

## Intentional and unintentional drug poisonings in Mubarak Al-Kabeer hospital, Kuwait

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### Abstract

**Objective :** The goal of this study was to identify the proportion of patients with intentional and unintentional drug poisonings and determine demographic and other factors having significant association with type of poisoning.

**Material and Methods :** The study was conducted at the Emergency Department of Mubarak Al Kabeer hospital, Kuwait from June 2010 to December 2012. Data were collected using a pre-tested structured questionnaire with a consent form and patients were followed until discharge from the hospital. The underlying cause of the admission was identified to be drug poisoning based on patient interviews and evaluation.

**Results :** A total of 116 patients were admitted due to drug poisoning. The majority of 63(54.3%) patients belonged to the age group of 12-29 years. Sixty seven (57.8%) patients had intentional poisoning. The causes for unintentional poisoning were, wrong dose 22(44.9%), duplicate therapy 14 (28.6%) and drug-drug interactions 13(26.5%). There is significant difference between the groups having intentional and unintentional drug poisoning ( $p < 0.001$ ) with regard to age, marital status, level of education and occupation. Paracetamol was the most common drug involved in poisoning.

**Conclusion :** Poisoning exists in Kuwait and its incidence will continue to increase with increased drug use and absence of public awareness and education. The risk factors identified in this study could stimulate further research and assist in targeted delivery of preventive strategies to protect public health.

**Keywords:** Poisoning; Kuwait; Antidotes; Paracetamol; Poison control center

### Introduction

Poisoning is a major public health problem which involves in most cases significant costs for medical services and also, can be fatal. The death rate related to drug poisoning has increased by approximately 300% over the past 3 decades and is considered the leading cause of injury death in the United States (US) [1].

Poisoning is the development of dose-related adverse effects after exposure to chemicals, drugs or other xenobiotics. It can be local (e.g., skin) or systemic, depending on the route of exposure, the physicochemical properties of the poison, and its mechanism of action. Drug poisonings can be intentional (suicide) or unintentional, both of which represent a growing portion of the global burden of injuries [2]. Unintentional poisonings are caused by improper use of over-the-counter and prescription drugs for their psychotropic or euphoric effects, misreading of labels, product mislabeling, wrong identification of unlabeled drugs, self-medication and dosing errors by healthcare professionals, parents or the elderly. Generally the majority of drug poisonings are accidental (unintentional), involve a single agent, result in minor or no toxicity, involve children younger than 6 years of age and occur at home [3]. According to the Centers for Disease Control and Prevention (CDC) in the US, in 2012 80% of the 41,502 drug overdose related deaths in the United States were unintentional and 13.2% were of suicidal intent and among people 25 to 64 years old. Drug overdose caused more deaths than motor vehicle traffic accidents [4]. Specific strategies can be developed to control and prevent poisoning if data is available as to whether the drug poisoning is intentional or unintentional. The pharmaceutical agent most often implicated in fatal poisoning is paracetamol [3].

According to the Ministry of Health (MOH) records of Kuwait, based on data from six public hospitals in Kuwait, there was increasing

prevalence of poisoning cases from 1999 to 2011 and the average number of poisoning cases seen annually was 1,005 [5]. There have been no interventions implemented in Kuwait to overcome this rising problem. In Kuwait, the paediatric poisoning discharges, as a proportion of all ages, ranged from 35% to 50% over the period 1999 to 2010, according to official MOH records as shown in Figure 1. Although there is a trend towards fewer annual admissions, it is not clear from the information gathered whether this represents a true trend, increased inpatient mortality, or differences in reporting. A previous study has found unnecessary routine hospital admissions for poisonings and has recommended the need for child-resistant containers, public education, and establishment of a poison control center (PCC) [6].

