

# The epidemiology of acute childhood and adolescent poisoning in Thi-Qar governorate (2013-2015)

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## Abstract

**Background:** acute childhood and adolescent poisoning remain one of the important emergencies causing a significant burden to the populations with important morbidity and mortality rates.

**Objectives:** This study aimed to determine the epidemiological features of poisoning for the patients less than 19 years old in Al-Nasiriyah governorate, and to eliminate the main types, clinical presentations, management, outcome, and seasonal variation of poisoning. Epidemiological studies are so important to determine the extent of the problem, according to which the preventive strategies are related.

**Methods:** A cross sectional retrospective study was conducted to three hundred forty patients recorded in Al-Nasiriyah poison center from (January 2013 to December 2015), data that collected from the case sheets and records of phone calls including the name, sex, address, type of poisoning, route of administration, management and the outcome of the patients (survive or died) are admitted to the SPSS (statistical package for social science) system and the results was obtained.

**Results:** two hundred (58.8%) of the exposed patients was male, toddler age group seen in 45% of cases with predominance of accidental type, while adolescents (>13-18yrs.) are mostly intentional with female preponderance, urban populations are more prone to poisoning 236 cases (69.4%), accidental exposure is the commonest (83.2%) oral route is the commonest (99.4%), (62.9%) of the causative agents are pharmaceutical, and (50.3%) are asymptomatic . most of them treated conservatively (96.5%) with survival rate of (97.9%), higher mortality seen in those presented after the first 24 hrs. of exposure. One third of acute poisoning was occurred in summer season. Easy accessibility to the drugs and toxic substances are the major risk factor.

**Conclusion:** Although poisoning is a preventable illness but, it is still a significant cause of morbidity and mortality especially in developing countries. Acute poison has a significant impact on the health services.

**Key words :** Epidemiology, Poisoning, Children, Adolescence.

## Introduction:

Acute poisoning is an important cause of morbidity and mortality among children and adolescents accounting for more than 1 million cases reported annually to the “Toxic Exposure Surveillance System” (TESS) of the “American Association of Poison Control Center” (AAPCC) <sup>(1)</sup>. Recent data demonstrate that poisoning is the second leading cause of injury-related fatalities <sup>(2)</sup>. Poisoning is used to denote any exposure to any xenobiotic (drug, toxin, chemical, or naturally occurring substance) that results in injury <sup>(3)</sup>. Also childhood poisoning is the third common emergencies resulting in high social and economic burden, remaining one of the important medical problem and public health concern <sup>(4)</sup>. The high prevalence of poisoning in children is caused by the curiosity to their environment and to taste and swallow substances including harmful type <sup>(5)</sup>. Poisoning can be classified into two classes depending on the pattern of poisoning; intentional and non intentional (accidental) poisoning <sup>(6)</sup>. Infants and children less than 5 years are frequently prone to accidental type. The childhood acute poisoning commonly Occur in the household (90%) and the poisons are often domestic substances. Drugs are considered as the second most common ingested poisons <sup>(7)</sup>. Intentional poisoning mainly involves adolescents, predominantly girls <sup>(8)</sup>. It may be a result of whole sequences of stressful events in their life, family problems, romantic disappointment, lack of self acceptance, leading to negative emotional reaction that can provide

thoughtless behavior and suicidal attempts <sup>(9)</sup>. Ingestion is the commonest route of poisoning in children, accounting for (77%) of the cases followed by, dermal (7.5 %), inhalation (6%) and ophthalmic route (5%) <sup>(10)</sup>. In Iraq the first poison center was initiated in Baghdad at the last three decades, while Al- Nasiriyah poison center was opened at 2010 <sup>(11)</sup>. At the last years the mortality caused by poisoning was decreased dramatically due to establishing poisons control centers in developed countries. Also early recognition of poisons exposure, early presentation to the medical services, and improved medical interventions can play an important role in the outcome of the patient <sup>(12)</sup>.

