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AN EVALUATION OF CHILDHOOD INTOXICATIONS IN THE REGION OF RIZE, TURKEY

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ABSTRACT

Introduction: Intoxication may be defined as injury caused by the entry into the body of a toxic substance or by a high dose of a substance that is not toxic in normal doses, or as exposure to a substance causing side-effects on any function of the organism. Intoxications are preventable causes of morbidity and mortality among childhood emergency diseases. Agents of intoxication vary depending on age, sex, the family's education level, the customs and traditions of the region involved and the season. Therefore, every country needs to establish its own intoxication profile in order to be able to adopt measures against the risks and hazards facing it.

Method: Our study was performed through a retrospective examination of the medical records of cases of intoxication presenting to the Rize Training and Research Hospital and Rize Public Hospital emergency departments between January 2015 and January 2016.

Results: 187 cases of intoxication presented to the emergency departments of the two hospitals over a 1-year period. Mean age at presentation was6.1±5.3 (1-17) years, and the largest number of presentations, 109 (58%), was observed in the 1-5 age group. Assessment of agents of intoxication included drugs in 109 cases(58.6%), followed by chemical substances in 44 cases(23.7%), food poisoning in 15(8.1%) and gases in 10(5.4%). The most common agents among medications were non-steroid anti-inflammatory drugs at 9.7%.

Discussion: Since morbidity and mortality rates are high in acute intoxications in the pediatric age group, early diagnosis and treatment are very important. It is therefore important for etiological and demographic characteristics to be known. Physicians in pediatric emergency departments need to be informed, equipped and in a state of readiness for cases of intoxication. Antidotes suited to regional epidemiological characteristics must be kept on hand in emergency departments and appropriate intensive care conditions must be available.

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INTRODUCTION

Intoxication may be defined as injury caused by the entry into the body of a toxic substance or by a high dose of a substance that is not toxic in normal doses, or as exposure to a substance causing side-effects on any function of the organism (O'Donnell *et al*., 2011; Gabor *et al*., 2004). Intoxications are preventable causes of morbidity and mortality among childhood emergency diseases. In addition, intoxications are still a common problem, in the pediatric age group in particular, in Turkey and worldwide (O'Donnell *et al*., 2011). The global incidence of acute intoxications, either accidental or for purposes of suicide, ranges between 0.2 and 9.3/1000 (Hojer *et al*., 1989). This figure has been rising in several countries recently, particularly in Western Europe and South America, in association with drug-taking (Camidge *et al*., 2003; Nkhoma *et al*., 2004). The prevalence in different studies of childhood intoxications ranges from 0.33% to 7.6% (Buch *et al*., 1991). The prevalence ranges from 0.4% to 5.5% in studies from Turkey (Öner *et al*., 2004). Another study reported that approximately 150,000 cases of acute intoxication present to emergency departments every year (Çam *et al*., 2003). Although the agents that lead to intoxication exhibit environmental, regional and cultural variations, the most common are nevertheless medications

(analgesics, antidepressants etc.), followed by agricultural chemicals and insecticides. Other agents include domestic chemicals (bleach, lime-scale solvents, etc.), toxic gases (carbon monoxide etc.), plants and foodstuffs (fungi, apricot seeds, etc.) and others (Biçer *et al*., 2007). Factors in intoxication also vary dependıng on age, sex, family education level, customs and traditions of the region concerned and the season. Therefore, every country needs to establish its own intoxication profile in order to be able to adopt measures against the risks and hazards facing it (Özdemir and Bayrakçı, 2009). Since intoxications are a significant cause of death in childhood, histories must be taken promptly. Physical examination must be performed carefully and measures must be taken bearing the worst possible scenario in mind. Intoxicated patients are a group requiring emergency intervention. Patients may sometimes present to the emergency department with encephalopathy or coma with no history of intoxication. It is therefore important for every country and even every region to determine its own intoxication profile and to develop appropriate preventive and protective measures. The purpose of this study was to determine the clinical and epidemiological characterictics of cases of intoxication seen in our region and thus to enable the appropriate precautions to be taken in advance. We also wished to help health teams in the emergency department predict underlying causes in the light of factors such as date of presentation, place of residence and age.

