Evaluation of Poisoning Cases in the Poisoning Consultation Center and Forensic Medicine Institute within Baghdad area

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Abstract

Social factors may affect the available sources of toxic substances and causes of poisoning, and these factors may change over time. Additionally, understanding the characteristics of poisoning cases is important for treating such patients. Therefore, the present study investigated the characteristics of poisoning cases in Baghdad Poisoning Consultation Center (PCC) and Forensic Medicine Institute (FMI). Data on all poisoning cases reported in PCC and FMI during 2013 were retrospectively obtained from medical records. Total of 1131 reports of poisoning cases (1082 from PCC and 49 from FMI) were analyzed according to age, sex, geographical distribution and causes of poisoning according to the type and class of poisoning agent. The results showed that most of the poisoning case are from urban area, and the incidence in male is greater than that in females. In both centers, the higher percent of poisoning occurred within the age range 11-20 years. Regarding the type of poisons, zinc sulphide and carbon monoxide represent the cause of poisoning reported in MFI, while metals (mostly copper) and drugs (mostly CNS depressants) represent the major causes of toxicity reported in PCC. In conclusion, among the elements that are common between the two centers are the age distribution of the cases. Rodenticides and metals represent the major causes of poisoning cases reported in Baghdad during 2013. The study results suggest that it is necessary to continuously collect data of patients admitted to emergency departments with toxic poisoning at multiple centers.

Keywords: Poisoning, Consultation center, Forensic medicine.

تقييم حالات التسمم في مركز استعلامات السموم ومعهد الطب العدلي في مدينة بغداد

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الخلاصة

قد تؤثر العوامل الاجتماعية على المصادر المتاحة من المواد السامة وأسباب التسمم. وهذه العوامل قد تتغير مع مرور الوقت. بالإضافة إلى ذلك، من المهم فهم خصائص حالات التسمم كونها من متطلبات العلاج لهؤلاء المرضى. ولذلك، حققت هذه الدراسة في خصائص حالات التسمم في مركز استعلامات السموم (PCC) ومعهد الطب العدلي (FMI) في مدينة بغداد. وقد تم الحصول على بيانات عن جميع حالات التسمم التي أعلن عنها في PCC وFMI خلال ٢٠١٣ بأثر رجعي من السجلات الطبية. وقد تم تحليل ما مجموعه ١١٣١ من تقارير عن حالات التسمم (١٠٨٢ من PCC و ٤٩ من FMI) وفقا للسن والجنس والتوزيع الجغرافي وأسباب التسمم ووفقا لنوع وفئة العوامل المسببة للتسمم. وأظهرت النتائج أن معظم الحالات هم من المنطقة الحضرية في بغداد، والإصابة في الذكور أكبر من ذلك في الإناث. في كل المراكز، حصلت أعلى نسبة مئوية من التسمم داخل الفئة العمرية ١١-٢٠ عاما. وفيما يتعلق بنوع السموم، فأن كل من كبريتيد الزنك وأول أكسيد الكربون تمثل سبب معظم حالات التسمم التي أعلن عنها في المؤسسات المستهدفة بالدراسة، في حين تبين ان المعادن (وبالأخص النحاس) والمؤثرات العقلية (ومعظمه من مضادات الاكتئاب) تمثل الأسباب الرئيسية للتسمم التي تم تسجيلها في PCC. في الختام، من بين العناصر التي هي مشتركة بين المركزين هي التوزيع العمري للحالات. ان مبيدات القوارض والمعادن تمثل الأسباب الرئيسية لحالات التسمم التي أعلن عنها في بغداد خلال عام ٢٠١٣. نتائج الدراسة تشير إلى أن من الضروري جمع البيانات بشكل مستمر من المرضى المصابين بحالات المحالين إلى أقسام الطوارئ في مراكز متعددة.

الكلمات المفتاحية : التسمم، استعلامات السموم، الطب العدلي .

Introduction

Poisoning is a serious health problem in many developed countries, but it is still poorly-defined in developing countries [(1-4)]. More than 9 million natural and synthetic chemicals are used worldwide, and the no. keeps increasing definitely [(5)]. In Iraq, the problem is getting worse with time, as newer drugs and chemicals are developed in vast numbers, and there are no stringent rules and regulations for their dispensing and use. Pesticides are the most common cause of poisoning. According to World Health Organization (WHO) estimates, approximately 3 million pesticide poisonings occur worldwide each years, leading to more than 220 000 deaths. Developing countries like Sri Lanka and India report high rates of toxicity and death [(6,7)]. However, In Iraq there is limited local information on the toxicity of pesticides or other toxicants due to insufficient cases documentation. In 1956, an outbreak of human poisoning by mercury occurred in northern Iraq, which caused more than 100 hospitalized patients and at least a 12 fatalities [(8)]. Furthermore, in 1971-72 a massive outbreak of alkylmercury poisoning, caused by the ingestion of treated seed occurred in Iraq.

