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**CAUSES, RELATED FACTORS AND EVALUATION OF TREATMENT
RESULTS OF ACUTE PEDIATRIC POISONING IN CHILDREN
AT CAN THO PEDIATRICS HOSPITAL FROM 07/2016 TO 05/2017**

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ABSTRACT

Background: Pediatric poisonings are common accidents that may lead to death or leave long-term complications. If the poisoning is detected and treated in time, the patient can be saved without severe complications. On the contrary, if the poisoning is diagnosed in its later stages or wrong treatments are provided, the patient will be at high risk of fatality. **Objective:** Studying on causes, related factors, and evaluating the treatment results of acute poisoning in children at Can Tho Pediatric hospital from 2016 to 2017. **Materials and method:** The cross-sectional descriptive study on 62 patients diagnosed with acute poisoning and hospitalized at Can Tho Pediatric hospital from 07/2016 to 05/2017. **Results:** Among 62 cases of acute poisoning, children under 5 years of age account for 72.6% of the total and the male to female ratio is 1.48:1. The main reason is the carelessness of the parents (90.3%). The main causes of pediatric poisoning are chemicals (mainly petroleum, pesticides, and detergents), which account for 59.7% of the cases. Poisonings were more common among less than 10-year-old children who are male, have blue-collar mothers with poor education. The majority of patients were cured (88.7%), 95.2% of which have a treatment period of fewer than 7 days. **Conclusions:** The main causes of pediatric poisoning are chemicals. Poisoning is common among children living in low-income families with blue-collar parents, which explains why they do not have enough time to care for their children.

Keywords: Acute poisoning, children, related factors.

I. INTRODUCTION

Pediatric poisonings are common accidents among children, which could lead to death or leave long-term complications. If the poisoning is detected and correct treatment is administered in adequate time, the patient can be saved without severe complications. On the other hand, if the condition is detected too late or the poisoning is treated incorrectly, especially in the first aid step, it could be fatal to the affected children. According to a report from the World Health Organization (WHO) and United Nations Children's Fund (UNICEF) on children's harm prevention in 2004, acute poisoning caused more than 45,000 deaths in children and adolescence under the age of 20. In high and medium-income countries. Poisoning the fourth most common unintentional cause of death, after vehicle crashes, burns and drowning, with the prevalence of poisoning being 0.5 per 100,000 people. However, there is no clear statistical record of pediatric poisonings in Can Tho city. This is

the reason we carried out this study to determine the causes and related factors of acute poisoning at Can Tho Pediatric Hospital from 2016 to 2017. From the analysis of this study, we hope to conclude risk factors and the correct approach to these poisoning cases.

Objectives

1. Determine the causes and related factors of acute pediatric poisoning in children at Can Tho Pediatric Hospital from 2016 to 2017.
2. Evaluate the treatment outcomes of acute poisoning in children at Can Tho Pediatric Hospital from 2016 to 2017.

II. MATERIALS AND METHODS

2.1. Subjects

Pediatric patients aged from 2 months to 15 years old with diagnosed acute poisoning and hospitalized at Can Tho Pediatric Hospital from 07/2016 to 05/2017.

2.1.1. Standards for selection

The patients were diagnosed with acute poisoning having these following signs:

- Had exposure to toxicants.
- Had clinical and/or paraclinical symptoms of acute poisoning.

2.1.2. Standards for elimination

- Patients had microbiological food poisoning, animals' or bees' bites.
- Cases with missing data.
- Cases without consent to be studied from the patients themselves or their families.

2.2. Methods

2.2.1. Study design: The cross-sectional descriptive study.

2.2.2. Sample size: the sample size was calculated with the following equation

$$n = \frac{Z_{1-\frac{\alpha}{2}}^2 p(1-p)}{d^2}$$

$$\alpha = 0.05 \rightarrow Z_{1-\alpha/2} = 1.96; d = 0.07; p = 0.916$$

(According to Farzad Gheshlaghi's study [1]); n = 62.

2.2.3. Sampling method: convenience sampling

2.2.4. Study contents: collecting data from subjects on general features, causes, related factors, and treatment outcomes of acute poisoning.

2.2.5. Statistical analysis: collecting data with a questionnaire; analyzing data with SPSS 20.0.

III. RESULTS

3.1. General features

Table 1. General features.

