poisonings was accidental. There were 91 (55.49%) children older than six hospitalised for poisonings. In this age group intentional poisonings were dominant – 81.32%; whereas accidental poisonings constituted barely 18.68%. The overall results show that intentional poisonings were more common among girls (55.22%) and patients living in urban areas (54,10%).

**Conclusions:** Poisonings are significant problems in paediatric health care. The frequency and the type of poisonings is correlated with the sex, age and the place of residence of patients.

**Key words:** accidental poisoning, intentional poisoning, suicidal attempt, children

#### STRESZCZENIE

**Wstęp:** Zatrucia w wieku rozwojowym są zagrożeniem dla zdrowia i życia małych pacjentów, jak również stanowią istotny problem społeczny.

**Cel pracy:** Celem była retrospektywna analiza liczby i rodzaju zatruc wśród pacjentów hospitalizowanych w Klinice Pediatrii w roku 2009.

**Materiał i metody:** Materiał pracy stanowiła dokumentacja medyczna pacjentów hospitalizowanych z powodu zatruc przypadkowych jak i celowych w 2009 roku w Klinice Pediatrii III Katedry Pediatrii Uniwersytetu Medycznego w Lublinie. Praca dotyczy 164 dzieci w wieku od 1 do 17 roku życia, w tym 83 dziewczynki (50,61%). Analizę statystyczną wykonano w oparciu o program Statistica 8.

**Wyniki:** W okresie od 01.01.–31.12.2009 r. w Klinice Pediatrii z powodu zatruc hospitalizowano 164 dzieci, co stanowi 13,06% wszystkich pacjentów. Do 6 roku życia było hospitalizowanych 73 dzieci (44,51%). W tym okresie wieku zatrucia przypadkowe stanowiły 100%. Dzieci powyżej 6 roku życia hospitalizowanych z powodu zatruc było 91 (55,49%). W tej grupie wiekowej dominowały zatrucia celowe – 81,32%, przypadkowe stanowiły zaledwie 18,68%. Wykazano, że zatrucia celowe częściej występują wśród dziewcząt (55,22%) oraz wśród mieszkańców miast (54,10%).

**Wnioski:** Zatrucia stanowią nadal istotny problem w medycynie wieku rozwojowego. Częstość i rodzaj zatruc zależy od płci, wieku oraz miejsca zamieszkania pacjentów.

**Słowa kluczowe:** zatrucia przypadkowe, zatrucia celowe, próba samobójcza, dzieci

**Table 1. The causes of accidental poisonings among children under 6 years of age****Tabela 1. Przyczyny zatruc przypadkowych wśród dzieci poniżej 6. roku życia**

Cause Przyczyna	Number of poisonings (n) Ilość (n)	Percentage (%) Udział procentowy (%)
Medications Leki	43	58,90
Pesticides Pestycydy	6	8,22
Alkalis and alkalis-like caustic substances Zasady i zasadopodobne substancje żrące	5	6,85
Unknown species of fruit Nieznane gatunki owoców	4	5,48
Metals Metale	3	4,11
Organic solvents Rozpuszczalniki organiczne	3	4,11
Gases, fumes, and vapour Gazy, dymy i pary	3	4,11
Chlorine derivatives of hydrocarbon Chlorowcowe pochodne węglowodorów	2	2,74
Nonorganic substances Substancje nieorganiczne	2	2,74
Unknown species of mushrooms Nieznane gatunki grzybów	2	2,74

## Introduction

Poisonings among children and adolescents are common problems in paediatric practice nowadays. Since they occur with high frequency they constitute a crucial social issue. According to the National Institute of Hygiene, in Poland in 2008 the total number of hospitalisations due to poisonings amounted up to 50,047, out of which 36,9% were patients under 19 years of age. It should be highlighted that in the recent years the number of poisonings among children has not decreased, but it remains at the same level (30-35%) [1].

Depending on their cause, poisonings can be divided into intentional or accidental. Accidental poisonings most often involve infants, preschool and school children. During these periods of their lives children are characterised by natural curiosity, which constitutes an integral part of their proper mental development and serves the purpose of accumulating knowledge of the world. The occurrence of poisonings in this age group is largely connected with a lack of responsibility on the part of adults [2].

Intentional poisonings mainly affect adolescents [3]. Typically, the cause of this kind of poisonings is not a single factor but a whole sequence of stressful events. The feeling of being misunderstood by their parents, the lack of acceptance from their peers, and problems at school generate negative emotions to which adolescents succumb. This often results in thoughtless behaviours, which frequently lead to a dramatic, even fatal end.

Medical care of children and adolescents should constitute an essential element of countries' and non-

governmental organisations' health policy. Thus, it seems extremely important to popularise and publicize the knowledge about poisonings in this age group.

