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Medical toxicology experience: Poisoning consultations cases registry in Saudi Ministry of Health -2020 annual report

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ABSTRACT

Introduction: Saudi poison control centers provide surveillance data that should be used to determine the magnitude of poisoning exposures and the level of public awareness that is to evaluate control measures. This work aimed to review and assess the characteristics of toxic events received by toxicological information center's hotline all over Saudi Arabia during 2020.

Patients and Methods: Data were collected from the poison control centers in Saudi Arabia. Cases of poisonings were studied during the period from 1st January to 31st December 2020.

Results and Discussion: The poison control center received 20,513 calls in the year 2020. Most of calls were from Riyadh city (40.9 %) and from public places (92.9 %). Regarding the patients, most of the cases were less than 6 years old and more than half of them were males. The majority of toxic exposures were accidental oral poisoning. About 84 % of patients (84.3 %) called for help within one hour from poisons exposure. Household substances toxic exposure represented about one third of toxic cases. Chemicals and alcohol sanitizers' poisoning were the highest among house hold substances toxicities (39.3 % and 17.7 % respectively of all household substances toxicity). In addition, the most frequently ingested drugs were vitamins poisoning.

Conclusion: Household chemicals represented the highest risk in exposures among children below 6 years. Finally, we recommended widespread awareness of the poisons risk and the importance of poison control that play a great role in time management and saving lives.

1. Introduction

Acute poisoning is a common reason for seeking medical help and being admitted to the emergency room. They are a real public health issue whose causes and consequences must be fully recognized [1].

The bulk of drug and chemical poisoning is classified as an imminent threat to one's health, life, property, or environment, and it affects both young boys and females. The majority of these poisonings require immediate attention to avoid a deterioration of the situation, particularly those caused primarily by self-poisoning with pesticides and corrosives [2].

Poisons' control Centre is a specialized unit providing information on prevention, early diagnosis, and treatment of poisoning and hazard management [3,4]. One of the main activities of poison control centers' is telephone consultation, which they offer to the general public, emergency medical services staff, health care professionals, and public health organizations. These programs rely on clinical toxicologists, medical toxicologists, experts in subspecialty areas, and poison specialists to manage calls rapidly and efficiently [5].

In the case of poisoning exposures, services given to the public include assessment of the nature and severity of toxicity, advice for at-home treatment when appropriate, reassurance to the caller, and referral to a health care provider when necessary. Callbacks are given as appropriate to ensure that the episode is resolved satisfactorily. To avoid repeat poisoning episodes, preventative measures such as removing certain objects from the home or putting them out of reach of children are recommended. When callers are referred to a medical facility, the facility is notified, and information about the case as well as the toxicology of the poison involved is made available [6,7].

Poison control centers often respond to public complaints regarding

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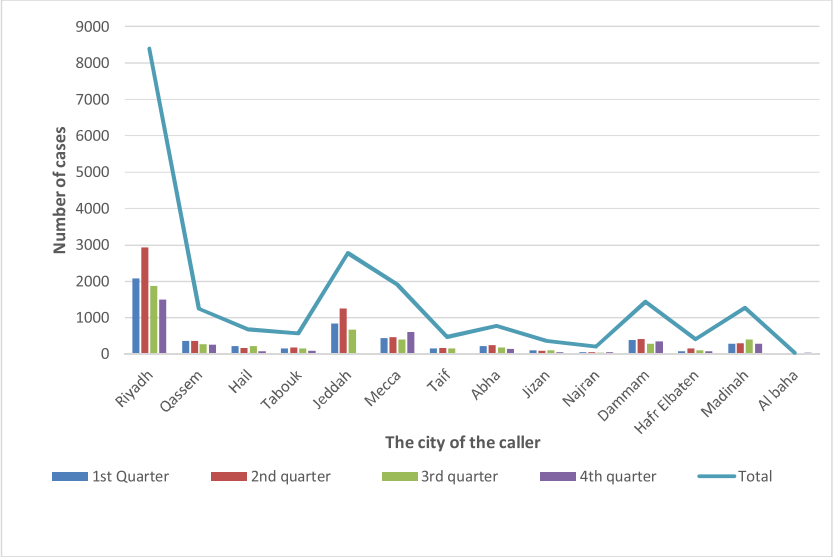

Fig. 1. Frequency of the received calls according to the cities.