Approximately three million of acute poisoning and 200,000 deaths annually reported around the world, caused by accidental or intentional exposure to pharmaceutical or non pharmaceutical substances <sup>(13)</sup>. Acute poisoning is a preventable illness and the mortality rate can be decreased dramatically by using effective prevention programs <sup>(14)</sup>. Poison is the substance that can cause damage or internal injury to the body cells result in toxication and endangers human life <sup>(15)</sup>. It has been found that the commonest risk factors for poison exposure are young age, female sex, large family size, low educational level of the patients or their parents, and low socioeconomic status <sup>(16)</sup>. In addition exposure to drugs, agrochemicals, and environmental poisons are the main cause of childhood and adolescent poisoning <sup>(17)</sup>. The most common agents ingested by young children

include cosmetics, cleaning solutions, personal care products, analgesics, and plants. Fatal childhood poisoning is mainly caused by analgesics, antihistamines, sedative/hypnotics, plants, and fumes/vapors/gases<sup>(18)</sup>. Any child who presents with unexplained symptoms including altered mental status, seizure, metabolic abnormality, and cardiovascular compromise should be considered to have poisoning until proven otherwise.<sup>(18)</sup> Epidemiological studies reveal the incidence of poisoning among children is (0.74% - 3%). About 80% of all cases in children occur in age (1-5) years, therefore; it is common in younger ages<sup>(19)</sup>. Acute childhood poisoning constitute (2.3%) of all pediatric emergencies. And the overall mortality rate is (3-5%)<sup>(20)</sup>. Management depend on the type of poisonous that exposed to, clinical presentation, and the duration between toxin exposure and the emergency unit admission<sup>(16)</sup>. Treatment can be started at home. In certain circumstances the child may admitted to the emergency unit were the assessment and stabilization of vital signs is done. Rarely, emergency management needs the administration of special antidote, or other measures to enhance the elimination of the absorbed toxins<sup>(21)</sup>. Laboratory analysis of serum or urine usually guided by the substance exposure, and its anticipated degree of toxicity, rarely toxicological screening tests done when the ingested substance is not identified<sup>(22)</sup>. Supportive care is the mainstay of treatment in most cases. If the level of consciousness is depressed, and a toxic substance is suspected, glucose (1 g/kg intravenously),

100% oxygen, and naloxone should be administered<sup>(18)</sup>. Single-dose activated charcoal decreases drug absorption when used within 1 hour of ingestion, whole-bowel irrigation using polyethylene glycol (GOLYTELY) as a non absorbable cathartic may be effective for toxic ingestion of sustained-release enteric-coated drugs<sup>(18)</sup>. Multiple-dose activated charcoal should be considered only if a patient has ingested a life threatening amount of carbamazepine, dapsone, phenobarbital, quinine, or theophylline. Alkalinization of urine may be helpful for salicylate or methotrexate ingestion<sup>(23)</sup>.

### **The aims of this study are :-**

- 1- To identify the epidemiology of acute childhood and adolescent poisoning. (incidence, pattern of, clinical presentation, seasonal variation, and the determinants of poisoning).
- 2- To evaluate the management of poisoning and the patient's outcome.

Careful evaluation of the above facts will help us to determine the effective strategies that prevent acute childhood and adolescent poisoning and the proper time for medical intervention in order to minimizing the morbidity, and mortality of the illness at the same time.

### **Materials and methods**

It is a retrospective cross sectional study carried out in Thi-Qar governorate from (January 2016 to September 2016). In which the researcher evaluate the medical records of Al-Nasiriyah poison center that

include phone cases and case sheets of the patients for the last three years (2013, 2014, and 2015). All the medical information was obtained from these records like; chief complain, physical signs and symptoms, laboratory investigations that done in the hospital and the toxicological screen in the poison center, outcome of the patient, lines of management that taken in the hospital or those that instructed by the poison center, in addition to the demographic data including (age, sex, and address). Thi-Qar governorate is located in the southeast of Iraq. Thi-Qar province includes agricultural, industrial, residential, and business regions consisting a total area of 12900 km. and a total population of (1,979,561) persons in 2014 (52%) of them are male and (48%) was female, distributed in(37,1%) rural and (62,9%) urban area <sup>(24)</sup>.

