

## **Clinical Profile and Outcomes of Poisonings and Drug Overdose at King Saud Medical City**

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### **ABSTRACT**

**Introduction:** Poisoning is a critical worldwide problem, having been reported in countries across the continent [1]. A significant number of emergency room visits are due to poisonings and drug overdose. Poisonings is a major cause of the increase in morbidity and mortality [2] of adults. Ingestion of different poisons can intentional or accidental. Poisoning can occur following ingestion, inhalational, or sometimes snuffing of drugs. Regardless of the method of poisoning, it usually leads to catastrophic outcomes.

**Study population:** Any patient aged more than 15 years, who presented to the Emergency Department (ED) of King Saud Medical City (KSMC). Riyadh, Saudi Arabia, with a drug overdose, chemical ingestion/inhalation, poisoning or alcohol intoxication was recruited for this study.

**Methods:** A study of all the patients that presented to our hospital from the period of January 2020 until September, 2020 was recruited for this horizontal study. Initial data was collected manually. An online Excel sheet was created, and the following parameters were collected; age, gender, and nationality, information regarding the ingested/inhaled substance, patients' signs, and symptoms upon presentation to the Emergency room, and various laboratory tests. Patients were followed till they were in the hospital and finally disposed. Statistical analysis was then performed on the collected data.

**Results:** Most of the patients (65.7%) were males. (69.4 %) were Saudi nationals with a mean age of 33-years. The most common presenting symptom is decreased level of consciousness (35 cases). Paracetamol overdose accounted for 12% of the cases, alcohol accounted for 10.2%. More than 50% of our patients had mixed drug poisoning or unidentifiable poison. The maximum reading for blood pressure was 221/149 mmHg among the benzodiazepine overdose group. The respiratory rate was within the normal limit in all patients. cMortality was below 1%.

**Conclusion:** Drug overdose is a common cause of emergency room visits and hospital admission. Paracetamol was the commonest cause of identifiable drug overdose, followed by Alcohol ingestion. But mixed poisoning involving multiple drugs were quite common these days. Outcome was generally good with just less than 1% mortality.

**KEYWORDS:** Drug Overdose, (KSMC).

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### **INTRODUCTION**

Poisoning is a critical worldwide problem, having been reported in countries across the continent [1]. A significant number of Emergency room visits are due to drug overdose and toxic ingestion. Poisonings it is a major cause of the

increase in the morbidity and mortality of adults [2]. With more chemicals and insecticides being used in households, the chances of accidental exposure are on the rise. Ingestion of different poisons can happen intentionally or accidentally. Poisoning can occur following ingestion, inhalational, or

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snuffing of drugs or chemical but regardless of the method in which the poison was taking, it might lead to catastrophic outcomes. Substance misuse is an increasingly pressing issue, and hospital admissions due to such abuse has substantially increased. Although with the strong religious and constitutional sanctions against suicide, several cases of intentional drug overdose occasionally occur in Saudi Arabia.

### METHODS

Being aware of the poisonimngs cases attending our hospital, we decided to take up this study. This study was conducted by the Interns of our department under the guidance of Principal investigator(PI). We obtained ethical approval from the local IRB committee,of King Saud Medical City. A horizontal study of all the patients that presented to King Saud Medical City, Emergency department, from the period of January 2020 until September 2020. Our inclusion criteria were the following: age more than 15 years, who ingested or inhaled chemical poisons/drugs or household material or a substance abuse. We also included patients with Alcohol

intoxication, drug overdose weather prescribed or illegal drugs, either ingested or inhaled, intentionally or accidentally. We collected the data of 108 patients who were admitted to KSMC, either in the general ward or Intensive Care Unit. An online Excel sheet was devised , and the following parameters were added; demographic data (age, gender, and nationality), substance abused, patient's signs and symptoms upon presentation to the Emergency room, Glasgow Coma Scale (GCS), Vital signs, Venous Blood Gases (VBG), and the antidote used, if any. Laboratory tests such as Complete Blood counts(CBC)Liver function test (LFT), Coagulation profile, Kidney Function Test (KFT), fasting glucose, and status upon discharge, were calso recorded. The data were analyzed using SPSS 25.0 (IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp. Continuous variables Age, GCS, temperature, BP, Pulse, RR, SpO2, Ph, pCO2, pHCO3, Na+, K+, CL-, are presented as Mean along with spectrum. The parameters Urea, Cr, AST, ALT, WBC, PLT, HCT, PT, INR, PTT, Fasting Glucose are tested for its normality