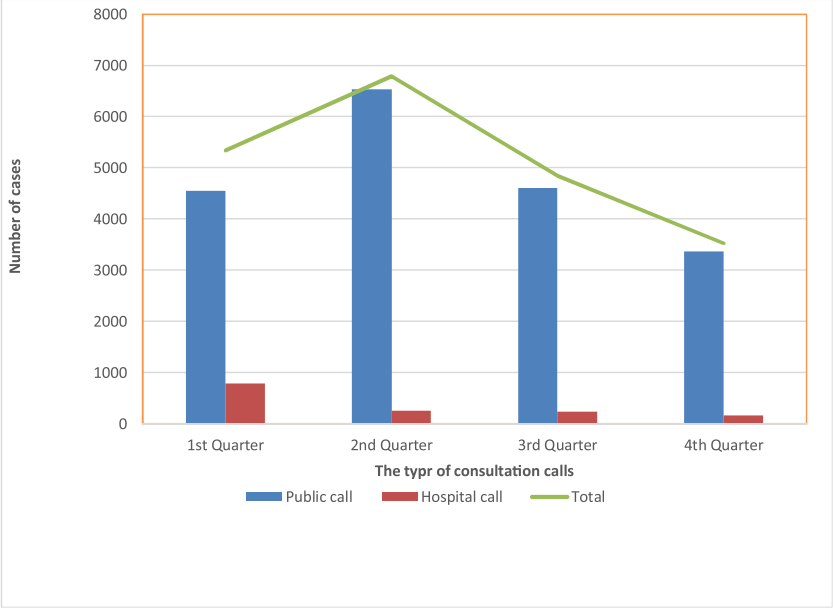

Fig. 2. Frequency of the origin of Consultations Calls.

toxins, chemical exposures at work or at home. They ask for an evaluation of symptoms they think related to poisoning, as well as questions about environmental contamination, plants, herbal remedies, medication interactions, or envenomation, and general knowledge about poisoning subjects (e.g., first aid). Since people call the poison control center when they don't know who else to call, the range of topics is wide. For potential food poisoning, such calls can be referred to more relevant departments, such as the local public health department [6].

Toxicology research, which focuses on poison control center clinical services and contribution of centers in researching and treating poisonings are very precious in improving their services [7,8]. Therefore, the present study aims to review and assess the characteristics of toxic events received by the toxicological information center's hotline all over Saudi Arabia during 2020.

2. Patients and methods

A retrospective study was performed on 20,513 cases of poisoning. The information was collected from the poison control centers hotline service all over Saudi Arabia.

Cases of poisonings were studied during the period from January to December 2020 divided into four quarters (1st from January to March, 2nd from April to June, 3rd from July to September and 4th from October to December). These parameters were studied: city as the call was received, origin of the call and all the followings regarding the case; age, gender, occupation, mode, place and route of poisoning, clinical manifestations, investigations, recommendations and type of poisoning.

Table 1
Frequency of the patients according to gender, age groups and occupation.

Character of patients	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Total n (%)
Gender					
Male	2961	3542	2603	2099	11,205 (54.6 %)
Female	2378	3251	2248	1431	9308 (45.4 %)
Age groups					
<6	4179	5098	3914	2830	16,021 (78 %)
<6–12	453	659	272	138	1522(7.4 %)
<12–18	140	154	131	62	487(2.4 %)
<18–24	118	200	131	116	565(2.8 %)
<24–39	200	323	247	212	982(4.8 %)
<39–60	128	219	116	112	575(2.8 %)
<60	121	140	40	60	361(1.8 %)
Occupation					
Employee	323	505	278	153	1259 (6.1 %)
Un-employee	268	373	237	239	1117 (5.4 %)
Student	610	874	510	193	2187 (10.7 %)
Preschool	4138	5041	3826	2945	15,950(77.8 %)
Total	**5339**	**6793**	**4851**	**3530**	**20,513 (100 %)**

1st quarter of the year from January to March.
2nd quarter of the year from April to June.
3rd quarter of the year from July to September.
4th quarter of the year from October to December.
n: number of cases.
%: percentage.

Table 2
Frequency of patients regarding mode, place and route of poisoning.