Age groups that involved in this study were ranged from (1 month-18 years) divided into 5 groups as the following:

- Less than one year (infancy).
- Toddlers (>1- 3) years.
- Preschooler (>3- 6) years.
- Schooler age (>6-13) years.
- Adolescent (>13-<19) years.

Type or the pattern of poisoning was divided as: (Intentional type, Non intentional type). The routes of administration were divided into: (oral, inhalational, and dermal). Time of presentation to the hospital divided to: (less than 24 hrs and more than 24 hrs).

Clinical presentations of the poisoned were patients classified according to the major system involved, multiple systems involvement, and asymptomatic cases. Type of poisonous (toxic substance) was divided to:- Pharmaceutical agents, Non pharmaceutical agents. Furthermore pharmaceutical agents were divided into:- Analgesia, Antibiotics, Anti hypertensive agents, Anti histamine and anti-tussives, Psychotropic agents, Anticonvulsants, Iron preparations, and Oral contraceptive pills. Others (thyroxin, warfaren, anti spasmine, ventolin, calamine, multivitamins, atropine drop, dostenix, thyphline, atarax, laxatives, and sodium bicarbonates) according to the calculated data. Some patients presented with multiple agents poisoning. Also non pharmaceutical agents subdivided into:- Toxic plants including mushroom and Datura ( palladona ), Pesticides including , Industrial chemicals like (hydrogen peroxides, naphthalene and thinner), Household products including, Others like (printer dye). Lines of treatment were divided into four groups: Conservative treatment (monitoring of the vital signs, intravenous fluid, gastric emptying, and intestinal decontamination), Using of specific anti dots, Mixed treatment, or in some instances the patient not receive any treatment. Outcome of the patient was evaluated either survive or dead. Also the seasonal variation of poisoning was noted.

All the collected data was analyzed by using SPSS (Statistical Package for Social Science) system, and presented by proper tables and graphs.

## RESULTS

In this study more than a half of the population is male 200 (58.8%) while female represent 140 cases (41.2%).

(Table 1) The frequencies of age group, sex, and address of the patients.

Variable	Frequency	Percent
<b>Age group</b>		
Less than one year	11	3.2
Toddlers	156	45.9
Preschooler	85	25
Schooler	30	8.8
Adolescents	58	17.1
<b>Gender</b>		
Male	200	58.8
Female	140	41.2
<b>Residence</b>		
Urban	236	69.4
Rural	104	30.6
<b>Total</b>	340	100

(Table 2) Sex distribution according to the age groups and residence of populations.

Variable	Sex		(% of total population)	Chi-seq. P. Value
	Male (%)	Female (%)		
<b>Age groups</b>				
Less than one year	7 (63.6%)	4 (36.4%)	3.2	51.886 0.001
Toddlers	110(70.5%)	46(29.5%)	45.9	
Preschooler	58 (68.2%)	27(31.8%)	25	
Schooler	14 (46.7%)	16(53.3%)	8.8	
Adolescent	11 (19%)	47 (81%)	17.1	
<b>Total</b>	200(58.1%)	140(41.2%)	100	
<b>Residence</b>				
Rural	59 (56.7%)	45 (43.3%)	30.6	0.271
Urban	141(59.7%)	95 (40.3%)	69.4	0.603
<b>Total</b>	200	140	100	

(Table 3) Differences in the pattern of poisoning according to age groups, sex and type.