The lack of reliable epidemiological data is one of the important obstacles to effective control and prevention of poisoning. Poisoning data can be obtained from sources such as PCCs and hospital records. The PCCs in the US are involved actively in disaster and terrorism preparedness and response planning and in traditional responsibilities for the benefit of public health such as surveillance [7]. In Kuwait, the current problem of poisoning is complicated by the absence of PCC and a central register to record and follow up cases of poisoning [8-11]. A study found inadequate availability of antidotes in Kuwait and recommends urgent measures to overcome this problem to reduce

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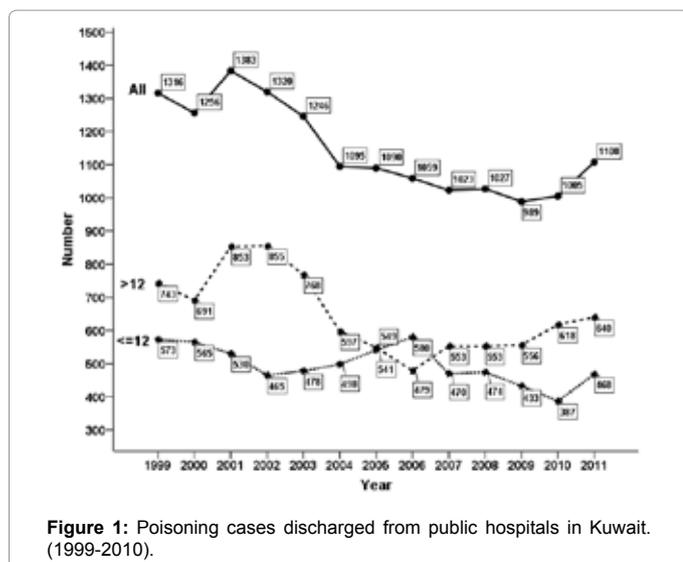


Figure 1: Poisoning cases discharged from public hospitals in Kuwait. (1999-2010).

the mortality and morbidity of poisoned patients [11]. A proposal for developing a PCC in Kuwait had been submitted to the MOH of Kuwait in 2013 and is available online [12].

The current survey is designed to identify the proportion of patients with intentional and unintentional drug poisonings and to determine demographic and other factors associated with type of poisoning. To our knowledge, a similar prospective Kuwaiti study has not been published till date

## Material and Methods

A prospective survey was conducted at the Emergency Department (ED) of Mubarak Al Kabeer hospital, Kuwait from June 2010 to December 2012. The ethical approval was obtained from the joint research and ethical committee of the Kuwait University Health Sciences Center (HSC). Patients above 12 years of age, who were admitted to the ED for intentional or unintentional drug poisonings, were included in this study after taking their guardians' permission and signing a consent form. Patients who had any mental illness were excluded from this study.

On admission to the ED, data were collected using a structured questionnaire and patients were followed until discharge from the hospital. The underlying cause of the admission to the ED was identified to be drug poisoning based on patient interviews and evaluation by the first author of this study, who is a qualified medical examiner at the ED.

The questionnaire consisted of five different sections containing open-ended and close-ended questions. The first section was designed to collect patient information such as age, gender, nationality, education, marital status, family income and occupation, while the second section collected data on the date and time of admission to the ED, duration of poison exposure till admission and location of exposure. The third section recorded the management received by the patient before admission, whereas the fourth section included questions to assess the reason for poisoning. This section also included questions to assess if the admission was the patient's first incident of poisoning and to identify the drug, the route of administration or exposure and the quantity of drug ingested. These questions were designed to differentiate between unintentional and intentional poisoning and to identify the cause of unintentional poisoning such as wrong dose, drug-drug interaction

and duplicate therapy and the reason for intentional poisoning such as to seek attention, suicidal thought, social problems etc. The questions that were included to assess patients with intentional poisoning are as follows;

- Did you feel that you will never take this medication again?
- Did you get what you need after taking this drug?
- Are you going to follow up with a psychiatric doctor?
- Do you know the lethality of the ingested drug you took?

The final section collected information on the signs and symptoms observed on admission and the poisoning severity scores (PSS) and the complications that occurred during management.