History of poisoning	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Total n (%)
Mode of poisoning					
Accidental	5182	6647	4800	3434	20,063 (97.8 %)
Intentional	104	81	30	58	273 (1.3 %)
Others	53	65	21	38	177 (0.9 %)
Place of poisoning					
Home	5245	6688	4810	3493	20,236 (98.6 %)
Work	29	38	12	8	87 (0.4 %)
Relatives house	22	52	18	9	101 (0.5 %)
Others	43	15	11	20	89 (0.4 %)
Route of poisoning					
Oral	5063	6354	4654	3225	19,296 (94.1 %)
Inhalation	117	158	64	49	388 (1.9 %)
Dermal	67	146	64	95	372 (1.8 %)
Eye	68	102	40	73	283 (1.4 %)
Others	24	33	29	88	174 (0.9 %)

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3. Statistical analysis

All data were analyzed using the Statistical Package for Social Science software (SPSS-Version 14). The data entered was then checked for accuracy. For each item, the frequency and percentage of assessment items were presented.

4. Results

Fig. 1 showed that the poison control center received 20,513 calls in the year 2020 (5339, 6793, 4851 and 3530 in 1st, 2nd, 3rd, and 4th quarter respectively). Most of the calls were from Riyadh City (40.9 %) with no statistical significance among the four quarters.

Most of the consultation calls were from public areas (92.9 %) while, the other calls were received from hospitals (7.1 %) (Fig. 2). Regarding the patients, 11,205 were males and 9308 were females. Most of the patients were in age group from <6 years (78 %) and in the pre-school stage (77.8 %) as shown in Table 1.

As shown in Table 2, the accidental mode of poisonings was the most among cases (97.8 %) while; the intentional mode of poisonings was 1.3 %. Regarding the place of poisoning, most of the cases were poisoned at home (98.6 %). The oral route of poisoning was represented the most among the cases (94.1 %) (Fig. 3).

About 84 % of patients (84.3 %) called for help within one hour from poisoning while about five percent of patients (4.9 %) asking for help after 2–4 hours. Most of the cases presented with no clinical

Fig. 3. Gender of the patients.

manifestation during call (90.3 %). Many investigative tools were ordered infrequently, but most of the cases needed no investigations (14,252 cases). Doctors recommended many advices to patients. Regarding the public calls, we recommended management at home in most of the cases (66.7 %) while regarding the hospital calls we recommended put patients under observations in 49.2 % (Table 3).

As regards type of poisoning (Table 4), household substances toxicities represented 6419 cases (31.3 %) while non-narcotic analgesic and other medications toxicity were 2657 cases (13 %) and 4790 cases (23.4 %), respectively in frequency. Chemicals then alcohol sanitizers poisoning were the highest (39.3 % and 17.7 % respectively) among household substances toxicities. Vitamins poisoning was the highest among other medications toxicities (31.1 % of all other medications).

5. Discussion

Poison control centers are a rich source of data and knowledge for food protection and toxicity analysis. These data have been used in hundreds of analysis papers. These data are often used for research into better patient care, antidote assessment, epidemiology, and policy creation [9].

The aim of the present study is to review and assess the characteristics of toxic events received by toxicological information center's hotline all over Saudi Arabia during the year 2020.

The results of that paper revealed that poison control centers received 20,513 calls in the year 2020 (5339, 6793, 4851 and 3530 in 1 st, 2nd, 3rd, and 4th quarter respectively). Most of the calls were from Riyadh City (40.9 %) and that because it is the largest Saudi city regarding number of populations. The numbers of calls increased during 1 st and 2nd quarters of year 2020, this could be explained by increasing the hazards of COVID 19 and people were frightened to get out of their houses and go to hospitals. This considered a great benefit of the poison control service as keeping patients out of the emergency department saves lives during the pandemic of COVID 19.

In consistent with our scope, Zaloshnja et al. and Bunn et al. as they stated that the important value of poison control calls is their significant impact on reducing health-care costs [10,11]. The primary driver of these health-care economic savings was through reduction of health-care expenses and this can be achieved by: Firstly, reduced emergency department (ED) visits for poisoning and secondly reduced length of patients' admission in hospitals.