Variable	Pattern of poisoning		(% of total population)	Chi-seq. P value
	Intentional	Non int.		
Age groups				
<b>Less than one year</b>	0 (0.0%)	11(100%)	3.2%	180.269  0.001
<b>Toddlers</b>	2 (1.3%)	154(98.7%)	45.9%	
<b>Preschooler</b>	3 (3.5%)	82(96.5%)	25%	
<b>Schooler</b>	9 (30%)	21 (70%)	8.8%	
<b>Adolescent</b>	43(74.1%)	15(25.9%)	17.1%	
<b>Total</b>	57	283	100%	
Sex				
<b>Male</b>	13(6.5%)	187(93.5%)	58.8%	36.675
<b>Female</b>	44(31.4%)	96(68.6%)	41.2%	0.001
<b>Total</b>	57	283	100%	
Type of poison				
<b>Pharmaceutical</b>	33(15.4%)	181(84.6%)	62.9%	0.748
<b>Non pharmaceutical</b>	24(19%)	102(81%)	37.1%	0.387
<b>Total</b>	57	283	100%	

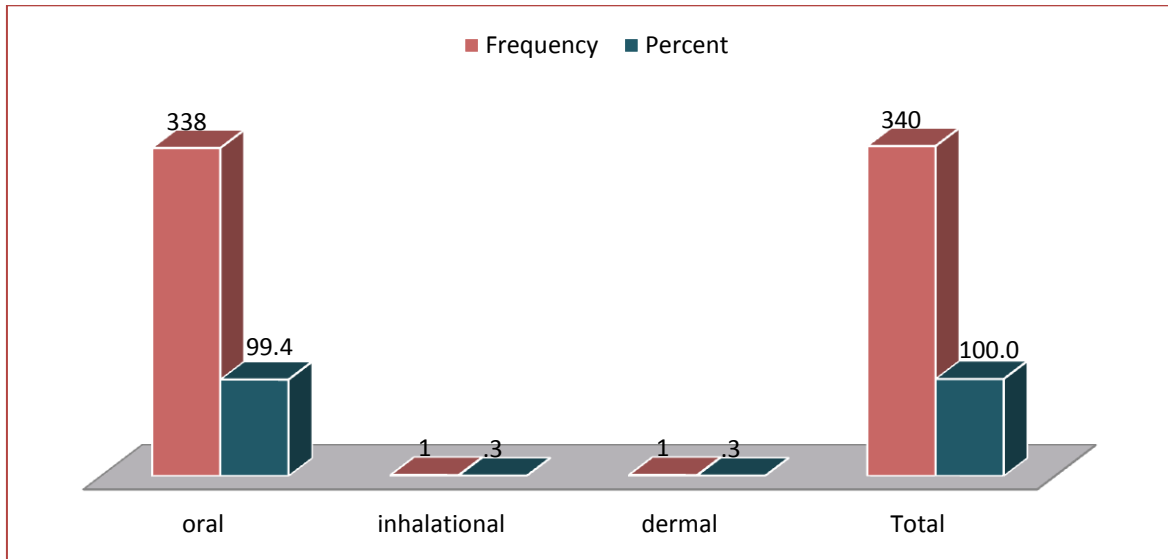
(Table 4) The proportions of pharmaceutical agents according to pattern of poisoning.

Variable	Pattern of poisoning		Percent from total	Fisher's test, P value
	Intentional	Nonintentional		
<b>Antihistamine, Antitusive</b>	4 (12.1%)	39 (21.5%)	20.1%	10.724  0.124
<b>Psychotropics</b>	5 (15.2%)	23 (12.7%)	13.1%	
<b>Analgesics</b>	4 (12.1%)	17 (9.4%)	9.8%	
<b>Anti convulsant</b>	2 (6.1%)	16 (8.8%)	8.4%	
<b>Oral contraceptive</b>	1 (3%)	12 (6.6%)	6.1%	
<b>Antihypertensive</b>	1 (3%)	10 (5.5%)	5.1%	
<b>Iron complements</b>	1 (3%)	7 (3.9%)	3.7%	
<b>Antibiotics</b>	0 (0%)	4 (2.2%)	1.9%	
<b>Others</b>	7 (21.2%)	42 (23.2%)	22.9%	
<b>Multipe agents</b>	8 (24.2%)	11 (6.1%)	8.9%	
<b>Total</b>	33 (100%)	181 (100%)	100%	

