



## Incidence of Intoxication in Karabük (Turkey) in 2013

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### Authors' contributions

*This work was carried out in collaboration between all authors. Author MA designed the study, authors VT and MK wrote the first draft of the manuscript. Authors MA and OA managed the analyses of the study data. Author BA managed the literature searches. All authors read and approved the final manuscript.*

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### ABSTRACT

**Aims:** The aim of this retrospective study was to analyze the rate and characteristics of intoxications who were admitted to our intensive care unit (ICU).

**Study Design:** This is a retrospective study.

**Place and Duration of Study:** Department of Medical ICU, Karabük Training and Research Hospital, between January 1 st and December 31 th, in 2013.

**Method:** The study was conducted on 166 intoxicated patients who admitted to the Medical ICU in study time. Data were collected from the patients medical records. The demographic features, causes of intoxications, clinical symptoms, the mean stay in the ICU, and outcomes were evaluated.

**Results:** The total number of patients followed in our ICU during this period were 2180, and 166 (7.61%) of them were acute intoxications. The female-to-male ratio was 1.6:1. Mean ages of female and male patients were 33.94±14.49 years and 38.13±17.31 years, respectively. The mean stay in the ICU was 2.43±0.89 days. Drugs were found to be the primary cause (49.40%) of intoxications, and analgesics (24.39%) were the most frequent causative agents. Suicidal attempts were present in 85 patients (49 female, 36

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male), and most of them were between 17-34 years (68.23%). The other common causes of intoxications were carbonmonoxide (24.70%) and mushroom (19.28%).

**Conclusion:** Intoxications were more frequent in female and drugs were the most common cause. Suicidal attempts were 51.20% of all intoxications. The intoxications of carbonmonoxide and mushroom were more common in our province than in other parts of Turkey.

*Keywords: Intoxication; intensive care unit; suicide; retrospective analysis.*

## 1. INTRODUCTION

Intoxication remains a serious public health problem despite regulatory interventions and medical advances [1]. In recent years, intoxicated cases constitute a significant portion of patients who were admitted to Intensive Care Units (ICU).

Common sources of intoxications include drugs, chemical compounds, plants, carbon monoxide (CO), industrial wastes, and food substances. Intoxication causes and rates vary from country to country, and even from city to city. It is crucial to know the etiologic and demographic aspect of acute intoxications [2,4].

Thus, we aimed to obtain a specific data for Karabük by evaluating intoxicated cases who were followed into the ICU within one year period.

## 2. METHOD

In the study, all intoxicated patients who admitted to the ICU of the Karabük Training and Research Hospital, between January 1 stand December 31 th in 2013, were evaluated.

The local ethics committee approved the study. The data were obtained by examining the patients hospital records, retrospectively. Patients' age, gender, causes of intoxications, reason of administrating the substance (accident, suicide), clinical symptoms, the mean stay in the ICU, and outcomes of the patients were recorded. 166 patients were included in the study. Patients whose stay was less than 24 hours, those who were less than 17 years old, and pregnant women were excluded from the study.

In the ICU, intoxicated patients were managed according to the standard protocols including the "ABCs" (airway, breathing, circulation), resuscitation with intravenous fluids, inotropes (if mean arterial pressure was less than 60 mmHg, in spite of fluid resuscitation) and use of renal replacement therapy (RRT) (if serum creatinine was progressively increasing, with worsening of acidemia, with or without hyperkalemia or to clear the toxins) as required. Patients were intubated to secure the airway or when otherwise indicated. Similarly, the patterns of weaning from inotropes and mechanical ventilation were as per standard ICU protocols. Prevention of absorption of toxin was attempted, with gastric lavage and activated charcoal, in selected patients presenting within 4 hours of oral ingestion of toxin. Specific antidotes were administered where indicated.

Statistical analyses were carried out using SPSS for Windows. Measurable variables were presented as mean (X) ± standard deviation (SD) and qualitative variables were presented with numbers and percentages.

### 3. RESULT

We recorded 166 intoxicated patients among 2180 patients admitted to our ICU. This was 7.61% of all ICU admissions. Of these, 102 patients were female (61.44%), 64 patients were male (38.55%). The female-to-male ratio was 1.6/1. Mean age of the patients were  $33.94 \pm 14.49$  in females, and  $38.13 \pm 17.31$  in males. The mean stay in the ICU was  $2.43 \pm 0.89$  days. The most common causes of intoxication are drugs (49.40%, n=82), carbon monoxide (CO) (24.70%, n=41) and mushroom (19.28%, n=32). The intoxication causes in terms of gender were summarized in Table 1.