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This case has discussed during November 1974 in an international conference that organized in Baghdad by the World Health Organization in conjunction with the Iraqi Ministry of Health and the Swedish International Development Authority [(9)]. There are increasing number of poisoning cases reported in Iraq, the reason could be attributed to the increasing number of toxic chemicals and their large-scale use without proper regulations and direction for use and storage. Banned products also continued to flow into the market like household agents , cleaning products, products that contain Dimethylfumarate (DMF), or medicines that have further widened the spectrum of toxic products to which people may be exposed. The scale of the problem is enormous due to the increased incidence of morbidity and mortality [(2)]. Improvement in the preventive and management approaches can be enhanced by identification of high risk population, susceptible groups within the population, identification of chemicals and commercial products implicated in poisoning cases in the community [(10-12)]. In Iraq, clinical and toxicological diagnostic and treatment facilities are usually not satisfying due to the lack of well-trained personnel and lack of appropriate treatment. Moreover, the weak communication between doctors, medical personnel, and the poisoning control center (PCC) make it difficult for good information flow between the medical team. According to that, we conducted this study to determine the poisoning cases reported in 2013 in Baghdad PCC and the Forensic Medicine Institute (FMI). However, we discussed the main problem facing PCC in the treatment of poisoning cases.

Material and Methods

Poisoning cases received by the medical referral system (written request, direct contact, samples and calls) to the Baghdad Poisoning Consultation Center (PCC) or the Forensic Medicine Institute in Baghdad (FMI), are analyzed during a period of one years (January-December 2013); the total number of cases reported in Baghdad PCC was 1082 (58.4 males and 41.6% females), and in the FMI was 49 (53.1 males and 46.9 females), during the year 2013. The reports form obtained from the PCC included the time, date, mode of inquiry, enquirer's name and address, patient's or victim's age, sex, chief complaint, symptoms and treatments given. The report form obtained from the FMI include victim's sex, age, address, and the cause of death. The age, sex, geographical distribution and causes of poisoning according to the type and class of poisoning agent are analyzed.

Results

A total of 1131 reports of poisoning cases reported in Baghdad PCC and FMI during a period of one year (January-December 2013), were retrieved and evaluated. There were 1082 cases of a positive result documented in the medical records of Baghdad PCC, and 49 cases in the FMI. Geographical distribution of poisoning cases reported in Baghdad PCC indicated that poisoning cases from urban area were 731 (67.5%), and those reported in suburban area were 351 (32.5%) as shown in figure 1.

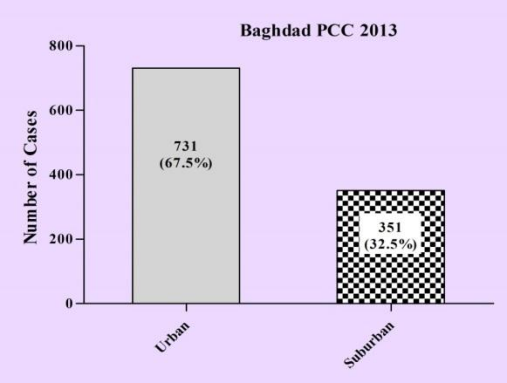

Figure (1): Geographical distribution of poisoning cases reported in Baghdad PCC during 2013.

Meanwhile, the geographical distribution of poisoning cases reported in the FMI showed that cases from urban region represent 65.3% (32 cases), while those reported from suburban regions represent 34.7% (17 cases), as shown in figure 2.

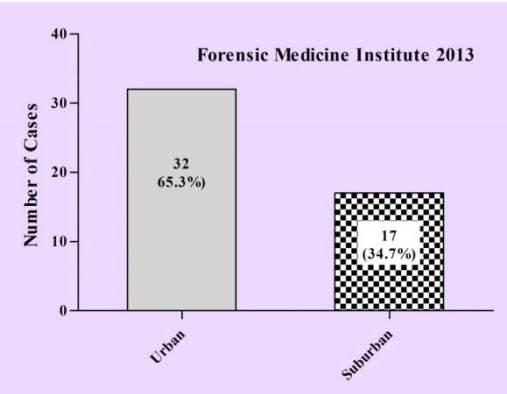

Figure (2): Geographical distribution of poisoning cases reported in the Forensic Medicine Institute during 2013.