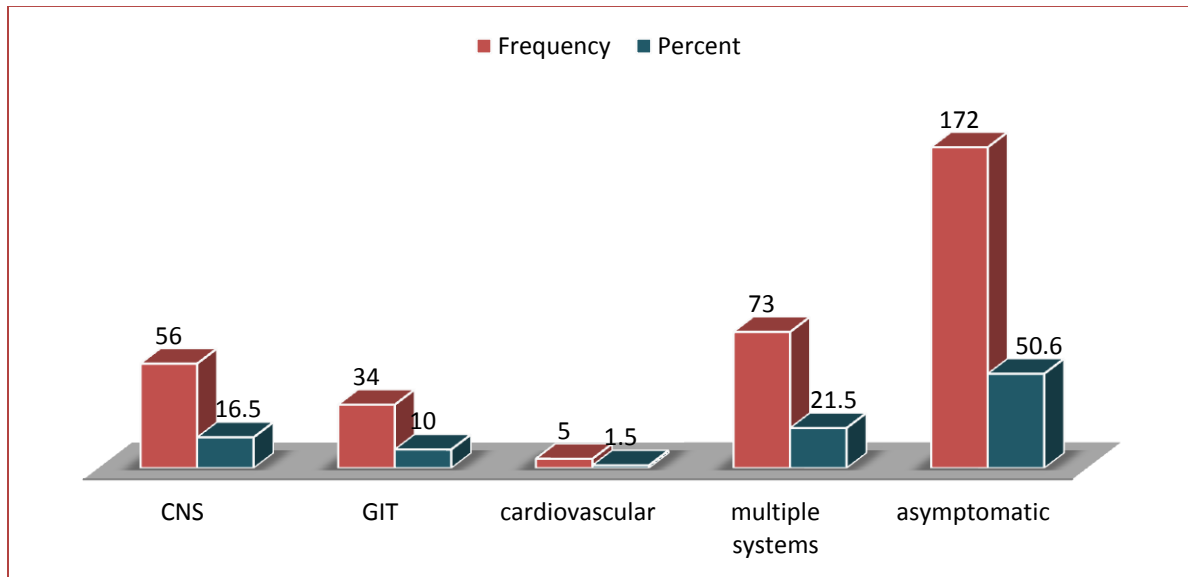
(Table 5) The proportions of non pharmaceutical agents according to the type of poisoning.

Variable	Pattern of poisoning		Percent of total	Fisher's test, P value
	Intentional	Nonintentional		
<b>Non pharmaceutical</b>				
<b>Pesticides</b>	17 (70.8%)	57 (55.9%)	58.7%	10.988  0.031
<b>Plants</b>	6 (25%)	17 (16.7%)	18.3%	
<b>Houshold products</b>	0 (0%)	16 (15.7%)	12.7%	
<b>Industrial chemicals</b>	0 (0%)	9 (8.8%)	7.1%	
<b>Others</b>	1 (4.2%)	3 (2.9%)	3.2%	
<b>Total</b>	24 (100%)	102 (100%)	100%	