**Table 1. Intoxication causes in terms of gender**

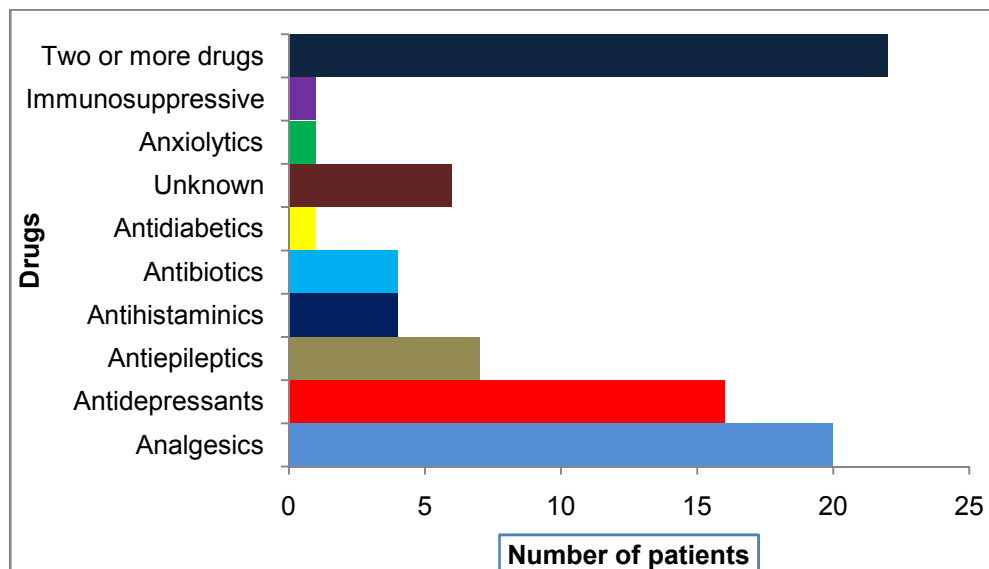
Agents	Female (n)	Male (n)	Total (n)	Percentages (%)
Drug	46	36	82	49.40
CO	27	14	41	24.70
Mushroom	22	10	32	19.28
Animal bites	5	1	6	3.61
Rat poison	1	2	3	1.81
Methyl alcohol	0	1	1	0.60
Organophosphate	1	0	1	0.60
Total	102	64	166	100

Of the 82 patients intoxicated with drugs, 46 (56%) were female and 36 (44%) were male patients. The mean age of them was  $30.54 \pm 18.08$  years. Twenty-two (26.83%) patients had taken multiple drug, 54 (65.85%) patients had taken one drug and in the remaining 6 (7.32%) patients had taken the drug could not be determined. The most frequently involved drugs were analgesics (24.39%), antidepressants (19.51%), and antiepileptics (8.53%) Fig.1. In these patients, the most common symptoms were nausea-vomiting and abdominal pain (68.42%), deterioration of consciousness and dizziness (18.42%). All of the patients had taken the drug with suicidal intent except two male patients. Two patients had severe valproic acid intoxication. They were intubated and hemodialysis was applied. The mean stay in the ICU was  $2.36 \pm 0.98$  days.

The mean age of the 41 patients who intoxicated with CO was  $40.85 \pm 17.49$  years, and most of them (65.85%, n=27) were female. All of the intoxications were unintentional, and most patients presented during the winter months. The most common sources of CO were coal stoves (92%) and water heaters (8%). The mean carboxyhemoglobin (COHb) level was  $18.55 \pm 9.49\%$ . The most common complaints were weakness and myalgia in 76.47%, headache in 52.94%, nausea in 20.57%, dizziness in 11.76%, confusion and syncope in 9%. Abnormal physical findings included tachypnea in 79% and tachycardia in 47%. Of these patients, 34 patients were treated with O<sub>2</sub> (via non rebreathing facial mask), 7 patients were transferred to other hospitals who needed for hyperbaric oxygen therapy (HBA-their mean COHb level was  $32.51 \pm 2.54\%$ ). The mean stay in the ICU was  $2.02 \pm 0.88$  days.

Thirty-two patients (19.28%) intoxicated with mushroom. The mean age was  $45.91 \pm 18.04$  years. The most common complaints were weakness in 85%, nausea-vomiting and abdominal pain in 81.25%, and delirium in 6.25%. The mean duration of admitted hospital was  $2.34 \pm 0.28$  hours. The mean stay in the ICU was  $2.69 \pm 0.74$  days.