The PSS is a standardized scale used for grading the poisoning severity and allows qualitative evaluation of morbidity and comparability of data. The occurrence of a particular symptom is checked and the severity grading is assigned. The severity grading takes into account only the observed clinical signs and symptoms and does not estimate risks or hazards on the basis of variables such as quantity ingested or plasma concentrations. Cases resulting in death are graded separately to allow the data to be presented accurately, although death is not a grade of severity but an outcome [13]. The severity grades used in PSS are as follows;

- None: No symptoms or signs related to poisoning
- Minor: Mild, transient and spontaneously resolving symptoms
- Moderate: Pronounced or prolonged symptoms
- Severe: Severe or life threatening
- Fatal: Death

The tenth revision of the International Statistical Classification of Diseases and Related Health Problems (ICD-10), a medical classification list by the World Health Organization (WHO), was used for classifying drugs [14].

The outcome for each patient, after admission, was recorded as successful discharge from the hospital or death.

Data were analyzed using SPSS version 17 and the results were expressed as counts and percentages. Descriptive statistics and chi-square test were used. Fisher's exact test was used in case of small numbers. The p-values less than or equal to 0.05 were considered to be statistically significant.

## Results

During the study period, a total of 116 patients participated in the study after admission to the ED of Mubarak Al-Kabeer hospital due to drug poisoning. The demographic features of the patients are shown in Table 1. The majority of the admitted 63 (54.3%) patients belonged to the age group of 12-29 years with a median age of 27.5 years. With respect to gender, 102 (87.9%) were females. Half of the samples were local citizens and 38 (33.9%) were students with 70 (60.3%) participants having a secondary education or above.

As shown in Table 2, 67 (57.8%) patients had intentional poisoning and 49 (42.2%) had unintentional poisoning. The causes for unintentional poisoning shown in Figure 2 were wrong dose 22 (44.9%), duplicate therapy 14 (28.6%) and drug-drug interactions 13 (26.5%).

There is significant difference between the groups having

**Table 1:** Demographic characteristics of poisoned patients (Number (n) =116)

Parameters	n (%)
Age in years	
12 – 20	28 (24.1)
20 – 29	35 (30.2)
30 – 39	16 (13.8)
≥40	37 (31.9)
Median (Range)	27.5 (12, 92)
Gender	
Male	14 (12.1)
Female	102 (87.9)
Nationality	
Kuwaiti	58 (50.0)
Non Kuwaiti Arabs	47 (40.5)
Non Kuwaiti Asians	11 (9.5)
Marital status	
Single	49 (42.2)
Married	51 (44.0)
Divorced/widowed	16 (13.8)
Level of education	
No formal education	11 (9.5)
Primary/Elementary School	35 (30.2)
Secondary School	33 (28.4)
Diploma/University	37 (31.9)
Occupation	
Not working/retired	10 (8.9)
Housewife	31 (27.7)
Student	38 (33.9)
Employee	33 (29.5)
Family Income (KD) <sup>a</sup>	
<500	31 (26.7)
500 - 1000	29 (25.0)
1000- 1500	33 (28.4)
>1500	23 (19.8)

<sup>a</sup>KD: Kuwait Dinar

intentional and unintentional drug poisoning ( $p<0.001$ ) with regard to age, marital status, level of education and occupation, as shown in Table 2. Intentional drug poisoning was more prevalent among younger patients, unmarried patients, students and those with an education level of secondary school or above, while the unintentional drug poisoning was more prevalent among the older patients, married and housewives with below secondary level of education.

The time of drug ingestion or exposure relative to ED admission, the PSS, history of drug use and complications that occurred during management after ED admission was significantly different between the groups having intentional and unintentional drug poisoning ( $p<0.001$ ) as shown in Table 3. The duration of drug exposure till ED admission was more for patients with unintentional drug poisoning, as shown in Table 3.

With regard to PSS on admission, the severity score was more for patients with unintentional poisoning.

Significant number of patients with unintentional drug poisoning had a history of drug use.

The complications that occurred during management were more among 29 (64.4%) patients with unintentional poisoning.

**Table 2:** Comparison of demographic characteristics between groups of intentional and unintentional drug poisonings (n=116).

