

ORIGINAL ARTICLE

A Cross Sectional Study on Opioid Poisoning in Children at a Tertiary Center

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Abstract

Background: Poisoning in children is a world-wide problem and one of the most important reasons for children's hospital admission. Incidence of toxicity based on cultural and economic characteristics vary in different communities.

Methods: All children with proven opioid toxicity who admitted to children emergency ward of Imam Reza hospital of Mashhad through June 2014 to June 2015 were included the study. Age, sex, weight, parent's educational level and job, causes and kinds of ingested opioid, addiction in family, clinical manifestations, laboratory findings, changes in QT corrected (QTC), and mortality rate were recorded. Finally, all data were analyzed with SPSS.

Results: In this study, 126 opioid-intoxicated children were recruited. No significant age difference was seen between genders (P value = 0.24). Parent's educational levels in most cases were low. Addiction to opium was also common among fathers (68.3%). Methadone was the most common agent causing opioid poisoning (52.4%), followed by opium (43.7%). The cause of poisoning was accidental in 58% of patients. The common signs and symptoms were drowsiness (77.8%), miotic pupil (69%), decreased levels of O₂ saturation (67.5%), Bradypnea (37.3%), apnea (27.8%) and convulsions (8.7%). Venous blood gases (VBG) in most cases (69.8%) was abnormal, leukocytosis (26.2%), hyperglycemia (11.1%), hyponatremia (9.5%), hypernatremia (5.6%), increases in distance of QT in Electrocardiography (2.4%) were seen.

Conclusion: Opioid poisonings are severe and life-threatening in children. Methadone was the most common cause of poisoning in more than the half of cases (52.4%). Poisonings were due to low parental knowledge about methadone poisoning and careless storage of methadone at their home.

Keywords: Children; Northeast of Iran; Opioid Drugs; Poisoning; Toxicity

How to cite this article: Ghaemi N, Alikhani S, Bagheri S, Sezavar M. A Cross Sectional Study on Opioid Poisoning in Children at a Tertiary Center. *Asia Pac J Med Toxicol* 2016;5:115-8.

INTRODUCTION

Opioid intoxication in children is quite dangerous because without timely diagnosis and appropriate treatment it can lead to death (1). Death is usually the result of respiratory depression, but for some opioids like methadone prolongation of QT interval may also play a role (2). Opioid intoxication is not a new concept in pediatric emergency care but the easy availability of opioids in many parts of the world has led to the increased cases of intentional or accidental toxicity in children and with the implementation and increased frequency of opiate substitution therapy in adults, rates of methadone exposure in children is strikingly increasing (3-5). The presence of bradypnea or apnea, miosis and decreased levels of consciousness in a child should lead the physician to the diagnosis of opioid toxicity which if mismanaged can cause severe morbidity and mortality (6).

In one review article, Stadnyk and Sachdeva reported that low doses of opioids can be adverse for children (child

weight) under 6 years old (1). Zamani and their colleagues showed that the Bradypnea, convulsion, low of consciousness and miosis were most common symptoms in opioid poisoning (7). Many studies such as the Lee study and FarNaghi study mentioned that the reason of poisoning in most children was the mistake of parents and most of them occurred accidentally (8). Sometimes opioids are used by parents and can cause poisoning in children. One study in England showed when methadone was prescreened for parents it caused poisoning in most children (9).

We aimed this study to evaluate the pattern of opioid toxicity in children in a tertiary toxicology center in northeast Iran.

METHODS

This was a prospective cross sectional study from June 2014 to June 2015. Children under 14 years with a diagnosis of opioid poisoning hospitalized in Imam Reza hospital in Mashhad, Northeast Iran were selected. This hospital is affiliated with Mashhad University of medical Sciences and

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Received 15 September 2016, Accepted 26 October 2016

is the referral center for childhood toxicology. Opioid intoxication was confirmed through patient's history, physical examination (presence of loss of consciousness, bradypnea and miotic pupils), and urinary test for the presence of opioids. Children older than 14 years or those that were simultaneously intoxicated by another drug or substance and patients with comorbid conditions were excluded from the study.