Six patients suffered from animal bites/stings. The mean age was  $33.65 \pm 15.91$  years and the mean stay in the ICU was 2 days. There were 3 patients intoxicated with rat poison, all of them were suicide attempts. The mean stay in the ICU was 6 days.



**Fig. 1. Causative drugs in patients with intoxication**

Suicidal attempt was present in 85 (51.20%) patients. Forty-nine of them were female (57.65%) and the rest of the patients were (42.35%, n=36) male. 80 of these 85 patients had taken drug with suicidal intent. The remaining patients had received the following substances, 3 rat poison, 1 organophosphate and 1 methylalcohol. The mean age of the suicide attempted patients were  $28.80 \pm 11.25$  and  $32.93 \pm 17.35$  in female and in male, respectively. The majority of those patients were between the age range of 17-34 years (17-24 years: 38.82%, and 25-34 years: 29.41%). These data were summarized in Table 2.

Fourty seven of the patients had comorbid diseases. Comorbid diseases of patients with the causes of intoxications were shown in Table 3.

Outcomes of the patients with regard to causes of intoxications were shown in Table 4.

**Table 2. Percenteces of suicide attempts by age groups and gender**

Age (years)	Female (n)	Male (n)	Total (n)	Percenteces (%)
17-24	21	12	33	38.82
25-34	16	9	25	29.41
35-44	7	5	12	14.12
45 and older	5	10	15	17.65
Total	49	36	85	100

**Table 3. Comorbid diseases with causes of intoxications**

Comorbid diseases	Drug	CO	Mushroom	Others
depression	10	-	-	-
schizophrenia	4	-	-	-
epilepsy	4	-	-	-
HT <sup>+</sup> or HF <sup>#</sup>	4	6	11	1
DM <sup>*</sup>	0	2	4	-
asthma	1	-	-	-
Total	23	8	15	1

<sup>+</sup> HT: Hypertension, <sup>#</sup> HF: Heart Failure, <sup>\*</sup> DM: Diabetes Mellitus

**Table 4. Outcomes of the patients with regard to causes of intoxications**

	Drug (n=82)	CO (n=41)	Mushroom (n=32)	Others (n=11)	Total (n=166)	Percenteces(%100)
Refused to treatment	20	0	0	2	22	13.25
Transferred to other hospitals	0	7	0	0	7	4.22
Discharged with recovery	62	34	32	9	137	82.53

#### 4. DISCUSSION

In our study, intoxications were more frequently in females and the most common cause was drug. The rate of suicide attempts was 51.20%, and the majority of those patients were females (n=49, 57.65%). Other common causes of intoxications were CO and mushroom.

Acute intoxications constitutes a significant proportion of ICU admissions and even though the overall mortality may be low, they may utilize considerable ICU resources. Patients with serious toxic ingestions, drug overdoses, and other forms of intoxications are frequently admitted to ICUs, either because they are critically condition at the time of hospital admission or because they have the potential for rapid deterioration in their condition [2-4].

According to reports of the Ministry of the Turkish Republic, 27144 poisoning were admitted to hospitals throughout the country. Thus, the incidence of poisoning in Turkey can be estimated to be 0.043% [5]. The population of Karabuk between study periods was around 230.000. When compared with the Turkey statistics, incidence of intoxications found out in this study was quite high.

Singh et al. [3] reported that 1478 patients admitted to ICU during their study period, 138 (9.3%) presented with acute intoxication. Cengiz et al. [4] reported that there were 86 poisoning cases among 844 patients admitted to the ICU. Guven et al. [6] reported that the total number of patients followed in the ICU during six years period were 3500 and 272 (7.8%) of them were acute intoxications. In Uyanikoglu's study [7], 53 patients were admitted to ICU within one year period. We followed 2180 patients in our ICU during one year study period and 166 of them were acute intoxications (7.61%). Additionally, in literature, it has been reported that intoxication cases are rather seen in the younger age group and in

females [4,6,7]. In this study, 102 of those patients were female and 64 of them were male. This is comparable with the findings of previous studies.

The causes of intoxications change with the characteristics of region, hospital and departments. In the report of American Association of Poison Control Centers (AAPCC), the most common causes of intoxications were cleaning agents, drugs, cosmetic products and plants [8].