Figure (1) Route of exposure



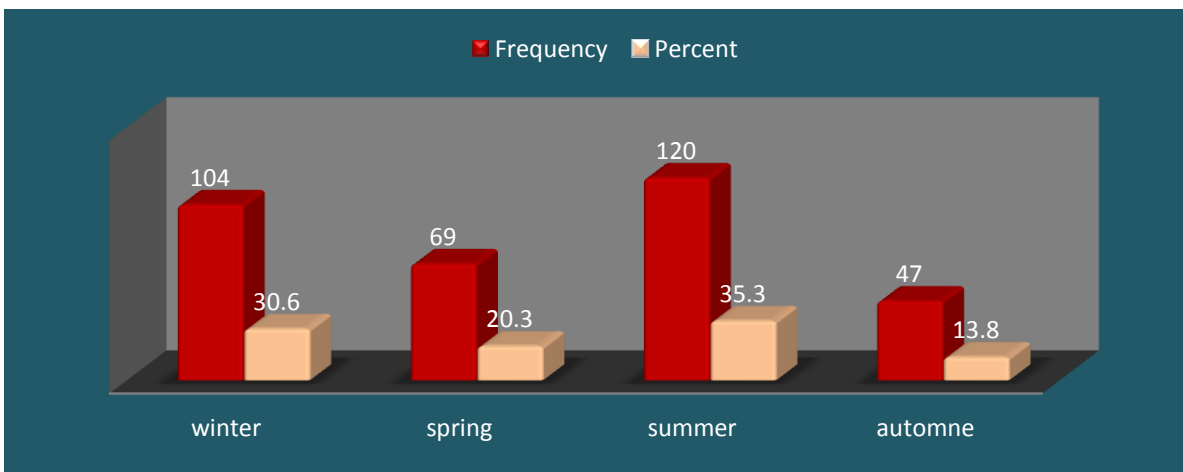
(Figure 2) Clinical presentations of acute childhood and adolescent poisoning.



(Table 6) The effects of presenting time to the hospital and type of management on the outcome of the exposed patients.

Variable	Outcome		Percent from total	Chi-square, P value
	Survive	Death		
Time of presentation				
<b>Before 24 hours</b>	332(99.8%)	4 (1.2%)	98.8%	106.797 .001
<b>After 24 hours</b>	1 (25%)	3 (75%)	1.2%	
Type of treatment				111.996 0.001
<b>Conservative</b>	325(99.1%)	3 (0.9%)	96.5%	
<b>Anti dotes</b>	1 (25%)	3 (75%)	1.2%	
<b>Mixed</b>	7 (87.5%)	1 (12.5%)	2.4%	

(Figure 3) Seasonal variation of poisoning.



**Discussion:**

At present study more than one half of exposed population are male across all the age groups (58.8%), except in adolescents (14-18yrs.) which showed gender reversal, that in agreement with other studies at Costa Rica and Spain <sup>(25-26)</sup>. Hyperactivity of the male and restless in compare with female is responsible factors. The more prevalent age group is toddlers (45.9%), followed by preschooler, adolescents, schooler, and infants, similar to other studies in Japan, and Costa Rica <sup>(25,27)</sup> Child curiosity, oral exploratory (mouthing habit), and newly acquired hand skills, are the main causes for this

predominance. Approximately two thirds (69.4%) of exposed patients are from urban population, similar to single center study in Poland at 2011 that reveal (64.50%) of poisoned patients came from urban area <sup>(4)</sup>, this fact may be due to easy accessibility and direct admission to the hospitals in urban population. O'Connor et al. study and Basheir study (in Australia and Egypt respectively) was not agreed with current study showing the high incidence of poisoning in rural areas <sup>(28,29)</sup>. Accidental type is the most common type of childhood and adolescent poisoning (83.2%), and intentional type (16.8%),



male gender at toddler and schooler age groups are predominant in accidental type, while adolescent female are the predominant of intentional type as a result of self intoxication, the incidence of accidental poisoning (non intentional) decreased as the age increased (inverse correlation), and the incidence of intentional type increased as the age of children increased. In addition, there was a significant relationship between the pattern of poisoning, age, and sex  $P$  value=0.001, as presented by our study and another similar studies<sup>(30,31)</sup>. The most probable causes of self intoxication are; depressive illnesses, self disappointment, romantic, family, and school problems, drug abuse are also a considerable cause.