The research questionnaire consisted of two parts. Part 1 consisted of demographic characteristics of patients and Part 2 included patients clinical and laboratory data.

The patient's parents were reassured about the confidential nature of the questionnaires.

The study was approved by the medical ethics committee of Mashhad University of Medical Sciences prior to performance.

All statistical analysis was performed using SPSS 16 statistical package. We used students T test for means and chi square test for proportions. For all parameters the confidence level was considered 95%.

RESULTS

One thousand and three children were hospitalized in Imam Reza hospital with the diagnosis of intoxication during the study period. Overall, 126 cases were included in the study and were analyzed.

Among these patients 69 (54.8%) were male and 57 (45.2%) were female. Mean age of the patients was 32.65±35.85 months (range 1 month to 14 years). The distribution of age and gender in patients of this study are shown in table 1.

In our study population, the major opioid substance causing intoxication was methadone (51.4%). Opium itself was the second most common substance (40.7%) and the rest of cases were due to intoxication with other opioids like tramadol (3.1%) and codeine, diphenoxylate and buprenorphine (4.8%).

Most of drug ingestions were accidental (58%) and in some cases the parent or caregiver had given these drugs to the child instead of another medicine. In 31% of cases these substances were used by the parent or caregiver for the relief of common pediatric problems like: colic and restlessness, diarrhea, cough and fever. This was most commonly seen in children under 1 year old (Table 2).

We also evaluated if there is an addicted person in the family. In 86 (68.3%) cases the father was addicted and in 16 (12.7%) the mother was addict. In 68 (54%) cases another family member like grandfather or grandmother was

Table 2. Cause of using of opioids in poisoning children

Cause of consumption	Frequency	Percentage
Accidental	73	58
Mistake of parents	14	11.1
Treatment purpose	39	31

addicted. In most cases, fathers have been had primary school (28.6%), high school (36.5%) and diploma(23.8%) education. Also, mothers have been had primary education (38.9%) and high school (25.4%) education, which explains the low level of education of the parents in these children.

In this term, in most cases especially in children under one year age, opium were given by parents (38.3%) or grandmother (34%).

The most common symptom was loss of consciousness followed by miosis and bradypnea (table 3).

Convulsion was most common in methadone toxicity, as of 11 patients with convulsion, 7 cases were due to methadone ingestion.

Hyperglycemia (blood glucose > 200 mg/dl) was reported by daily bedside glucometry in 14 (11.1%) of patients which was due to stress. Three (2.3%) patients had hypoglycemic probably due to inadequate caloric intake (table 4). A few electrolyte abnormalities were also detected in our patients. Five cases of hyponatremia and three cases of hypernatremia were reported. Hyper or hypokalemia was not reported in our patients.

The most common abnormality on blood gas analysis was respiratory acidosis (39.3%).

Three (2.3%) of our patients died due to severe toxicity and two of them were due to methadone ingestion. Both parents were addicted to opium and giving the child opioid drugs.

DISCUSSION

Poisoning with opium and its derivatives is very dangerous and harmful for children (3). This type of intoxication is common in our country and many other parts of the world. According to the report, the rate of methadone poisoning has risen all around the world as well as Iran (10,11).

In one descriptive-sectional study completed by Jabbehdari, all of the methadone poisoned children younger than 12 years who were admitted to the Loghman Hakim Hospital in 2012 were selected. They observed that the mean time of symptoms onset after methadone consumption was 1 hour and 30 Min, that it showed a relatively long time after onset of symptoms. The most important finding was increase in distance of QT interval in Electrocardiography ECG (23.8%). They observed the mean time of treatment with naloxone infusion was 51 hours. In addition, three percent of patients had a return of symptoms after discontinuation of naloxone in their study (11).