Parameters	Intentional n=67 (58%) n (%)	Unintentional n=49 (42%) n (%)	p-value <sup>a</sup>
Age in years			<0.001
12 – 20	22 (32.8)	6 (12.2)	
20 – 29	31 (46.3)	4 (8.2)	
30 – 39	8 (11.9)	8 (16.3)	
≥40	6 (9.0)	31 (63.3)	
Gender			0.229
Male	6 (9.0)	8 (16.3)	
Female	61 (91.0)	41 (83.7)	
Nationality			0.064
Kuwaiti	31 (46.3)	27 (55.1)	
Non Kuwaiti Arabs	26 (38.8)	21 (42.9)	
Non Kuwaiti Asians	10 (14.9)	1 (2.0)	
Marital status			<0.001
Single	39 (58.2)	10 (20.4)	
Married	23 (34.3)	28 (57.1)	
Divorced/widowed	5 (7.5)	11 (22.4)	
Level of education			<0.001
No formal education	0 (0.0)	11 (22.4)	
Primary/Elementary School	20 (29.9)	15 (30.6)	
Secondary School	24 (35.8)	9 (18.4)	
Diploma/University	23 (34.3)	14 (28.6)	
Occupation			<0.001
Not working/retired	3 (4.5)	7 (15.2)	
Housewife	7 (10.6)	24 (52.2)	
Student	30 (45.5)	8 (17.4)	
Employee	26 (39.4)	7 (15.2)	
Family Income (KD) <sup>b</sup>			0.548
<500	17 (25.4)	14 (28.6)	
500 - 1000	17 (25.4)	12 (24.5)	
1000- 1500	22 (32.8)	11 (22.4)	
>1500	11 (16.4)	12 (24.5)	

<sup>a</sup> p- values generated by chi-square test. <sup>b</sup>KD: Kuwait Dinar

The drugs identified in the poisonings are listed in Table 4, where 82 (47.4%) cases of poisonings were due to non-opioid analgesics and antipyretics and paracetamol was the most common drug involved in 50 (60.9%) cases. Twenty one (12.1%) patients were poisoned by drugs primarily affecting the cardiovascular system. Warfarin was the most common drug involving 12 (6.9%) patients with unintentional poisoning.

The reason for intentional poisoning in order to seek attention, was reported by 38 (56.7%) patients, while 20(29.8%) had suicidal intentions. Only 9(13.4%) patients reported social problems as a cause for poisoning. Majority of the 66 (98.6%) patients with intentional poisoning admitted that they did not know the lethal effect of the drug they ingested and 38 (57.3%) decided that they will never take that drug again. In this group, 59 (88.0%) patients did not get what they needed after taking the drug intentionally and 35 (52.9%) agreed to follow up with a psychiatrist for counseling and treatment, if needed, as shown in Figure 3.

The outcome of the 116 patients, on follow up, was that 112 (96.5%) patients were successfully discharged and 4 (3.4%) patients had a fatal outcome.

## Discussion

In this prospective study the majority of the 116 patients hospitalized for drug poisoning were intentional. A case-control study reported similar results where 60% of the patients were categorized as intentional poisoning [15].

Majority of the patients in our study belonged to the age group of 12-29 years 63 (54.3%) with a median age of 27.5 years. Almost half of the patients with intentional poisoning were students 30 (45.5%). In this study 10 (20.4%) patients of the age group 12-29 years were admitted for unintentional poisoning. This observation could be an indication that this group having inherent psychosocial problems or intention to seek attention or pressure from peers. A student health behavior survey revealed that some of the behaviors contributing to intentional injuries