According to AAPCC, the categories of substances/toxins were analgesics, antidepressants, sedative/hypnotics/antipsychotic, stimulants, "street" drugs, cardiovascular drugs, and alcohols [8]. The Singh et al. [3] reported that the highest incidence of intoxications was due to drugs (46.3%). Islambulchilar [9] revealed that drugs were the most common cause of intoxications (60.8%). Among the drug intoxications, benzodiazepines (40.31%) were the most frequent agents, followed by antidepressants (31.98%).

The most common cause of intoxications have been reported as drugs in different studies that had been made in Turkey [4,6,7,10-15]. In these studies, the most frequently used drugs have been reported as antidepressants, antibiotics, analgesics, benzodiazepines, in different proportions [4,10-15]. In the present study, drugs were the major cause of intoxication, and the most frequently involved medicinal drugs were similar with those from other studies. We never observed any stimulants, or illicit drug poisoning. This may be related with Islamic beliefs which forbid the illicit drug using. However, sometimes nobody, even strong religious belief cannot prevent them from suicidal attempt.

Only 7.3% of intoxications were suicide attempts in the AAPCC report [8]. The Singh et al. [3] reported that the most common mode of intoxications was suicidal (78.26%). Islambulchilar et al. [9] stated that 9.8% of cases accidental and 90.2% intentional poisonings were evident in their study. In Turkey, the incidence of suicidal intoxications have been reported in numerous studies as 39.8–82.2% [4,6,12-15]. Cengiz et al. [4] reported that 80.2% of intoxicated patients were suicide attempts. Most suicide attempts were carried out by females (51 cases, 59.3%). Ozkose [12] reported that 78.9% of their intoxicated cases were suicide attempts. This rate was 39.8% of total intoxications in report of Pinar et al. [13]. Goktas et al. [14] found that 74% of their cases were suicide attempts. In Guven's [6] study, suicidal intoxications were 72% of all intoxications. Similarly, we found that 51.20% of all intoxications were suicidal attempts and the majority of the patients were female. The findings are the same as the other studies done in Turkey before. According to the Institute of Statistics in Turkey, the mean suicidal ratio between; 15-24 years of age were 38.82%, and in 25-34 age group the suicidal ratios were 29.41%. These are similar with the Turkish population [5].

Acute CO intoxication is a common problem that occurs during winter and leads to serious complications. Ozkose [12] reported that CO poisoning was 6.9% of all intoxications. This rate was 19.25% of total intoxications in report of Yagan et al. [16]. In our study, CO was the second most intoxication cause (24.70%). Seven of the patients were transferred to other hospitals, the others were treated with O<sub>2</sub>.

Guven et al. [6] reported that the rate of mushroom intoxication was 9%, and this rate was 6.99% of total intoxications in report of Yagan et al. [16]. In our study, the rate of mushroom intoxication was 19.28%. This rate was quite high compared to previous studies that had been made in Turkey. It may be explained by wild mushroom is one of the most popular food

in our province. All of mushroom intoxications were due to the consumption of foraged mushrooms.

In present study, 6 patients suffered from bites of animals, 3 patients intoxicated with rat poison, one patient intoxicated with insecticide, and one patient intoxicated with methyl alcohol.

In previous studies, the mean stay in ICU was reported as 1-8 days for intoxicated patients [3,4,6]. For our patients this was  $2.43 \pm 0.89$  days.

The mortality rate has been reported in several studies as 0-50% [17,18]. No death occurred in the intoxicated cases. It can be explained by patients with serious conditions to be transferred to other hospitals.

## **5. CONCLUSION**

In our study, intoxications were more common in younger females, and drugs were the most common cause. Suicidal attempts constituted the majority of all intoxications. Although, these findings are consistent with the literature in many aspects, mushroom and CO intoxications were more common in our province than in other parts of Turkey.

This findings provided significant information about the characteristics of intoxications in Karabuk. In order to reduce the incidence of intoxications, the local residents should be informed about mushroom and CO intoxications.

## **6. LIMITATION**

We only evaluated patients admitted to the ICU. However, we did not examined patients who were followed in emergency department or patients were transferred to other centres by the emergency physician.

## **7. FUTURE PLANNING**

We are planning to form the standardized criteria of intoxicated patients for admission to the ICU with a commission which composed of anesthesiologists, other critical care physicians, and emergency physicians. Thus, we may achieve in both decreasing expenditures and using of ICU beds effectively. This is important for rural hospitals, as they have a limited number of beds of ICU.

## **CONSENT**

Not applicable.

## **ETHICAL APPROVAL**

All authors hereby declare that all actions have been examined and approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

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## **COMPETING INTERESTS**

Authors have declared that no competing interests exist and no financial disclosure to be made.

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