Besides, most of the consultation calls in the current work were from public areas (92.9 %) while, the other calls were received from hospitals (7.1 %). In agreement with our results, previously documented reports of the poison control centers provided information to the public about poisoning exposures and respond to requests for poison information [12, 13].

As a result, everyone can call the poisoning hotline for assistance. Moreover, and regarding the patients, 11,205 were males and 9308 were females. Most of the patients were in age group <6 years (78 %) and most of them in pre-school stage (77.8 %). The accidental mode of poisonings was the highest mode (97.8 %). Regarding the place of poisoning, most of the cases poisoned at home (98.6 %). The oral route of poisoning represented the most among cases (94.1 %).

The preponderance of male to female patients in our study is in accordance with Al-Shehri [8]. Similarly, the involvement of children in the age group <6 year in this study agrees with Saddique [12]. We can explain that that children "in this age group" have curious and explorative behavior as well as being hyperactive, making them vulnerable to poisoning at home, where almost every substance is thrown into the mouth. It is important to note that careless storage of products and drugs is a very important factor in the poisoning of children.

About eighty-four percent of patients (84.3 %) called for assistance within one hour of being poisoned and this behavior reflected good awareness of the population regarding the poisoning and the benefit of poison center-hotline service in saving the poisoned patient's life. Due to early seeking for help by calling the hotline, most of the cases presented with no clinical manifestation during call (90.3 %).

Many investigative tools were ordered occasionally, but the majority of cases needed no investigations (14,252 cases). Toxicologists recommended much advice to patients. Regarding the public calls, toxicologists recommended management at home in most of the cases (66.7 %). While regarding the hospital calls, we recommended put patients under observations in most of the cases (49.2 %). Determining which of these poisoned patients may manage at home not only reduced ED visits and hospital admissions but also, limited microbial transmission and the hazards of infection during the Covid19 pandemic.

As regards the type of poisoning, household substances toxicities represented a remarkable category of poisoning about one third of cases then other medications toxicity in frequency (31.3 % and 23.4 % respectively). Chemicals then alcohol sanitizers' poisonings were the highest among household substances toxicities (39.3 % and 17.7 % respectively from household substances). Vitamins poisoning was the highest among other medications toxicities (31.1 % of all other medications). We can explain that by the availability of disinfectants and antiseptics in all homes during Covid 19 outbreak, also the availability of vitamins and analgesics due to its use in Covid 19 treatment protocols.

These results were in agreement with the findings in some

Table 3
Frequency of patients regarding time of call, clinical manifestations and investigations.

Management	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Total n (%)
Time of call					
<1 h	4323	5588	4419	2970	17300 (84.3%)
<1-2 h	330	348	133	199	1010 (4.9%)
<2-4 h	272	346	117	85	820 (4%)
<4-6 h	154	171	56	31	412 (2%)
<6 h	260	340	126	245	971(4.7%)
Total	5339	3793	4851	3530	20513(100%)
Clinical manifestation					
Present	388	812	432	339	1980 (9.7%)
Absent	4951	5981	4419	3191	18533 (90.3%)
Total	5339	6793	4851	3530	20513(100%)
Investigation					
Liver function	304	138	279	172	893
Kidney function	258	109	118	166	651
ABG	183	49	55	23	310
CBC	243	74	74	20	411
ECG	140	29	172	65	406
Coagulation profile	63	42	36	48	189
Abdominal	12	9	29	5	55
RBS	359	230	112	84	785
Chest X-ray	77	34	43	45	199
BP monitoring	983	408	435	1	1827
No-investigation	4603	3003	3410	3236	14252
Toxicological analysis	198	119	88	105	510
Recommendation					
1-Public call					
-Manage at home	3043	4288	3158	2234	12723 (66.7%)
-Refer to hospital for consultation	1251	1980	1250	905	5386 (28.3%)
-Refer to hospital for admission	263	263	202	224	952 (5%)
Total	4557	6531	4610	3363	19061 (100%)
m2-Hospital call					
Observe	431	120	96	68	715 (49.2%)
Admit to word	207	75	93	61	436 (30%)
Admit to ICU	47	20	32	25	124 (8.5%)
Discharge	97	47	20	13	177 (12.2%)
Total	782	262	241	167	1452 (100%)

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developing countries, where ingestion of household products like chlorine bleach (Clorox), pesticides, disinfectants and unidentified products ranked first [14]. Previous studies have shown that accidental poisoning in children is related to the lifestyle of the household, and some environmental factors [8]. In addition, Al-Shehri in his study showed that 95 % of poisoning occurred in the child's own home where a collection of drugs, household cleaning agents and personal products are very often improperly stored [8]. Home medications were a common type of children poisoning due to its availability in an easy to reach storage cabinet [16] and attractive packaging of these medications that get children's attention [17].