Characteristics	Frequency (%)
Mean age	41 months (2 months- 15 years of age)
2 months- 5 years	45 (72.6)
5 years - 10 years	9 (14.5)
≥ 10 years	8 (12.9)
Gender: male/female	37 (59.7)/ 25 (40.3)

Residence	Can Tho	34 (54.8)
	Others	28 (45.2)
Circumstance	Unintentional	56 (90.3)
	Intentional	6 (9.7)
Administration	Ingestion	58 (93.5)
	Inhalation	2 (3.2)
	Injection	1 (1.6)
	Skin contact	1 (1.6)
Location	Inside	47 (75.8)
	Outside	15 (24.2)
Time of detection	Morning	16 (25.8)
	Noon	18 (29)
	Evening	28 (45.2)
Time from exposure to hospitalization	< 6 hours	57 (91.9)
	> 6 hours	5 (8.1)

Comment: Poisoning can happen to all ages; however, the higher prevalence was found in the younger age groups, mainly at less than 5 years of age group (72.6%), the rate of poisoning in male was 59.7%, which was higher than that in female (40.3%). The residence status showed that the majority of the cases were from Can Tho, which accounted for 54.8%. Unintentional poisoning was dominant (90.3%). The most common administration of toxicants was via ingestion (93.5%). The location status showed that most of the poisoning happens inside (75.8%). The time of hospitalization mostly happened in the evening (45.2%). Most of the patients were taken to the hospital within the first 6 hours of exposure (91.9%).

3.2. Causes and related factors of acute pediatric poisoning

Table 2. Poisoning due to medications.

Medications	Frequency (n)	Percentage (%)
Neuroleptic	4	6.5
Antihypertensive	3	4.9
Antipyretic	3	4.9
Antihistamine	3	4.9

Antidepressant	2	3.2
Epinephrines	2	3,2
Antifungal	1	1.6
Contraceptive	1	1.6
Theophylline	1	1.6
Unknown	5	8.1
Total	25	40.3

Comment: In the medications group, the most common ones are neuroleptic, antihypertensive, antipyretic, and antihistamine medications. Neuroleptic medications made up 6.5%, which is also the highest one. Three other mentioned causes made up 4.9%.

Table 3. Poisoning due to chemicals.

Chemicals	Frequency (n)	Percentage (%)
Petroleum, gases	12	19.4
Pesticides	11	17.7
Detergents	8	12.9
Corrosive substances	4	6.5
Colored paints	1	1.6
Desiccants	1	1.6
Total	37	59.7

Comment: The causes of poisoning were mainly chemicals (59.7%) and medications (40.3%). In the chemicals group, the most common ones were petroleum, gases, pesticides, detergents, in which the major one was petroleum and gases (19.4%), pesticides and detergents made up 17.7% and 12.9%, respectively.

Table 4. Some risk factors for accidental poisoning in children.

Risk factors	OR (95% CI)	p (Fisher' Exact Test)
Age (< 10 years old)		< 0,001
Male gender	3,33	0.023
Low mother's education level	3,48	0.026
Mother is a blue-collar worker	3	0.044
Mother is the caregiver	2,05	0.062

Comment: By investigating the risk factors for unintentional poisoning in children, we found that poisoning was more common among <10-year-old children who are male and

having blue-collar mothers with poor education. We recorded the relationship between the caregivers and unintentional poisoning with $p = 0.06$

3.3. Treatment outcomes of acute poisoning

Table 5. Treatment and results.

		Frequencies (%)
Hospital management	Eradicating toxicants	28 (45.2)
	Neutralization – adsorption	19 (30.6)
	Antagonists	3 (4.8)
	Increase the elimination of toxicants	24 (38.7)
Results	Completely treated	55 (88.7)
	Complications	7(11.3)
Duration of treatment	< 7 days	59 (95.2)
	≥ 7 days	3 (4.8)

Comment: Among the methods used in hospital management, the most used treatment was eradicating the toxicants, which accounted for 45.2% of the cases, followed by increasing the elimination of toxic substances and neutralization – adsorption, which were used in 38.7% and 30.6% of the cases, respectively. According to our study, the cases of poisoning that were completely treated made up a high rate of 88.7% and 11.3% of the cases got complications, which was mainly pneumonia caused by drinking gasoline, oil. There were no deaths recorded. We found that the average number of days of treatment was 3.9 ± 1.7 days, of which the majority of duration of treatment was <7 days (95.2%).