MATERIALS AND METHODS

Our study was performed through a retrospective examination of medical records of cases of intoxication presenting to the Rize Training and Research Hospital and Rize Public Hospital emergency departments between January 2015 and January 2016. Patients' records were examined to elicit information such as age, sex, season of presentation, the substance or medication concerned, mode of contact, time from intake to presentation, clinical findings, procedures performed, complications, length of hospital stay and intensive care requirements. Agents of intoxication were classified into five groups – medications, foodstuffs, chemical substances, gases and unclassifiable. The medications group included non-steroid anti-inflammatory drugs (NSAID), drugs acting on the central nervous system (CNS), antihistaminics, antibiotics, drugs affecting the cardiovascular, gastrointestinal (GIS) and respiratory systems, topical medications, vitmains and minerals, antiepileptics and others. Clinical features such as time to presentation to hospital, hospitalization rates and intensive care requirements were assessed. Statistical analyses were performed on SPSS 21.0 (Statistical Package for the Social Sciences) software. Data were expressed as mean±standard deviation. The independent samples *t- test was used to compare two independent groups* and the Mann-Whitney U test to compare two independent group means.

RESULTS

187 cases of intoxication presented to the two hospitals' pediatric emergency departments during the 1-year study period, 95 (51.3%) to the Rize Training and Research Hospital and 92(48.7%) to the Rize Public Hospital. Of the cases presenting with intoxication, 109 (58.3%) were female and 77 (41.7%) male, giving a female:male ratio of 1.4. Mean age at presentation was6.1±5.3 (1-17) years. The age group with the highest number of presentations, with 109 (58%) children, was the 1-5 age group, and a statistically significant difference was determined between the age groups($p<0.001$). Data for age and sex are shown in Table 1. In terms of reasons for intoxication, 17 (9.1%) cases presented due to attempted suicide. All the patients with attempted suicide were aged over 12, with a mean age of15.8 ±1.1 (14-17) years, and all were girls. The remaining 172(90.9%) cases involved accidental poisonings.

In terms of distribution of cases of intoxication by seasons, the highest number, 57 (30.6%) occurred in spring, and a statistically significant difference was observed in numbers of intoxications among the seasons ($p<0.001$). Case numbers and agents of intoxication in all seasons are shown in Figure 1. Agents of intoxication were classified under five main headings, drugs/medications, foodstuffs, chemical substances, gases and unclassifiable, and statistically significant variation was observed among the agents ($p<0.001$). Details concerning the agents involved are given in Table 2. The highest number of cases of intoxication, 109 (58.6%) involved drugs, while 44 (23.7%) involved chemical substances,15 (8.1%) foodstuffs and 10(5.4%) gases. When time elapsed until presentation to the emergency department was analyzed, the mean time to presentation was 71.2±148.4 (15-1440) min, with43.5% (n=41) of patients presenting within the first 30 min, 46.2% (n=86) in the first hour, 4.8% (n=9) within 1-3 hours and5.4% (n=10) after 3 hours. In terms of hospitalization rates, 13.9% (n=26) of cases were monitored under hospital conditions. The mean hospital stay was27.5±16.9 (12-72) hours. The most common agent of intoxication in patients requirinbg hospitalization was drugs, in21 (80.8%) patients. The 6 (3.2%) patients requiring intensive care were referred to an external center, and all involved intoxication due to drugs. No fatalities occurred among the cases of intoxication among our patients.