In our study we investigated 126 patients with mean age 32 ± 35.85 months who were referred to Imam Reza hospital because of opioid poisoning symptoms. In our study, 80.22% of cases were under 5 years old and this was the same as the

Table 1. The distribution of age and gender in patients of this study

	Age (month)	
	Mean±standard deviation	Age Ranges
Female	28.53±30.61	(0.8-120)
Male	36.05 ±40.20	(0.1-162)
Total	32.65 ±35.85	(0.1-162)

T-Test = 1.16, P value = 0.24

Table 3. Frequency of symptoms in poisoning children

Symptoms	Methadone (%)	Opium (%)	Others (%)	Total (%)
Drowsiness	69.69 (46)	87.27 (48)	80 (4)	77.8 (98)
Apnea	24.24 (6)	29.9 (16)	60 (3)	27.8 (35)
Bradypnea	27.27 (18)	49.09 (27)	40 (2)	37.3 (47)
Miosis	62.12 (41)	74.54 (41)	100 (5)	69 (87)
Convulsion	9.09 (6)	7.27 (4)	20 (1)	8.7 (11)
Decrease in level of O ₂ saturation	59.09 (39)	76.36 (42)	80 (4)	67.5 (85)

Table 4. Changes in level of blood glucose in poisoning children

	Level of blood glucose				Total (%)
	Increasing (%)	Hypoglycemia (%)	Normal (%)	Hyperglycemia (%)	
Female	14 (8)	1.75 (1)	73.68 (42)	10.5 (6)	100 (57)
Male	13 (9)	2.89 (2)	72.46 (50)	11.6 (8)	100 (69)
Total	13.5 (17)	2.38 (3)	73.01 (92)	11.1 (14)	100 (126)

Test: Pearson Chi-Square= 0.233 , P value= 0.97

Khajeh and Farzaneh studies (12,13); there were no significant difference between males and females in all of them.

We observed that 70% of fathers and 75% of mothers had low level of education; the Besharat study showed the same result too (14).

As a cause of dangerous and acute poisoning referred to the National *Poisons Information Service* (NPIS), methadone was ranked third after iron and its compounds and anticonvulsants (15).

Also, based on Farzaneh and Arjmand Shabestari studies methadone was the most common cause of poisoning and in our study 52% of patients were poisoned with methadone (13, 16).

We observed in 58% of cases opioid was used accidentally. Farzaneh study mentioned that 86.6% poisoning was accidental that it verified our result (13).

This study mentioned that in 65% of poisoning cases, opium was used for treatment purpose and this was as same as Besharat and Kadivar studies (14,17).

In Cheraghali study mothers and grandmothers had important role in opioid poisoning in children less than one year old that we had same result as them (18).

Furthermore, opium poisoning in children is characterized by classic triad of miosis, reduced bradypnea and level of consciousness, which are the signs of opiate intoxication. Zamani and his colleagues showed that the most usual sign of opium poisoning was miosis (90%) followed by a decreased level of consciousness (88.4%), bradypnea (28.4%) and seizure (10.3%). Other studies mentioned that bradypnea, convulsion, low of consciousness and miosis were most common symptoms of poisoning in children (7, 8).

CONCLUSION

Opioids poisoning are a severe and life-threatening toxicity in children. Poisoning with opium and its derivatives is very hazardous for children. Based on our study the most prevalent opioid causing intoxication in children was methadone. Bradypnea, convulsion, low levels of consciousness and miosis were the most common symptoms of poisoning in children. Because most poisoning happened accidentally, educating parents and families about safe storage of this drug and other opioid is very important and could be lifesaving to the children.

ACKNOWLEDGEMENT

The authors acknowledge the Vice Chancellor for Research of Mashhad University of Medical Sciences for supporting this research. The authors greatly appreciate for the co-operation of Mrs Nooshin Abdollahpour in manuscript draft preparation.

Conflict of interest: None to be declared.

Funding and support: None.

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