Some other studies showed that acetaminophen was the most common drug poison in children [15,16]. On other hand, Al-Shehri found that toilet bowel cleaners were the most common household products swallowed accidentally, followed by fingernail polish remover, soap powder and Clorox [17].

In conclusion, most of poison control's calls were from Riyadh City and were received from public places. Regarding the patients, the largest were males in the age group <6 years. The accidental mode of poisonings was the most of cases that poisoned at home by oral route of poisoning. About 84 % of patients called for help within one hour from poisoning. The household substances toxicities represented the first in frequency of all types of toxicities, whereas chemicals were the highest then alcohol sanitizers. Medication's toxicities represented the second of all types of toxicities in frequency whereas vitamins toxicity was the highest.

6. Recommendations

This study reinforced the importance of parental supervision, control, and prevention of poisoning of children.Because of lack of safe storage of poisonous drugs and household products, we recommend as a preventive strategy, that parents must ensure that all medicates, household chemicals and toxic products are kept in a safe place out of the reach of children. Child-resistant containers for household agents and dispensed medications should be used firmly.

Finally, the establishment of drug and poisoning information centers in every region through a network is highly recommended. In addition, we recommended widespread awareness of the importance of poison control hotline service and use a simple unique phone number to be easily remembered by the public.

Table 4
Frequency of patients according to types of poisoning.

Type of poisoning	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Total (n)	%
House hold substances						
Volatile	29	75	94	52	250	
Corrosives	431	386	170	66	1053	
Chemicals	636	991	661	233	2521	
Insecticides	101	139	109	71	420	
Rodenticides	134	154	47	15	350	
Hair dye	141	48	27	12	228	
Alcohol sanitizers	123	367	300	348	1138	
Batteries	31	87	41	300	459	
Total					**6419**	**31.3**
Gases						
Co	19	31	35	8	93	
Other gases	-	20	25	5	50	
Total					**143**	**0.7**
Envenomation						
Scorpion	19	41	34	11	105	
Snake	5	30	25	2	62	
Other	-	20	24	27	71	
Total					**238**	**1.2**
Non-narcotic analgesics						
Paracetamol	472	507	31	244	1254	
Salicylates	51	53	383	49	536	
NSAIDs	292	338	54	183	867	
Total					**2657**	**13**
Other Medications						
Vitamins	235	415	374	477	1501	
Antihistaminics	248	171	94	140	653	
Respiratory drugs	174	118	8	17	317	
Antibiotics	176	165	77	29	447	
Oral hypoglycemic	155	180	-	38	373	
Anticoagulants	140	175	-	14	329	
iron	133	88	-	67	288	
Antipsychotics	100	148	-	35	283	
CNS drugs	45	72	-	22	139	
Antidepressants	107	99	-	29	235	
Antiepileptics	80	100	-	45	225	
Total					**4790**	**23.4**
Non-toxic exposure						
Cosmotics	123	182	390	151	846	
Hormones	200	200	352	140	892	
Silica	99	100	556	-	755	
Thyroid extract	20	99	10	59	188	
Oral contraception	70	202	20	162	454	
Proton pump inhibitors	10	149	30	140	329	16.9
Total					**3464**	
Food	55	124	125	61	**365**	**1.8**
Drug of abuse	107	19	498	15	**639**	**2.6**
Trace metals	478	320	100	423	**1321**	**6.4**
Others	**100**	**80**	**157**	**140**	**477**	**1.6**
Total	**5339**	**6793**	**4851**	**3530**	**20513**	**100**

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Author agreement

This statement to certify that all authors have seen and approved the final version of the manuscript being submitted. They warrant that the article is the authors' original work, hasn't received prior publication and isn't under consideration for publication elsewhere.

Declaration of Competing Interest

The authors report no declarations of interest.

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