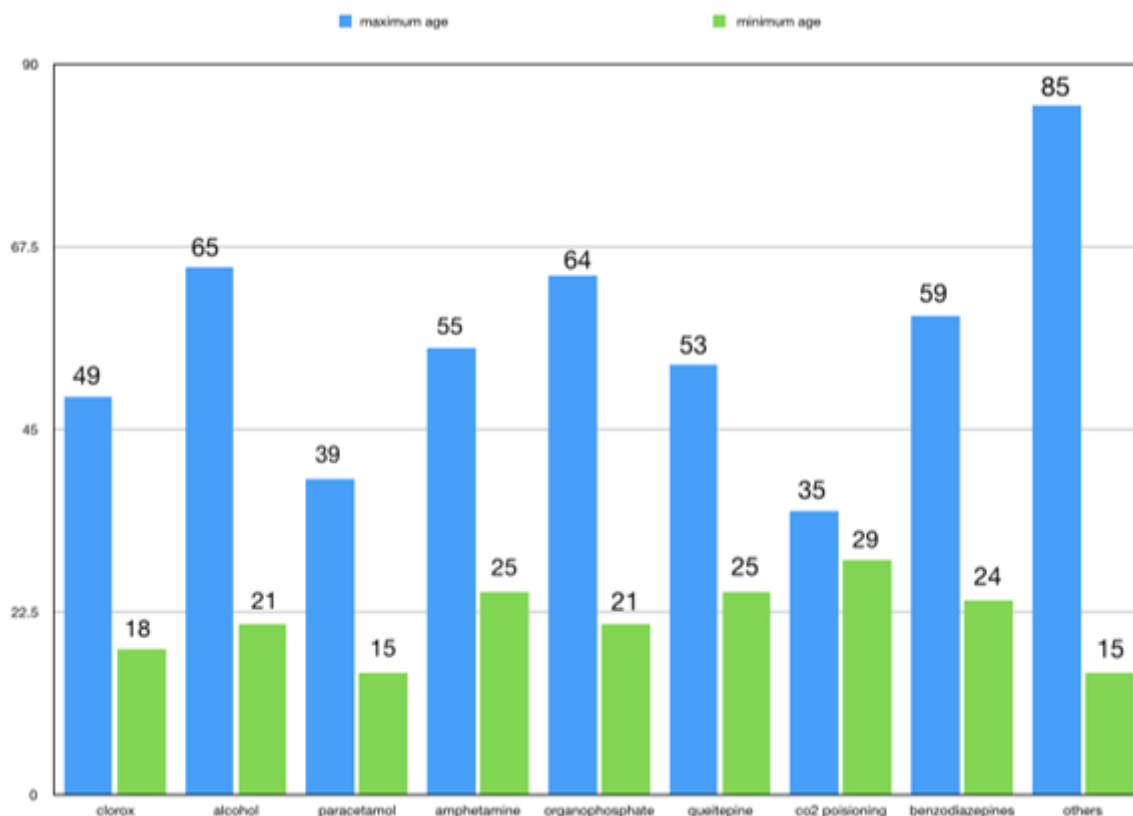


Figure (1) shows the maximum and minimum age of the patients of different drug overdose category.

### RESULTS

The study involved a total of 108 patients who came to emergency department (ED) of King Saud Medical City-Riyadh with drug overdose, chemical ingestion or alcohol intoxication. Vast majority of the patients, 71, (65.7%) were males and 69.4 % (n=75) were Saudi nationals with

minimum age of 15 and maximum of 85 years and the mean age was 33 years.. Most of them were stable on arrival (74%) and one was a case of death on arrival (Table 1). Ages spectrum of different subgroups are represented in the figure 1, below

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**Table 1: distribution of Drug and substance overdose**

S.no	Name of poison	Number	percent	Males	Females	Saudi	Nonsaudis	ICU	deaths
1	Bleech(Chlorox)	6	5.6	0	6	2	4	0	0
2	Alcohol	11	10.2	11	0	10	1	3	0
3	Paracetamol	13	12.0	0	13	13	0	1	0
4	Amphetamine	3	2.8	3	0	3	0	3	0
5	Organophosphorus	6	5.6	6	0	1	5	2	1
6	Quetapine	3	2.8	3	0	3	0	0	0
7	Carbonmonoxide	4	3.7	4	0	0	4	3	0
8	Benzodiazepines	6	5.6	4	2	1	5	1	0
9	Others:mixed	56	51.8	40	16	42	14	7	0
10	total	108	100	71	37	75	33	20	1

**Table 2. Showing spectrum of Lab abnormalities.**

Lab value	Max	Min	Mean	Normal values
Urea	1.14	15.8	4.63	2.86-8.21 mmol/L
Creatinine	31.57	59.45.	78.34	44-80umol/L
AST	9.1	230.81	40.26	<32 U/L
ALT	8.5	219	36	<33U/L
WBC	2,75	53.3	11.90	4-10,10 <sup>9</sup> /L
PLT	44	577	289	150-400,10 <sup>9</sup> /L
HCT	22.3	67.2	41.8	36-46%
PT	10.9	19.3	13.74	12.3-15.7 sec.
INR	0.8	1.52	1.06	0.8-1.2
PTT	23.5	127.7	34.71	26-45 sec
Glucose fasting	1.67	18.88	6.85	3.5 -5 mol
pH	6.8	7.7	7.28	7.32-7.43
pCo2	13	71.3	42	41-51 mmHg
Hco3	5.3	80.9	22	22-29mmol/L
K+	2.6	7.2	4.3	3.5-5.1 mmol/L
Na+	123	159	141	136-145mmol/L