The aim of the study was to analyse the frequency and profile of poisonings among patients hospitalised in the Paediatric Clinic in 2009.

## Material and method

The study group consisted of children hospitalised for poisonings in the Paediatric Clinic, Medical University of Lublin in 2009. During the period of study 164 children aged 1-17 years were admitted to the Paediatric Clinic because of poisoning. The patients were divided into two groups. Group 1 were children aged six years or younger, children older than six years belonged to Group 2. The clinical details of each patient were collected from the medical records retrospectively. The analysis took into account the frequency of poisonings in relation to the number of hospitalised children, age, sex, place of living, cause of poisoning and type of toxic substance.

Statistical analysis was carried out by Statistica 8 software. Differences in the frequency of accidental and intentional poisonings in relation to the age, sex and place of living were analysed by Chi-square test;  $p < 0,05$  was considered as statistically significant.

## Results

From the 1<sup>st</sup> January to the 31<sup>st</sup> December 2009, 164 children aged 1-17 years, 83 girls (50.61%) and 81 boys (49.39%), were hospitalised for poisoning (13.06% of all patients admitted to the Clinic).

**Table 2. The causes of intentional poisonings among children aged over six years of age****Tabela 2. Przyczyny zatruc celowych wśród dzieci powyżej 6. roku życia**

Cause Przyczyna	Number (n) Ilość (n)	Percentage (%) Udział procentowy (%)
Psychotropic drugs Leki psychotropowe	7	7,70
Dextromethorphan hydrobromide Bromowodorek dekstrometofanu	6	6,60
Mixture of different drugs Mieszanka różnych leków	6	6,60
Paracetamol Paracetamol	4	4,40
Benzodiazepines Benzodiazepiny	4	4,40
NSAIDs NLPZ	2	2,20
Tetrahydrocannabinoids Tetrahydrokanaboidy	2	2,20
Skeletal muscle relaxants Środki rozluźniające mięśnie	1	1,10
Pesticides Pestycydy	1	1,10

The analysis revealed that 122 of the examined children (74.39%) came from urban areas and 42 (25.61%) were from rural areas. Intentional poisonings were more common among children from towns (54.10%), whereas accidental poisonings predominated among children living in the country (78.57%). Differences in the frequency of accidental and intentional poisonings in relation to the place of living were statistically significant ( $p=0.00$ ).

Group 1 comprised 73 children (44.51% of all examined patients) under six years of age, 29 girls and 44 boys. In that group only accidental poisonings were noted (100%). The majority of poisonings were caused by medications (58.90%). The most common cause of poisonings by medications were medicines widely and easily accessible non-steroidal anti-inflammatory drugs NSAIDs (20%). Drugs affecting the central nervous system (CNS) and cardiovascular drugs caused 17.5% of drug poisonings each. Table 1 presents a detailed analysis of causes of poisonings in Group 1.

Group 2 were 91 children (55.49%) older than six years, 55 girls and 37 boys. In Group 2 the most common cause of the poisonings was alcohol (45.05%). Ethanol abuse was the dominant intoxicating agent (38.46%); less common was abuse of both ethanol and methanol (5.49%). In one case (1.10%) the type of alcohol was not determined. In Group 2 there were 33 cases (36.02%) of intentional poisonings. Among the children who were hospitalised for the poisoning-related to suicidal attempts prevail teenage girls (81.81%). In their attempt to commit a suicide they overused psychotropic drugs and over-the-counter (OTC) drugs, such as paracetamol, dextromethorphan hydrobromide, or took a mixture of different medications.

Table 2 presents a detailed analysis of the intentional poisonings in the children aged over six years.

Accidental poisonings in Group 2 constituted only 18.68%. Most of them were caused by drug abuse (9.89%). Other causes included organic solvents (2.20%), pesticides (2.20%), unknown species of mushrooms (2.20%); less common causes were toxic effects of chlorine derivatives and gases (1.10% each).

Observed differences concerning the frequency of the intentional and accidental poisonings in the particular age groups were statistically significant ( $p=0.00$ ).

The research found that intentional poisonings (55.22%) were more common among girls than accidental ones (45.78%). Among boys accidental poisonings dominated over intentional ones (62.96% and 37.04% respectively). The presented correlation between poisonings and sex was statistically significant ( $p=0.03$ ).

## Discussion

Poisonings constitute one of the most common causes for the hospitalisations observed among children and adolescents. Epidemiological analysis of poisonings among children in the Lublin Macroregion during the periods 1982-1989 and 1990-1994 did not indicate any decrease in the number of poisonings. During the thirteen year period the poisoning index hardly changed; it has been increasing since 1991, and in 1994 it reached peak at 10.70 for 10,000 people [4].