When the reported cases of poisoning were ranked according to gender bases, table 1 showed that the poisoning cases were higher in males than females (632, 58.4% *vs.* 450, 41.6%), and the maximum number of cases (during 2013) are reported during the following months: September (126) > July (117) > May (105) > August (101). The percent of poisoning in males reported in Baghdad PCC is greater than that reported in the FMI (58.4% *vs.* 53.1%), while the percentage of poisoning within females reported in the FMI is greater than that reported in Baghdad PCC (46.9% vs. 41.6%), within the same period of time (2013) (Figure 3).

Table (1): Distribution of poisoning cases according to gender and month of the year in Baghdad PCC during 2013.

Month	Male No. (%)	Female No. (%)	Total
January	40 (54.8)	33 (45.2)	73
February	65 (65.7)	34 (34.3)	99
March	51 (54.3)	43 (45.7)	94
April	48 (52.7)	43 (47.3)	91
May	54 (51.4)	51 (48.6)	105
June	45 (57.7)	33 (42.3)	78
July	80 (68.4)	37 (31.6)	117
August	58 (57.4)	43 (42.6)	101
September	67 (53.2)	59 (46.8)	126
October	39 (59.0)	27 (41.0)	66
November	38 (62.3)	23 (37.7)	61
December	47 (66.2)	24 (33.8)	71
Total	632 (58.4)	450 (41.6)	1082

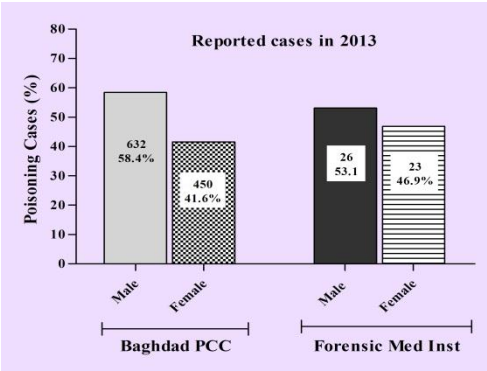

Figure (3): Gender distribution of poisoning cases reported in Baghdad PCC and Forensic Medicine Institute during 2013.

The results of the present study showed that maximum number of poisoning cases were reported within the age group 11-20 years (32%), followed by the other age groups as follow: 1-10 years (23%)> 21-30 years (17%), 31-40 years (11%)> 51 years and above (10%) (Figure 4).

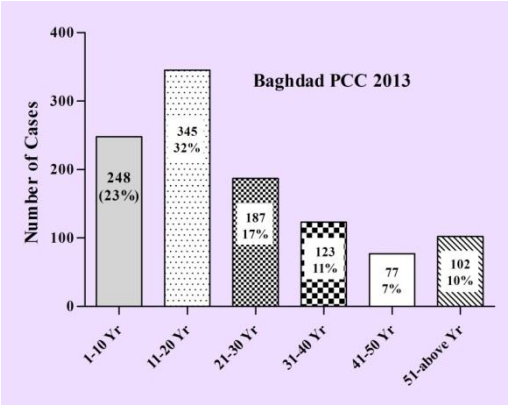

Figure (4): Distribution of poisoning cases reported in Baghdad PCC during 2013 according to the age ranges.

Moreover, distribution of poisoning cases reported in the FMI according to the age range revealed that maximum number of cases are reported within the age group 11-20 years (32%), similar to that reported in Baghdad PCC; the remaining cases are distributed as follow: 1-10 years (20%)>31-40 years (18%)> 21-30 and 1-10 years (12% each)> 51 years and above (6%) (Figure 5).

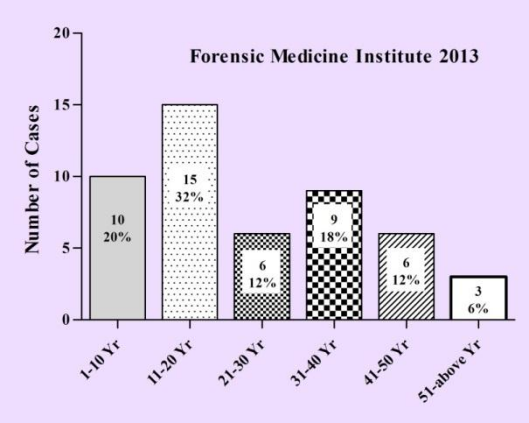

Figure (5): Distribution of poisoning cases reported in the Forensic Medicine Institute during 2013 according to the age ranges.