The most common presenting symptoms is decrease level of consciousness (32% ). The second most common was gastrointestinal symptoms (Nausea, Vomiting and Abdominal Pain) in 30%, , 4% with shortness of breath ( 80% are males and 20% females) , 3% with seizures. Two males' patients came as a case of burn along with poisoning (fire survivors).Eight of our patients had met accidents and were brought to hospital for police.

The mean Glasgow coma scale for the patients is 13 out of 15, minimum scale of 7 was within the cases of alcohol intoxication and maximum GCS scale of 15 in most of the patients. Temperature was within the range between 36.01 C to 38 C in all patient groups. The maximum reading for blood pressure was 221/149 mmHg among benzodiazepine overdose group. Heart rate was 162 per minute as a highest reading in alcoholic group while 65 per minute as a lowest reading in paracetamol and benzodiazepine groups. Respiratory rate was within normal limit in all patients. Oxygen saturation was low in 85 % in carbon monoxide

poisoning. Venous Blood Gases (VBG) were done routine for all patients.

### DISCUSSION

While reviewing the literature of poisoning in Saudi Arabia, we found that Mahdi et al(1) had reported in 1983 that children are commonly brought to Hospital with poisonings and constituted around 5% of total admission in Pediatric setting. Abdulaziz(2) reported from Poison center located in King Khalid university Hospital, Riyadh about a 10 year experience. He reported that enquiries were made to poison centers mostly by doctors and that 88% of such calls were made regarding poisoning in Children. Mozzam e tal(3) published their surveillance report of poisoning From Alqaseem region and mentioned that poisoning occurs both in children as well as adults. According to his report Insecticides were common cause of poisoning followed by paracetamol and analgesics. He also reported almost 50% mortality in insecticide poisoning.) Khan and Khan(4) reported from

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Najran in 2003 and mentioned that 23% of the poisoning reported to Najran General Hospital were organophosphorus poisoning and many of them were unstable at admission. They also mentioned about the local shamma poisoning, a local herbal product.(4). Zainub et al reported from Almujaah, in 2014 region of Saudi Arabia that although pharmaceutical drugs, stored at home were the common cause of poisoning in Children, but stings and envenomation was the common in adults, especially those working in agricultural areas. (5) Bakhaider and his colleagues, reported in 2015 that pharmaceutical drugs were the common cause in western Saudi Arabia. (6). More than 97% of their patients were Saudi nationals and 54% were females and that probably reflects the type of patients eligible to get admission in their hospital. Sulaiman Alnasser from Qaseem region reported in 2017 that 56% of their patients were females and 46% had drug overdose and 23% had domestic products like chlorox poisoning. (7). Wahba and his team from Najran reported a retrospective study of 2017 to 2019 and reported that pharmaceutical drugs and bleach was the common poison used by adult patients. (8) Sulaiman Alnasser while publishing his work from Makkah region from an official data had reported that 60% of the patients were males and most had accidental poisoning only.(9). Alzahrani et al reported that the poisoning in Jeddah region had a seasonal variation being highest in summer months(10)

We had planned this study for five months, starting from January to May, 2020. But a Covid pandemic struck us and from April onwards the pandemic overwhelmed us. We were expecting at least 200 patients over a period of 5 months, but we continued our study up to September and we got less patients. Our study included 108 patients who presented to the ER of KSMC. Majority of the patients were males with females accounting for 34.3% of the cases. Saudi Arabians accounted for 69.4% of the cases. A similar study that was conducted in western region of Saudi Arabia provided the same results as in our study. However, in another study that was discussing patterns of drug overdose, it was shown that females were more than half and Saudis were even up to 97.7%. These differences might be due to geographic locations of the hospitals, the distribution of non-Saudi citizens in different cities, and hospitals' policies. Mean age of patients in our study was 33 years old which lies within the range of other similar studies (33-40y) (3-6). Other studies have shown a lower mean age which might be attributed to the inclusion of the children in the study. (6-7) Paracetamol was the most commonly ingested drug with presentation to the ER (12%) with alcohol being the second most common (10.2%). Those results are supported by similar studies that were conducted in Saudi Arabia in which the most common ingested drug was paracetamol (9-10). However 50% of our patients had either a mixed poisoning or no single clearly defined agent was identified. The drugs included ferrous sulphate tablets, folic acid, metformin tablet, gliclidiazide tablet, b-complex, anticonvulsants, carbamazepine, phenytoin,