Table 1. Demographic characteristics of intoxication cases

Age range	Male		Female		Total		p
	(no.)	%	(no.)	%	(no.)	%	
Under 1 year	5	2.7	8	4.3	13	7.0	<0.001
1-5 years	50	26.7	59	31.6	109	58.3	
6-12 years	14	7.5	13	7.0	27	14.4	
Over 12 years	8	4.3	29	15.5	37	19.8	

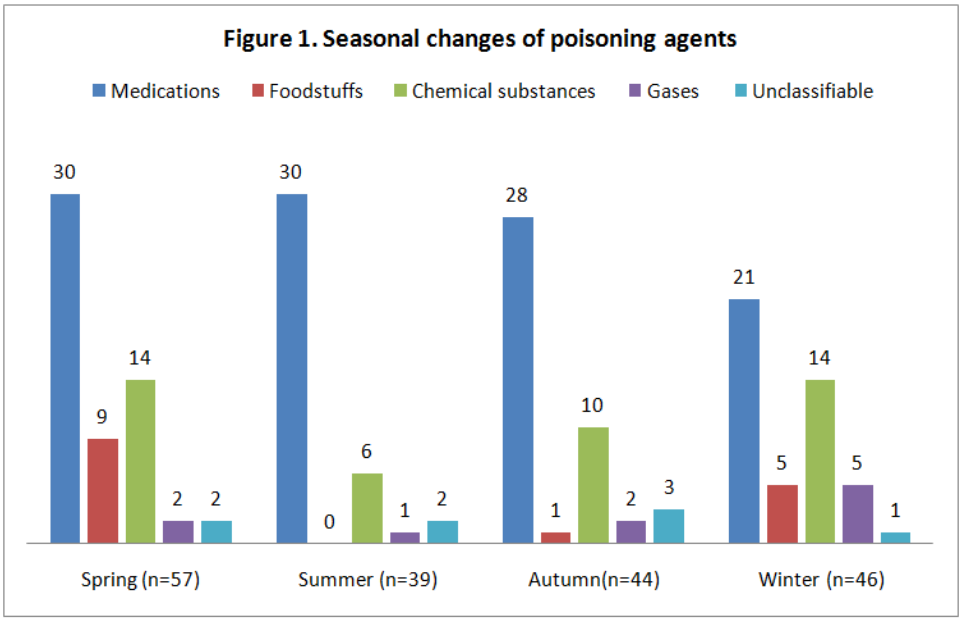
DISCUSSION

Intoxications are one of the main causes of presentations to the emergency department and hospitalization during childhood (Gabor *et al*., 2004; Camidge *et al*., 2003). Due to their high levels of morbidity and mortality, early diagnosis and treatment are very important in the event of clinical suspicion of acute intoxication. It is therefore important for etiological and demographic characteristics to be known (1-17) years, with the 1-5 age group predominating with 109 cases (58.3%). While studies have revealed variations among countries, cases are nevertheless most common in children in the first 5 years of life. According to data from the USA for 2007, children under 5 constituted 5.23% of intoxications, while a study from India reported that children aged 1-5 constituted 48.9% of intoxications and a study from Greece reported a figure of 93% for children under 5 (Bronstein *et al*., 2007; Wani *et al*., 2004; Petridou *et al*., 1996). One study from Turkey reported a figure of 60.1% for childen aged 1-4 (Bükülmez *et al*., 2013). This may be due to children aged under5 having low levels of awareness, and to their being active, curious and eager to experience foreign substances by placing them in their mouths (Ellenhorn *et al*., 1997).

Table 2. Classifiction of intoxication agents

	No.	%		No.	%
Drug*			Foodstuffs		
NSAIDs	17	9.7	Milk	9	5.1
CNS drugs	17	9.7	Plant products	3	1.7
Antiepileptics	2	1.1	Alcohol	2	1.1
Respiratory system drugs	6	3.4	Tea, oil	1	0.6
CVS drugs	5	2.8			
Antibiotics	16	9.1	Chemical substances		
GIS drugs	10	5.7	Corosive substance	32	17.2
Vitamins and minerals	5	2.8	Rat poison	6	5.2
Antihistaminics	9	5.1	Cleaning product	5	2.8
Topical drugs	1	0.6	Insecticide	1	0.6
Hormone preparates	3	1,7			
Flu medications	15	8,5	Unclassifiable		
Unknown	9	5,1	Pain thinner	4	2.2
			Naphthalene	2	1.1
Gases			Adesive substance	1	0.6
Carbon monoxide	8	4.5	Mercury(thermometer)	1	0.6
Paint fumes	2	1.1			