Regarding the type of agents that predispose to the poisoning cases reported in the FMI, figure 6 showed that zinc phosphide and carbon monoxide are the major causative agents (32.6% and 30,4%, respectively), while hydrogen sulphide, kerosene and ketamine predispose to equal percent of poisoning cases

(8.1% each), followed by cefotaxime (4.1%); while thallium, carbamazepine, phenine diamine, and multi-drugs formulations are responsible for the least amount of poisoning (2.1% each).

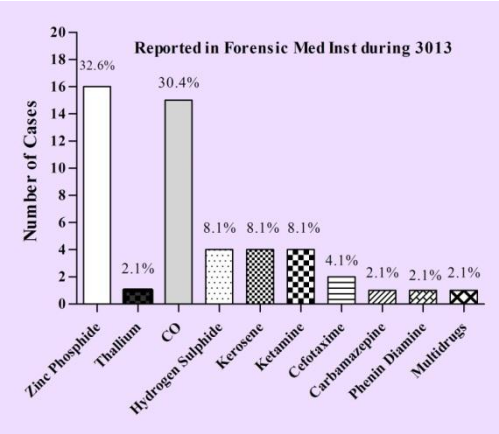

Figure (6): Distribution of poisoning cases reported in the Forensic Medicine Institute during 2013 according to the poison type.

In Baghdad PCC, the highest percent of reported poisoning cases were attributed to metals (82.2%), while unspecified types of drugs predispose to 7.1% cases, followed by pesticides and amanita phalloids, which represent 4.2% and 0.5% of the reported cases at that center, respectively (Figure 7).

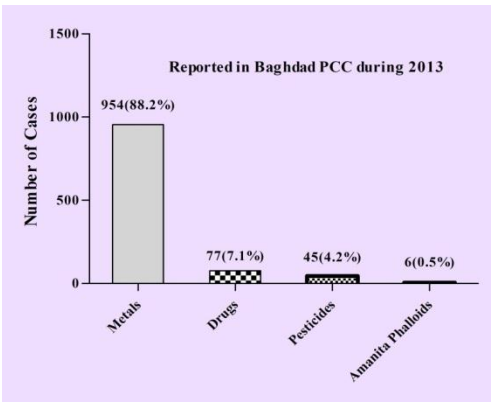

Figure (7): Distribution of poisoning cases reported in Baghdad PCC during 2013 according to the class of the poisoning agent.

Copper was found to be the causative agent behind 89.1% of poisoning cases reported in Baghdad PCC during 2013, while the other types of metals are ranked as follow: Magnesium (4.1%)> Lead (3.5%)> Zinc (2%)> Thallium (1.2%)> Lead+Copper (0.1%) (Figure 8).

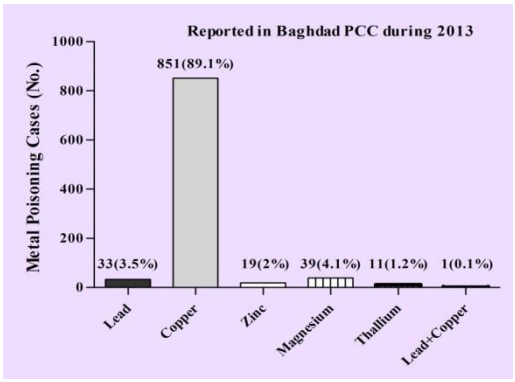

Figure (8): Distribution of metal-induced poisoning cases reported in Baghdad PCC during 2013 according to the metal type.

Regarding the type of pesticides that predispose to the reported cases of poisoning in Baghdad PCC during 2013, zinc phosphide seems to be the causative agent behind 42% of cases, followed by the organophosphates and their mixtures with organochlorines, which predispose to 29% and 11.2% of the cases, respectively (Figure 9). Meanwhile, warfarin and organochlorine compounds predispose to equal percent of poisoning cases (4.5% each), followed by the other agents that predispose to equal percent of poisoning cases (2.2%each) during 2013 (Figure 9).