valproate, prednisolone and other commonly prescribed drugs. Majority of patients were stable on presentation to the ER with 25% being unstable and 0.9% death on arrival. Also, 58% of patients were discharged home after 24 hours, 26% were admitted to the general ward, and 16% were admitted to the ICU. Patients presenting with poisoning due to alcohol, paracetamol, benzodiazepines, organophosphate, and carbon monoxide had a higher percentage of ICU admission. Interestingly, we did not see a patient with snake bites or other stings. We believe, it was mainly due to COVID-19 that patients did not report to our hospital and then Riyadh city is the most urbanized city and people were staying mostly indoors during lockdown.

Low Glasgow Coma Scale (GCS) is not a specific indicator of drug intoxication since in this study the average GCS was 13. Lower scores were associated with alcohol intoxication. However, the reduction in GCS in patients with alcohol intoxication was not clinically significant, therefore, it should not affect the diagnostic significance of GCS in patients with a traumatic head injury.

In regards to vital signs, in our study, the highest reading of blood pressure was 221/149 which was reported in a patient with benzodiazepine (BZD) overdose. Isolated BZD overdose rarely causes significant derangement in vital signs, and the reported finding is most likely a result of drug co-ingestion or an underlying untreated or undiagnosed hypertension.

Also, tachycardia (defined as a heart rate above 100) was seen with the average heart rate of 105 per minute reading in this study. The most likely explanation for tachycardia in patients with drug overdose is the agitation and aggressiveness that most patients present with. Tachycardia could also be correlated with the type of drug intoxication since anticholinergic excess is the most associated with elevated heart rate due to vagal nerve blockage. On the other hand, bradycardia (defined as heart rate below 60) was commonly reported with paracetamol and BZD overdose. Paracetamol-induced cardiac toxicity without direct tissue injury could be the underlying mechanism for bradycardia especially in patients who developed hepatic failure. Furthermore, the average respiratory rate was within normal limits in this study indicating that respiratory derangement is not a strong factor to rule in drug intoxication.(11)

In this study patients with alcohol intoxication had PCO<sub>2</sub> values between 13 mmHg and 71.3 mmHg, this wide range of PCO<sub>2</sub> could be attributed to the various stages of metabolic/respiratory abnormalities. In one of a study, a patient admitted with alcoholism-related complications, the acid-base imbalance was reported in 43% of patients. Metabolic acidosis was an important clinical finding in intoxicated patients. Five patients in our study had the lowest value of HCO<sub>3</sub> was 5.3 meq/L which was seen in a patient presenting with alcohol intoxication(12).

Electrolyte disturbances were seen most in form of hyponatremia and hyperchloremia.(12) Alcohol can lead to

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direct mitochondrial injury and activation of programmed cell-death factors leading to cell apoptosis and release of enzymes and electrolytes to the extracellular compartment. In a study evaluating the disturbances of electrolytes and blood chemistry in acute alcohol intoxication hypernatremia and hyperchloremia were present in 41% and 21% respectively. In the other hand, Anemia (defined as < 13 g/dl in males and < 12 g/dl) was associated with alcohol intoxication. Moreover, Anemia in alcoholics is attributed to many underlying causes including nutritional deficiency (megaloblastic anemia), alcohol-induced liver disease, or direct alcohol toxic effect on the bone marrow. Other laboratory findings like elevated urea, elevated creatinine, and blood glucose are not specific and could be the result of dehydration and the general toxic effect of the overdosed drug.

Eventually, all but one of our patients were discharged home in stable conditions. Most of the cases did not receive a reversal agent (80%). Those who received were Paracetamol poisoning, Benzodiazepine overdose or those who had evidence of opiate overdose in mixed poisonings. Supportive care is the cornerstone in managing patients with intoxication rather than counteracting the poison. Some antidotes usage could cause more harm than the actual intoxication, thus, its administration should be only in severe cases where its benefits are warranted and must be monitored carefully.

### CONCLUSION

Poisoning is basically a heterogeneous group of disorders and is difficult to present under single category. Riyadh being the capital city of the country and King Saud Medical City, the oldest and largest of the ministry of Health Hospitals, admits a diverse variety of patients. Paracetamol poisoning although the largest single group, still comprised of only 12 % of the total patients. These were usually young and predominantly female patients. Alcohol intoxication, is seen as second largest category, mainly young men, which we do not see in other cities of the kingdom. Similarly Amphetamine overdose and Narcotic overdose was also seen in our patients. These three were young but predominantly males. Organophosphorus poisoning was seen mostly in expatriate farm workers. Combination of pharmaceutical drugs, commonly prescription drugs, were more common. Antidote was used in 26% of the patients and mortality was less than 1%.

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