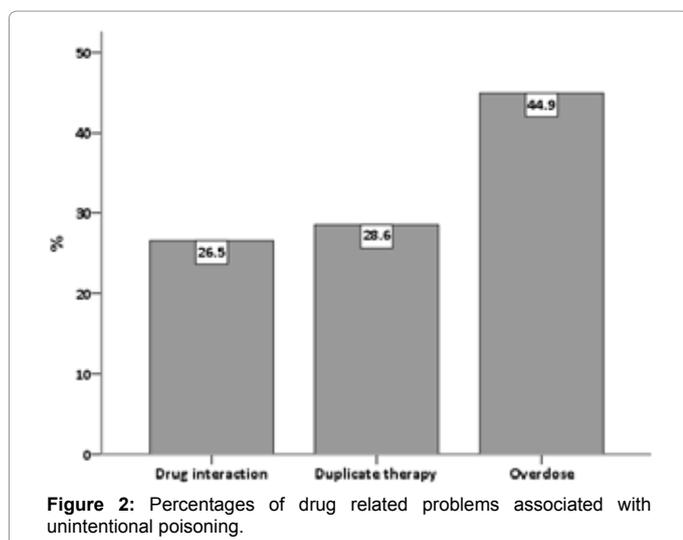


Figure 2: Percentages of drug related problems associated with unintentional poisoning.

**Table 3:** Factors significantly associated with the type of poisoning (n=116).

Variable	Intentional n=67 (58%)	Unintentional n=49 (42%)	p-value
	n (%)	n (%)	
Duration of drug exposure			<0.001 <sup>a</sup>
≤2 hours	21 (32.8)	4 (8.2)	
3-6 hours	26 (40.6)	7 (14.3)	
7-23 hours	13 (20.4)	7 (14.3)	
1-6 days	4 (6.2)	22 (44.9)	
A week or more	0 (0.0)	9 (18.3)	
Poisoning severity score			<0.001 <sup>b</sup>
None	49 (76.6)	18 (39.1)	
Mild	10 (15.6)	11 (23.9)	
Moderate	4 (6.3)	7 (15.2)	
Severe/Fatal	1 (1.6)	10 (21.7)	
History of previous medication			<0.001 <sup>a</sup>
No	60 (92.3)	16 (38.1)	
Yes	5 (7.7)	26 (61.9)	
Complication arise			<0.001 <sup>a</sup>
No	53 (86.9)	16 (35.6)	
Yes	8 (13.1)	29 (64.4)	

<sup>a</sup> p - values generated by chi-square test  
<sup>b</sup> p - values generated by Fisher's exact test

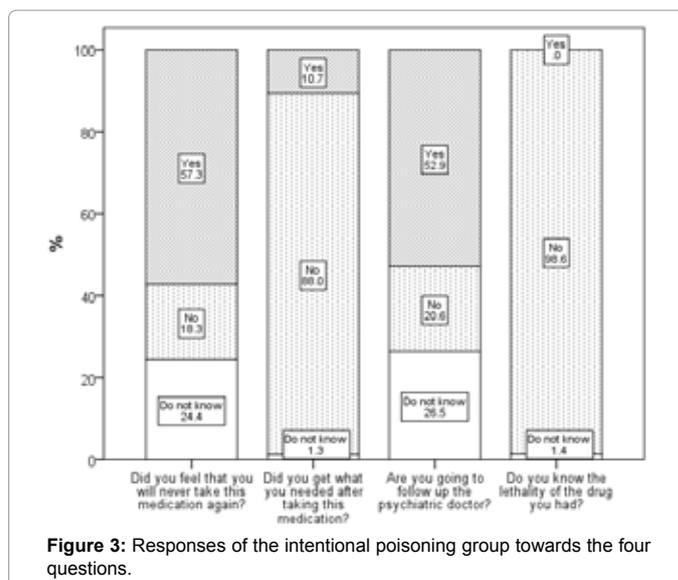


Figure 3: Responses of the intentional poisoning group towards the four questions.

(including poisoning) were dating violence, school-related violence, sadness, and suicide attempts [16].