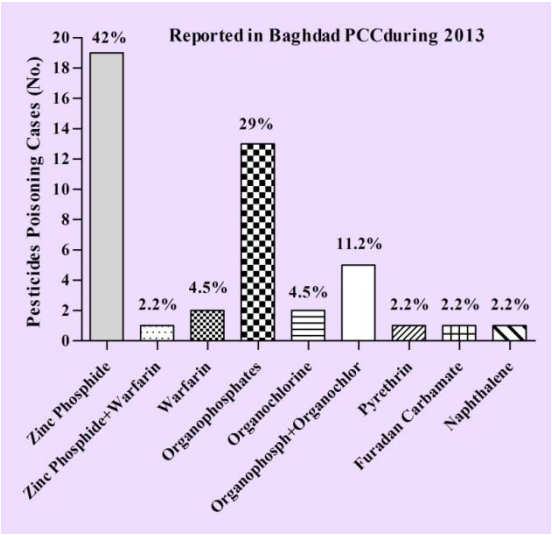

Figure (9): Distribution of pesticides-induced poisoning cases reported in Baghdad PCC during 2013 according to the specific type of pesticides.

Table 2 showed that multi-drugs formulations were responsible for 20.8% of poisoning cases reported in Baghdad PCC during 2013, followed by carbamazepine (14.3%). Meanwhile, diazepam and paracetamol predispose to equal percent of

cases (7.8% each), while chlorpheniramine, alprazolam, and tramadol predispose to equal percent of poisoning cases (6.5 each). Table 2 indicated that 5.1% of reported cases were due to ingestion of diphenhydramine, while amitriptyline, imipramine, benzhexol, and codeine were found to be the causative agents in 2.6% of poisoning cases for each one of them. The other types of drugs were found to be responsible for equal percent of poisoning cases (1.3% each).

Table (2): Incidence of drugs-induced poisoning reported in Baghdad PCC during 2013 distributed according to drug type.

Name of Drug	No. of Cases	Percent
Carbamazepine	11	14.3
Diazepam	6	7.8
Amitriptyline	2	2.6
Niflumic acid	1	1.3
Chlorpheniramine	5	6.5
Diphenhydramine	4	5.1
Paracetamol	6	7.8
Atenolol	1	1.3
Alprazolam	5	6.5
Metronidazole	1	1.3
Imipramine	2	2.6
TCA	1	1.3
Clonazepam	1	1.3
Cinnarizine	1	1.3
Oxazepam	1	1.3
Benzhexol	2	2.6
Tramadol	5	6.5
Codeine	2	2.6
Rifampicin	1	1.3
Methamphetamine	1	1.3
Glibenclamide	1	1.3
Lithium	1	1.3
Multi-drugs	16	20.8
Total	**77**	**100**

Discussion

In emergency settings, the proportion of patients with poisoning differs depending on which agents are defined as toxic and classification of these toxic agents. Toxic poisoning may be broadly or improperly defined, and the definition may differ in different countries and societies, and over time [13]. Additionally, collection and analysis of nationwide data on poisoning plays a key role in informing policies for toxic substances, including the production and sales management of toxic substances as well as, establishment of poison control centers and stores of the required antidotes [14,15]. Therefore, relying on treatment data from other countries is problematic and cannot be easily interpreted according to the local findings. In USA for example, nationwide toxic poisoning centers participate in the Toxic Poisoning Surveillance System (TESS), and data are stored in a database operated by the American Association of Poison Control Centers (AAPCC) [16]. However, there are no standardized nationwide guidelines for such classifications in other countries including Iraq [17]. The present study shed a light on some of the available data in two centers that concern with reporting poisoning cases in Baghdad. Comparative evaluation was not possible due to inconsistency of reported details in the two centers (Baghdad PCC and FMI), and this was considered as a sounded limiting factor of the present study. Moreover, since the study followed the retrospective approach, the data are presented as appeared in the patient's files. The present study focused on providing a comprehensive view about some important data related to the characteristics of Iraqi patients with toxic poisoning that were reported in Baghdad PCC and FMI during 2013. However, thorough comparison of data between these two institutions are not amenable due to inconsistence of registration approaches and inadequacy of certain information. With respect to the age groups of patients, the results indicate some degree of similarity, where the age group 11-20 years demonstrates the higher rate of poisoning; the geographical distribution of the cases also indicate similar incidence pattern in both centers. In 1992, Song *et al*. reported that patients in their 20s were the highest proportion (35.7%) of patients with toxic poisoning [18]. Additionally, Lee *et al*. (1996) also found that the most common age group with poisoning patients were in their 20s (46.8%) [19]. Meanwhile, Kang *et al*. (1999) also reported that 23.7% of patients with toxic poisoning were in their 20s [20]. In other countries, Burillo-Putze *et al*. (2003) reported that the average age of patients with toxic poisoning in Spain was 33 years [21], while Xiang *et al*. (2007) reported that most patients