IV. DISCUSSION

4.1. General features of study subjects

The highest rate of poisoning was among children under 5 years of age (72.6%) which similar to other authors [2], [3]. This can be explained by the explorative characteristic and lack of perception in children especially the 5-year-old stage, so the poisoning rate is especially high. In our study, the prevalence of poisoning in boys was higher than that in girls. The cause of this distribution may be due to the fact that boys are more interested in exploring things around so that the prevalence of poisoning in boys is higher than that in girls [4]. According to our study, up to 90.3% of the cases were unintentional poisoning, which resulted from mistaking medications and harmful chemicals with sweets and drinks. This result is in accordance with the studies of the authors from Pediatric 1 Hospital, Ho Chi Minh City, and India [3], [5]. These poisoning cases might originate from parents storing medications and chemicals in candy containers or water and soft drinks bottles, which made their children mistake those with sweets and drinks. This is also in accordance with the results of Sonya M.S.'s study in Egypt, which showed that poisoning via ingestion made up 96.3% of the cases [6]. 75.8% of the cases happened inside, which was similar to the result of the study of Nguyen Thi Kim Thoa [3]. This raises the alarm that parents ought to store medications and chemicals out of reach of children and not to store harmful chemicals at home. 91.9% of the patients were hospitalized within 6 hours after exposure to the toxicants, whilst Raed M. Alazab's study in Egypt revealed that 68.7% of the cases were hospitalized within 4 hours [8].

4.2. Causes and related factors

The dominant cause of poisoning in our study was the chemicals, followed by medications. Among the chemical agents, petrol and oil are the main causes, followed by pesticides and detergents. These results were also similar to that of other studies [4], [10]. Most of the hospitalized children had parents who were farmers, so the latter often store chemicals at home, which led to the risk of curiosity and mistaking those substances. Among the medications, neuroleptics, antihypertensives, antipyretics, antihistamines, and antidepressants were the ones to be most aware of.

When investigating the risk factors for accidental acute poisoning in infants, we had a look at the relationship between the age and the onset of poisoning, we found that the difference was statistically significant ($p < 0.001$). Bui Quoc Thang and Dhakal AK also had similar results [4], [6]. In terms of the relationship between gender and the risk of poisoning, male children are more likely to drink or mistakenly take poisonings than girls, because they were likely to be more mischievous and active than girls are. On the contrary, in terms of committing suicide, girls dominate with the female to male ratio being 2:1. This suggests that girls were more sensitive to changes in the family, more susceptible to inferiority, and frequently have feelings of self-pity and anxiety leading to higher rates of suicide. Boys were 3.33 times higher than girls at risk of accidental poisoning.

When studying the relation between mother's education levels and the poisoning situations, we found that the difference was statistically significant at $p < 0.05$. Children whose mothers have low education levels have higher risks of accidental poisoning. Specifically, it is 3.48 times higher than that of mothers with a high education level. Considering the relation between maternal occupation and poisoning situation, we found that the difference was statistically significant at $p < 0.05$. Children whose mothers were occupied with blue-collar jobs have a three-time higher risk of accidental poisoning than those with mothers doing white-collar works.

4.3. Outcomes of treatments

According to our study, among the poisoning treatment methods, the most common method was removing toxicants, accounting for 45.2%. Next is the absorption-neutralization method, accounting for 30.6%. The method used to increase the elimination of toxicants is 38.7%. Using antagonists were also used in three cases, accounting for 4.8%. Gastrointestinal toxicity was the highest, gastric lavage was, therefore, the common method for eliminating most of the gastrointestinal toxicants... This is also in accordance with the studies from Turkey and Korea [9]. The majority of patients were cured, accounting for 88.7%. However, 11.3%, cases of patients having complications mainly aspiration pneumonitis because they inhaled volatiles such as gasoline and kerosene. This reminds parents to carefully preserve volatile chemicals, especially petrol and oils, away from the reach of the children. We should not store chemicals in bottles that are not properly well-regulated such as bottles of mineral water or bottles of soft drink because this might make children mistakenly think that those bottles are drinkable. Therefore, it will act as a precursor to increasing the risk of poisoning. In our study, no deaths were reported. The percentage of patients having treatment time less than 7 days was 95.2% and there is no fatality. In addition, there are some cases with patients having treatment time for more than 7 days, accounting for 4.8%. The average days of treatment time were 3.9 ± 1.7 days, the shortest time was 2 days, and the longest time was 11 days.

V. CONCLUSION

Acute poisoning is a common childhood accident that could occur at any age. The situation of poisoning in young children is often due to accidents, whereas in older children, most were due to suicide. Poison children often live in families with financial problems, parents doing manual labour which explains why they do not have enough time to care for their children. In addition, subjective factors also contribute to the increase in poisoning incidence. Therefore, parents should pay more attention to their children; take better care of them, especially children in puberty and infants in order to minimize the poisoning factors. Whenever the poisoning happens, they will be able to promptly detect the children's manifestation and then quickly send them to the nearest medical center for timely medical intervention.

Conflict of Interest: The authors declare that they have no conflict of interest.

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