The authors of this study recommended that intervention programs have to be designed that specifically address differences in health risk behaviors which vary significantly by gender and type of educational institution. These steps will successfully reduce premature morbidity and mortality among all youth and into adulthood [16]. A two-year retrospective case series study on adolescent poisoning found that peer pressure and problems with social relationships were the main triggering factors for intentional poisoning. Often adolescents do not confess suicide attempt and also claim that they had no desire for a fatal outcome but only unintentional poisoning or intentional self-hurting. The authors stated that it is necessary to pay attention to cases of unclear or circumstances of suspicious poisoning and consider the claims of the adolescent that it was unintentional poisoning with caution. This approach would help to identify group of patients that have to be sent immediately to the psychiatrist [17].

In our study, a higher proportion of poisoning was observed with females. The higher proportion of females was found in other similar studies [18,19]. However, another regional study in Oman, showed equal distribution between the genders [20]. Even though the proportion of females was high in our study, there was no statistically significant difference (p=0.229) between the genders, as shown in Table 2. However, further research is required to investigate the reasons for having a higher proportion of females with drug poisoning in Kuwait.

The most common drug involved in intentional poisoning in our study was paracetamol. This could be attributed to the easy availability in houses and unrestricted sale of large packs of paracetamol in supermarkets and cooperative societies in Kuwait. Paracetamol overdoses are a common method of suicide and frequent cause of liver damage. Legislations should be implemented to control the quantity of paracetamol sold in supermarkets in Kuwait. The sale of general medicines list including paracetamol in supermarkets or cooperative societies is regulated by the ministerial decree No. 621, 1998 of Kuwait but there is no regulation on the quantity that can be sold. A cross-sectional survey found that in Kuwait, the paracetamol pack sizes varied between 48 and 100 tablets and the public was able to obtain any quantity they desired [21]. In the United Kingdom (UK), there

**Table 4:** Drugs associated with intentional and unintentional poisonings.

ICD-10 code	Drugs	Intentional n (%)	Unintentional n (%)	Total n (%)
T36	Systemic antibiotics	7 (7.1)	7 (9.3)	14 (8.1)
T38	Hormones and their synthetic substitutes and antagonists	2 (2.0)	1 (1.3)	3 (1.7)
T39	Nonopioid analgesics, antipyretics and antirheumatics	63 (63.3)	19 (25.3)	82 (47.4)
T40	Narcotics and psychodysleptics [hallucinogens]	1 (1.0)	5 (6.7)	6 (3.5)
T41	Anaesthetics and therapeutic gases	1 (1.0)	1 (1.3)	2 (1.2)
T42	Antiepileptic, sedative-hypnotic and antiparkinsonism drugs	8 (8.2)	7 (9.3)	15 (8.7)
T43	Psychotropic drugs	2 (2.0)	3 (4.0)	5 (2.9)
T44	Primarily affecting the autonomic nervous system	3 (3.1)	4 (5.3)	7 (4.0)
T45	Primarily systemic and haematological drugs	0 (0.0)	12 (16.0)	12 (6.9)
T46	Primarily affecting the cardiovascular system	6 (6.1)	15 (20.0)	21 (12.1)
T47	Primarily affecting the gastrointestinal system	4 (4.1)	0 (0.0)	4 (2.3)
T48	Primarily acting on smooth and skeletal muscles and the respiratory system	0 (0.0)	1 (1.3)	1 (0.6)
T50	Diuretics and other and unspecified drugs, medicaments and biological substances.	1 (1.0)	0 (0.0)	1 (0.6)
	Total cases	98	75	173

is a limit for the number of tablets that can be sold. This legislation has already shown initial benefits, in terms of non-fatal overdoses and liver unit activity in England and Wales and the long term effect of the legislation has yet to be evaluated [22]. We recommend that the Kuwaiti government should introduce and implement similar legislations to control the availability of paracetamol. Pharmacists are in a unique position to promote the rational use of acetaminophen. Pharmacists must provide patient education for those who purchase OTC acetaminophen products [23].