The results of the study by Zawadzka-Gralec et al., in which the number of hospitalisations of children and adolescents caused by acute poisonings in 1993-1995 and 2003-2005 was compared, also confirm that the frequency

of acute poisonings among children does not show a decreasing tendency [5].

In the examined group the majority of patients were girls, which is consistent with the results obtained by Zawadzka-Gralec et al. [5]. However, the epidemiological research in the Lublin Macroregion carried by Szajner-Milart et al. showed a higher rate of poisonings among boys compared with girls [4]. Nevertheless, it should be noted that in our study among hospitalised children younger than six years boys are the dominant group, whereas among older children girls outnumber boys. Lamireau et al. made similar observations [6].

The frequency of poisonings is related to the place of living. Among the analysed group, the patients from urban areas were predominant which is a common finding not only in Poland but also in other European countries [4, 5, 6].

According to different authors, the most common cause of accidental poisonings are drugs and chemical substances commonly used in households [2, 4, 6, 7]. Our results confirm that too. It is parents and caretakers that should be held responsible for this type of poisonings as they recklessly ignore the basic rules of safe storage of drugs and other chemical substances [4, 7]. Moreover, the great majority of chemical cleaning products is colourfully packaged, what make them attractive for children. Producers of chemicals use child-resistant packaging to prevent children from getting at any dangerous contents [4]. Nevertheless, it is not called “childproof packaging” because some children will be able to open it. Preventive actions from producers of chemicals are still insufficient and need coordination by objective and independent inspectors.

Alcohol drinking is one of the most important social problem in Poland. According to the European School Survey Project on Alcohol and Other Drugs (EPSAD) in 2007, alcohol is the most popular psychoactive substance used by the Polish youth [8]. The imitation of bad habits of adults, demoralisation of peer group, increasing availability of alcohol drinks, and lack of supervision on the part of adults contribute to the reduction of the age of alcohol initiation and the overuse of alcohol by children, which results in a tremendous number of hospitalisations caused by alcohol poisonings [9]. A considerable increase in alcohol poisonings in 1993-1995 and 2003-2005 was observed by Zawadzka-Gralec et al. [5]. In the researched group alcohol abuse was predominant cause among cases of intentional poisonings.

In recent years intentional, suicide-related poisonings among children and adolescents have been gradually becoming an increasing problem. In an American analysis by Chavira et al. it was shown that 28% of the researched population has suicidal thoughts and 7.1% openly admitted to their suicidal intentions in the previous year [10].

Our analysis revealed that girls attempt suicide more frequently which was also observed by other authors [11,

12]. However, it turns out that suicide attempts undertaken by boys lead to death more often [13]. The explanation for this discrepancies should be searched for in a different psychopathological profile of the sexes and the use of a different means for committing suicide. Girls that attempt suicide suffer from depression more often than boys. On the other hand, boys are characterised by irritability, aggression, inclination to alcohol and drugs abuse [14]. In order to commit suicide boys use more direct and irreversible methods, such as firearms or hanging. Girls usually use less decisive methods, such as a medication overdose [15].

Medications are the most popular means of committing suicide. In the analysed group, children and adolescents usually took several dozen of different medications widely available in a medicine chest in every household and other OTC drugs such as paracetamol and dextromethorphan. It should be highlighted that OTC drugs play a considerable role in accidental poisonings. The fact was also confirmed by other studies [5, 10].

In the case of intentional poisonings it is extremely important that child's motives are revealed. Usually, a suicide attempt undertaken by a child or an adolescent is a cry for help or an escape from a traumatic situation [16]. A failure to communicate with parents, a feeling of peer isolation, a lack of acceptance, and a need to draw other people's attention drive a young, sensitive person to irrational behaviours. The situation at school is also of importance here. Too high expectations of parents and teachers, classroom rivalry, and bad marks that a child got despite their efforts deepen the feelings of isolation and of being left alone with one's problems [7]. Vieira et al. observed that some of the most common reasons for suicidal attempts among adolescent girls include a “broken heart”, family problems, disturbed human relations, and a lack of attention and care during adolescence [17].

Unfortunately, there is no one universal method of preventing suicides among children and adolescents. Preventive actions should be directed not only at persons with family, economic or school problems but also at all young people. This requires a constructive cooperation between parents, teachers and paediatricians. Adults should strengthen adolescents' stress resistance, boost their self-esteem, and readily give them help and advice.

Poisonings among children and adolescents constitute a crucial problem not only from the medical point of view. It has become a serious social problem too. Thus the implementation of preventive programmes should be a priority of the health policy.

## Conclusions

1. Poisonings are significant problems in paediatric health care.
2. The frequency and type of poisonings are correlated with age, sex, and the place of residence of patients.

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