In our study we identified eight most common pharmaceutical poisons accounting for (62.9%) of exposed population and four commonest non pharmaceutical substances consisting a (37.1%). Antihistamine-antitussive group is the commonest (20.1%) followed by Psychotropics and analgesia, explaining the availability and easy accessibility of over the counter drugs along with un proper usage and storage of psychotropics. In contrast antibiotics are the least that involved in medicinal type of poisoning, our findings are partially agreed with<sup>(29)</sup> study that found the predominant medications are neurological and analgesics where over-the-counter drug is the third one. Among non pharmaceutical substances; pesticides are the commonest (58.7%) followed by plants and household products agreed with Akhtar et al.<sup>(32)</sup>, while not agree with another previous studies showed that cleansing agents were the main cause of poisoning in children and that pesticides the least one<sup>(33,34)</sup>. This discrepancy explained by agricultural nature of Thi-qar where pesticides are available in most houses. Among pharmaceutical agents; psychotropics are the commonest that found in intentional poisoning, agreed with Yan-Ren

study in Taiwan<sup>(35)</sup>, while antihistamine-antitussives are the commonest in accidental type, furthermore pesticides are the most prevalent one from non pharmaceutical group in both types of poisoning, not similar to<sup>(35)</sup> that show cleansing products are the most common in intentional type, with no statistically significant differences in pharmaceutical agents,  $P$  value=(0.124), while there are statistically significant differences in non pharmaceutical substances,  $P$  value=(0,031). In addition (8.9%) of our population exposed to multiple agents similar to Lee et al. study<sup>(36)</sup> while the majority (91.1%) exposed to single agent which was in agreement with Hon et al. study<sup>(37)</sup>.

More than half (50.6%) of the exposed patients presented asymptotically to the emergency department just with history of exposure, this may be due to bad taste of poisonous substances lead to ingestion of very small amount, or may be due to induction of vomiting by the family at home or early presentation to the hospital. This finding was less than that reported by Kholod D.H that found 62.5% of patients asymptomatic<sup>(38)</sup>. By the other hand (16.5%) of cases presented with neurological symptoms including (drowsiness, blurred vision, confusion, and even coma), (10%) gastrointestinal presentation (nausea, vomiting, and abdominal pain), additionally; (21.5%) presented with multiple signs and symptoms, which in agreement with<sup>(29,35)</sup>. Oral route is the predominant in all cases of poisoning followed by inhalational and dermal route, which is in agreement with Liebet<sup>(10)</sup>. In our study (98.8%) of the patients presented at the first 24 hrs. treated properly and discharged, with mortality rate of only (1.2%), while (75%) of patients that presented after the first 24hrs. are died, these observations were similar to Sabiha S. et. al. study<sup>(39)</sup>. Death occur more in psychotropic poisoning (pharmaceutical agents) similar to<sup>(40)</sup>, while plants are the commonest in

non pharmaceutical group in contrast to another finding of <sup>(40)</sup> that found the pesticides are the main causative substance of death in childhood poisoning, followed by industrial chemicals. In current study the highest incidence of poisoning was in summer (35.3%), followed by winter (30.6%), that in partial agreement with Majid study that present a highest incidence of poisoning in summer season followed by spring<sup>(41)</sup>. High prevalence of poisoning in summer and winter might be due to the more time that expend by the child was in door along with availability, easy accessibility, and un safe storage of various xenobiotics in home. The mortality rate of acute childhood and adolescent poisoning ranges from 7.6% to 0.4% in literature <sup>(42)</sup>, in our study 7 cases (1.2%) was died for the three years of our populations. Relatively this good prognosis attributed to early presentation to the emergency unit, early measures in home such as induction of vomiting and availability of poison centers along with proper medical interventions. Limitations in this study are mainly due to retrospective nature, and the accuracy of data depend on the data collectors that may have a misclassification to the medical information such as pattern of poisoning, so a potential bias might be developed. Another important limitation is lack of kerosene and snake venom poisoning that not sent to the poison center from the emergency departments, that's why we exclude kerosene and snake venom poisoning from our study.