Majority of the patients 66 (98.6%) with intentional poisoning admitted that they did not know the lethal effect of the drug they ingested. A study suggests that patients with intentional poisoning can be further classified as a possible or definite suicide attempt. This difference is based on whether a patient knows that the drug is lethal and whether other methods were carried out by the patient to have a fatal outcome, which is considered as a definite suicide attempt. If the intention by the patient was indecisive and had requested help shortly after ingestion, then the poisoning can be classified as possible suicide attempt [24]. Further investigation is required for a definite classification. However, we could assume that the majority of patients in this group made a possible suicide attempt, as most of them did not know the lethal effect of the drug.

Only 38 (57.3%) patients decided that they will never take that drug again. This indicates that the remaining patients might take the drug again which could have a fatal outcome. A history of hospitalization for poisoning could be a risk factor for death due to a later poisoning [25]. Most patients, reported that the reason for intentional poisoning was to seek attention, while others reported suicidal intentions and social problems as causes for poisoning. This group of patients requires urgent interventions by healthcare professionals after identifying their risk factors for poisoning such as socioeconomic background, lifestyle behaviors etc.

A study in Finland recommended more prevention programs to reduce cases of poisoning [25]. Kuwait also needs prevention programs to decrease poisoning rates.

Only 36 (52.9%) patients would consult a psychiatrist as the public in Kuwait is averse to such consultations probably because of stigma and a false perception of insignificant benefit. Fifty nine (88.0%) patients did not get what they wanted by poisoning themselves, although 12 (18.3%) patients stated that they might take the drug again. A more comprehensive approach using face to face interviews, on a case by case basis, is required to find out the accuracy of the responses made by the patients.

The severity grades of poisoning for patients with unintentional poisoning were severe for 6 (12.2%) patients, fatal outcomes for 4 (8.16%) patients, and complications in 29 (64.4%) patients. The higher proportion of severity and complications in this group could be due to the presence of chronic illnesses, chronic drug exposure, increased age or increased sensitivity to drug toxicities. However, further research is required to determine the reasons for this higher incidence of severity and complications in this group.

The most frequent cause of unintentional poisoning observed in our study was overdose followed by duplicate therapy and drug interaction, all of which are preventable by proper education and awareness. Non-adherence to therapy could also be a causative factor for unintentional poisoning. Clinical pharmacists can play a crucial role in reducing these incidences. The time between drug exposures to presentation at the hospital by this group is relatively long as they might have been on chronic medications and the signs and symptoms of drug toxicity might have developed gradually. Warfarin was the causative drug in 12 (16%) patients. The establishment of an anticoagulation clinic in this hospital directed by pharmacists will be immensely beneficial for patients on warfarin therapy. One study found that a pharmacist-directed and physician-supported anticoagulation program was able to achieve reduced rates of thromboembolic complications and better INR control compared with standard care [26].

Kuwait does not have a national PCC, although most of its neighboring countries have [27,28]. Saudi Arabia has several local Drug and Poison information Centers which provides important

services to minimize the impact of accidental poisoning, to disseminate information on poisoning and to provide database for all cases of poisoning [27]. The absence of PCC adds burden to the health care system of Kuwait, as it can play a vital role in the education of the public as well as treatment and follow up of poisoning cases. The existence of PCC can also help in better stocking of antidotes and in conducting poisoning-related research and developing strategies for preventing and controlling poison related morbidity and mortality [11]. However, a proposal for the establishment of a PCC in Kuwait was prepared by experts and submitted to the MOH in 2013 and a copy of the proposal can be obtained online on request from the SAHA Institute, which is a regional organization of experts [12].

The limitation of this study is that the collected data were from a single government hospital. More information could have been obtained if hospitals from the public and private sectors were included in the study.

## Conclusion

Intentional and unintentional drug poisoning exists in Kuwait and its incidence will continue to increase with increased drug use and absence of public awareness and education. We recommend restricting the quantity of drugs for non-pharmacy sales as it will considerably reduce suicide rates. Suicide prevention is a collective responsibility and must be spearheaded by the government and the society. The risk factors identified in this study could stimulate further research and assist in targeted delivery of preventive strategies to protect public health.

## Ethical Approval

Ethical approval obtained from the joint research and ethical committee of the Kuwait University Health Sciences Center.

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