NSAID: Nonsteroid anti-inflammatory drugs, CVS: Cardiovascular system, GIS: Gastrointestinal System
*: patients took more than one drug



Analyzed in terms of sex revealed a female:male ratio of 1.4. These levels were 1.8 in the 1-5 age group and 3.6 in the over-12 age group. Studies from Turkey have determined female:male ratios of 4.3 in the over-12 age group and 0.8 among children aged 1-5 (Dereci *et al*., 2015). Another study reported figures of 2 and 0.6 (Bükülmez *et al*., 2013). In general terms, girls predominate after adolescence, while boys predominate in childhood in some studies and girls in others. In our study, girls predominated over the age of 12 and also, interestingly, in the 1-5 age group. In terms of seasonality, intoxications in our study were most common in the spring (30.5%). This is compatible with the previous literature. One study from Turkey reported a figure of 37.8% for the period from March to June (Dereci *et al*., 2015). A high level of drug intoxications (52.6%) was observed among cases occurring in the spring in our study. This may be attributed to moving home and house repairs being common in the spring, to materials used being left in the open, to parents being busier in gardens, vineyards and with agricultural activities, and to childen being left at home alone (Bükülmez *et al*., 2013; Dereci *et al*., 2015). The most common cause of intoxication in the pediatric age group in previous studies is again drugs (Gabor *et al*., 2004; Hojer *et al*., 1989; Dereci *et al*., 2015).

According to US Poison Control Center reports, there were more than 1.5 million drug-related intoxications under the age of 18 in 1998 (O'Donnell and Ewald, 2011). The level for Turkey in previous studies ranges between 37%and 58.6%, and drugs are again the most common cause of intoxications (Bükülmez *et al*., 2013; O'Donnell and Ewald, 2011; Sarıkayalar, 2001; Özcan *et al*., 2009). In our study, drugs were also the most common agent of intoxication, and NSAIDs were the most common cause among these (Table 3). Studies involving hildren from Pakistan, Taiwan and France have reported central nervous system drugs in first place, followed by analgesics (Manzar *et al*., 2010; Lamireau *et al*., 2002; Lin *et al*., 2011). A study from Turkey reported flu medications in first place, followed by antidepressants and paracetamol and NSAIDs (Özcan and İkincioğulları, 2009). Another study from Kırıkkale in Turkey reported analgesics, antidepressants and cardiovascular system) CVS) drugs in first place (O'Donnell and Ewald, 2011). The number and variety of drugs must also be taken into account. According to a National Poisoning Information Center (UZEM) report for 2008, when the drugs occurring as agents of intoxication were set out in order of frequency, CNS drugs appeared at a level of 39.57%, musculoskeletal system drugs at 13.56% and