### Conclusion:

- Accidental poisoning was more frequent in toddlers and preschooler males. While Intentional poisoning was increased with increasing age of child to being at more risk in schooler and adolescent females as compared with male.

- Although about half of the exposed patients are asymptomatic, the others presented with CNS, GIT, and multiple symptoms.
- Vast majority of cases presented to the causality within the first 24 hrs. of exposure and treated conservatively. Higher mortality seen in those presented after the first 24 hrs. of exposure.
- Easy accessibility to the drugs and toxic substances are the major risk factor, and poison information centers play a vital role in the management of acute poisoning.

### Recommendations:

- All the poisonous substances and drugs should be kept in their original container and out of reach of children, food and drink containers should never be used for the excess of xenobiotics.
- Xenobiotics should be kept with non lethal concentrations.
- Parents should buy or accept medications only if it is in a child-resistant container.
- Training the families about the early managements of exposed patient and early consultations in order to reduce the morbidity and mortality.
- Appropriate public educational programs about safe practice of storing medications and toxic household substances, and earlier educational programs in the secondary schools for adolescent female regarding the hazards of poisoning and self intoxication.
- Further prospective epidemiological studies are required for further exploration of acute poisoning illness.

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## وبائية التسمم الحاد عند الاطفال واليافعين في محافظة ذي قار (2015)

الدكتور رائد كريم دهبول

### الخلاصة:-

ان التسمم الحاد عند الاطفال واليافعين من الحالات الطارئة ذات الآثار الواضحة على المجتمع متسببة في تزايد حالات المراضة والوفيات بين تلك الفئات.

### الاهداف:-

تهدف هذه الدراسة الى تحديد الخصائص الوبائية لحالات التسمم لمن هم اقل من سن 19 عام, مع توضيح انواع التسمم, الاعراض السريرية, طرق العلاج, النتائج, والاختلافات الموسمية لحالات التسمم. ان الدراسة الوبائية مهمة من اجل معرفة حجم المشكلة ولتحديد الاجراءات الوقائية الملائمة.

### طريقة العمل:-

دراسه مقطعيه شملت ثلاثمائة واربعون حالة تسمم اخذت من ملفات المرضى وسجلات المركز الاستشاري لأستعلامات السموم في الناصرية من كانون الثاني 2013 الى كانون الأول 2015. تتضمن هذه الملفات والسجلات معلومات مهمة عن الحالات المسجلة مثل العمر, الجنس, محل الاقامه, نوع التسمم, طرق المعالجة, وكذلك النتائج. تم تحليل تلك المعلومات واستخراج النتائج الاحصائية منها.

### النتيجة:

كان عدد المصابين من الذكور 200 حاله (58.8%), وسجل الأطفال بعمر (1-3) سنه نسبة 45% من الحالات اغلبهم كانت إصابات عرضيه بينما اغلب حالات التعاطي المقصود كانت عند اليافعين (14-18) سنه وخصوصا الإناث منهم. كذلك بينت الدراسة إن سكان المدن هم أكثر عرضة للتسمم مسجلين نسبة 69.4% من الحالات. 83.2% من الحالات هي عرضيه, التسمم عن طريق الفم كان يمثل 99.4%, التسمم بالعقاقير الدوائية كان بنسبة 62.9%, الغالبية العظمى من الحالات عولجت تحفظيا (96.5%). كذلك 50.3% من الحالات كانت بدون علامات سريريه, ونسبة النجاة بين المصابين كانت عاليه جدا 97.9% كما وان مايقارب ثلث الإصابات حدثت في موسم الصيف. ان سهولة الوصول للأدوية والمواد السامة وتوفرها في المنازل من العوامل المهمة لتزايد حالات التسمم.

### الاستنتاج:

رغم إن التسمم من الحالات التي يمكن تلافيتها والتوقي منها إلا أنها تبقى من الأسباب المهمة لتزايد حالات المراضة والوفيات خصوصا في دول العالم الثالث.