with toxic poisoning admitted to emergency departments in USA were aged 35-44 years [22]. In Baghdad, and according to the patient's data abstracted from the two centers, highest incidence of poisoning were found in teenage and young people, and then declined in older ages. Comparison with the data presented by other investigators may be not exactly accurate, because the data presented in the current study not represent the national situation in Iraq. In the present study, poisoning was more common in males than females according to reports of Baghdad PCC, while the opposite situation was predicted in the FMI during 2013. The wide variation between sample sizes from both institutions could be the reason behind this result, and this finding seems to be in tune with that reported by other investigators, while not with others. Lee *et al*. reported a male-to-female ratio of 1:173 in poisoned patients [19]. Similarly, the proportion of females among poisoning patients was reported to be 52.1%, according to So *et al*. [14], 53.3% according to Kang *et al*. [20], and 68.4% according to Song *et al*. [18]. Given that female patients are exposed to toxic substances at a higher rate than male patients, and the main cause of poisoning being consumption of toxic material while committing suicide, this finding is most likely related to the high rate of suicidal attempts among women [23]. According to Xiang *et al*., 56.7% of all suicide attempts are made by women [22]. The previously mentioned data are in tune with the FMI reports. In contrast to the Iraqi FMI data, Burillo-Putze *et al*. reported that 56% of poisoning are reported in men in Spain [21], which was in tune with the data reported in Baghdad PCC during 2013. Although the present study do not clarify whether exposure to toxic substances accidental or for committing suicide, most cases of the reported cases of poisoning in other countries are due to consumption of toxic substances for committing suicide, while accidental poisoning are the second most common cause. Burillo-Putze *et al*. reported that 77.7% of patients admitted to emergency departments with acute toxic poisoning had attempted suicide, which are similar to our study findings: 74.9% and 72.0% of admissions in 2003 and 2011, respectively, were due to suicide attempts [21]. Similar rates were reported by other investigators [18-20]. Regarding medication-related poisoning cases, the proportion of toxic poisoning cases due to prescribed drugs tended to increase over time, pharmacies were the most common source of toxic materials followed by other types of stores [24]. The finding of the present study was not in tune with the previous one, where drugs related cases are not the primary cause, as reported in Baghdad PCC. The present study showed that during 2013, the most poisoning cases reported in Baghdad PCC were admitted to emergency departments in September, July, May and August, respectively. This finding may not be consistent with other reports due to many social and geographical variations [25]. The most important factor to consider in the treatment of acute toxic poisoning is the causative substance. Decontamination and treatment methods as well as antidotes used are different according to toxic substances. Therefore, access to data on substances commonly associated with toxic poisoning is very important for medical staff dealing with patients in emergency departments. The substances most commonly causing poisoning vary depending on the patient's society, for example, the ease of purchase and acquisition of toxic substances. In the present study, exposure to the rodenticide zinc phosphide and carbon monoxide were the most common causative agents in reported in FMI during 2013, while in Baghdad PCC exposure to toxic metals represents the major cause within the same period. Such discrepancy could be attributed to the difference in sample size, or that the FMI reports include only the death cases referred for forensic evaluation. Several studies have reported that pesticides were the most commonly used agents for poisoning in many regions worldwide. However, the present study findings showed that pesticides contributed only for 7.1% of the poisoning cases within Baghdad area; the social class of the referred cases to Baghdad PCC were mostly from urban regions, and might explain the small contribution of pesticides in poisoning cases. This finding was not consistent with that reported by others [26,27]. In addition to pesticide poisoning, the other common types of expected poisonous agents were medicines like benzodiazepines, analgesics, anti-depressants and others. The present study showed that multi-drugs formulations represent the major causative agent of drugs-related poisoning, followed by other drugs especially CNS depressants and anticonvulsants. Medicines are used as poisoning agents for intentional poisoning in developed countries [28] and urban areas. In certain places, street drugs and OTC medicines like paracetamol, antihistamines are also used for intentional poisoning [29, 30].

Conclusions

The present study evaluates the characteristics of poisoning cases reported in Baghdad PCC and FMI. Among the elements that are common between the two centers are the age distribution of the cases. Rodenticides and metals represent the major causes of poisoning cases reported in Baghdad during 2013. The study results suggest that it is necessary to continuously collect data of patients admitted to emergency departments with toxic poisoning at multiple centers.

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