reapiratory system drugs at 12.33% (Özcan and İkincioğulları, 2009). This may show that the reason for patients' ingestion of drugs (accidental or for suicidal purposes) may vary depending on the the number of people in th household (elderly relatives, etc.), the presence of chronic disease in the family (hypertension, diabetes, depression etc.) and situations such as child neglect. Examination of the reasons for intoxication revealed that accidental intake of a single drug or small number of drugs generally predominated. In second place were multiple drugs (usually for purposes of suicide). One study from Turkey reported that accidental ingestion of a single drug was most common in the 105 age group (51%), followed by multiple drug ingestion in female gender (female:male ratio 4.3) in the 12-18 age group (45%) (Dereci *et al*., 2015). According to the UZEM report for 2008, the level of intoxication from a single agent in the pediatric age group was 66.42%, with multiple drug intoxications being determined at a level of 33.58% (Özcan and İkincioğulları, 2009). All cases of attempted suicide in our study occurred in the over-12 year age group, and all in girls. The reason for attempted suicide being more common among girls in this age group may be associated with the place and role of girls in society, physical and psychiatric disease in the family, intra-familial conflicts, physical traumas, failure at schools, loss of mother or father, family breakdowns, with girls enjoying less freedom than boys of their age at this time, with families being more protective toward girls and with girls being unable to share their problems (Öner *et al*., 2004; Bükülmez *et al*., 2013). Increasing emotional fluctuations in adolescence and problems in school and the family are thought to be involved in this. Therefore, all cases of attempted suicide must be examined by a child psychiatrist on admission to hospital, and support must be made available. The second most common agents of intoxication were chemical substances (such as caustic substances, cleaning materials, plant chemicals and rat poison). One study from Erzurum reported a figure of 21% (O'Donnell and Ewald, 2011), while another study from Ankara reported figures of 5% for caustic substances and 4% for organophosphates (Bükülmez *et al*., 2013). A study from Isparta reported figures of 6% for insecticides, 4% for plant agents and 2% for cleaning materials. In general terms, although the incidence varies, cleaning materials appear to be significantly involved in intoxications. We think that the variations observed depend on regional structure, rates for living in rural areas and sociocultural structure. Intoxications caused by corrosive substances are particularly common in children in the first 5 years of life, and an increase has recently been observed (O'Donnell and Ewald, 2011). Caustic substances lead to morbidity and mortality by causing burns in the esophagus. Such materials being sold unwrapped and in drinking bottles lead to children being eager to use them and accessing them more easily. Involvement with agriculture and animal husbandry in cultrally and economically more backward regions also levels of intoxication from agricultural products (Wani *et al*., 2004). This may be due to a failure to take proper precautions when using agricultural chemicals in our region.

Analysis of times to presentation to hospital revealed that 89.7% of cases presented to the emergency department with 1 hour of intoxication. Six patients requiring intensive care were referred to external centers, and no mortality occurred in these cases. Several studies from Turkey in recent years have shown that mortality rates are constantly falling (Bükülmez *et al*., 2013; O'Donnell and Ewald, 2011; Kavalcı *et al*., 2006; Deniz *et al*., 2009). We think that improvements in communications and transportation underlie this phenomenon. Additionally, attaching priority to triage of cases of intoxication in the emergency department, the increasing use of active charcoal, increased availability of monitoring in the emergency department, improvements in collaboration with UZEM, effective support therapy being given in all cases and intensive care support when necessary may also be involved. In conclusion, since intoxications are a preventable cause of morbidity and mortality, they represent a significant public health problem. Neglect and lack of education are usually particularly involved. On the basis of our study findings, intoxications were most common in the 1-5-year age group and were most associated with drugs. Individuals responsible for caring for children have a duty to ensure their safety, to protect them from potential harm, to meet their basic needs and to provide education and health care (Gürpınar and Aşırdizer, 2006). We think that the lids of drug containers must be made safe in order to reduce these cases in the 'age of play.' The most important responsibility of families in this context is to take precautions to ensure that their children are unable to come into contact with harmful sustances inside the home. The responsibility of individuals involved in child care in terms of child intoxications must not be forgotten. The medicolegal process must be initiated by issuing forensic case reports. In addition, priocedures must be adopted that are appropriate to the mindsets of adolescent girls, another significant group in terms of intoxication, and support must be sought from specialists when required. Physicians in pediatric emergency departments need to be informed, equipped and in a state of readiness for cases of intoxication. They must also be ready to collaborate with the Poison Information Center on the subject of emergency procedures. Antidotes suited to regional epidemiological characteristics must be kept on hand in emergency departments and appropriate intensive care conditions must be available. In the light of this information, we think that intoxications can be prevented through greater care being taken and with simple precautions on the part of families, drug manufacturers and physicians in Turkey as a whole.

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