ORIGINAL ARTICLE

Causes of poisoning in patients evaluated in a hospital emergency department in Konya, Turkey

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Abstract

Objectives: To evaluate demographic and clinical characteristics of patients with poisoning at a community hospital.

Methods: The retrospective study comprised records of patients who were admitted to the emergency department of Konya Numune Hospital, Turkey, because of poisoning between January 1, 2009, and December 31, 2011. Data was evaluated for age, gender, educational status, occupation, arrival time, mechanism of intoxication , body temperature, pulse, respiratory rate, Glasgow Coma Scale score, treatment applied, duration of hospital stay, duration of follow-up, test results, final diagnosis, clinical disposition, and outcome. Agents causing the poisoning were also determined.

Results: Records of 1036 patients were evaluated. Of them, 764(74%) were female and 272(26%) were male. The predominant age range was 15-24 years in 617(60%) patients. The median time from substance exposure to admission to the emergency department was 2 hours. The most common cause of poisoning was attempted suicide in 955 [92%] patients and drug intoxication was the agent involved in 932 (90%). In the 15-24 year age range, there were 469(76%) female patients. Of the total female population in the study, 716(94%) attempted suicide. The median hospital stay was 24 hours. There were 908(88%) patients who were advised to seek further evaluation at the psychiatry clinic, and 9 (0.9%) patients were admitted to the psychiatry inpatient units after medical treatment. In patients who were hospitalized and followed up, 1 (0.1%) died because of multiple drug poisoning.

Conclusion: Most admissions to the emergency department for poisoning related to young women had used drugs during a suicide attempt.

Keywords: Drugs, Attempted suicide, Accident, Demographics. (JPMA 64: 1042; 2014)

Introduction

Poisoning is the absorption of chemical, physical, or organic substances into the body by the gastrointestinal tract, skin, mucosa or respiratory tract or by injection, causing toxic effects and cell, tissue and organ damage.[1] Poisoning is an important public health problem that causes a major portion of emergency department (ED) admissions and may cause serious consequences to health.[2] Epidemiological characteristics of poisoning vary between countries and geographical regions within the same country. These differences are affected by socioeconomic status, educational status, occupation, age and gender.[3] Poisoning is associated with high morbidity and mortality. Therefore, the diagnosis should be made when poisoning is suspected. Acknowledgement of local causes of poisoning and demographic characteristics of patients may be helpful in diagnosis.[4]

In recent years, there has been an increase in acute poisoning cases in Turkey. Poisoning is a global problem and an important preventable cause of worldwide morbidity and mortality. Approaches to poisoning type and duration are similar among EDs. The cornerstone of treatment of such patients includes supportive measures, timely gastrointestinal (GI) decontamination, extracorporeal methods of increasing elimination of poisons, and antidotes when indicated.

The purpose of the present study was to retrospectively evaluate the demographic and clinical characteristics of patients of acute poisoning who were admitted to a community hospital in Turkey.

Patients and Methods

The retrospective study comprised records of patients who were admitted to the ED of Konya Numune Hospital, a community hospital, because of poisoning between January 1, 2009, and December 31, 2011, and whose cases were consulted with the National Poison Information Centre. At the time of the study, the population of the city of Konya was 1.5 million, and

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there were a total of 424413 patients who had been admitted to the said ED on various accounts., The records of patients with poisoning were evaluated for age, gender, educational status, occupation, arrival time, mechanism of intoxication, body temperature, pulse, respiratory rate, Glasgow Coma Scale (GCS) score, treatment applied, duration of hospital stay, duration of follow-up, test results, final diagnosis, clinical disposition, and treatment outcome. The agents causing the poisonings were determined, and patients were grouped by cause of poisoning, including alcohol, drugs, carbon monoxide, rat poison (superwarfarins), mushrooms, corrosive substances, organophosphates and carbamates, and other intake. Records of patients with missing data were excluded. The study was approved by the institutional research ethics committee.

Data analysis was performed with Minitab software. Before statistical analyses, Anderson-Darling test was applied to check whether variables were normally distributed. Descriptive statistics were obtained. Continuous variables were evaluated with Kruskal-Wallis test and Mann-Whitney U test was applied as a post-hoc test. Two-way tables were evaluated with chi-square test. Statistical significance was set at $p \leq 0.05$.

Results

Of the total patients visiting the ED during the period retrospectively reviewed by the study, 1243 (0.29%) aged ≥13 years had been treated for intoxication. There were 207(16.65%) patients who were excluded because of missing data in the medical records. The remaining 1036(83.35%) patients comprised the study. Of them, 764(74%) were female and 272(26%) were male. The predominant age range was 15-24 years in 617(60%) patients (Table-1).

The most common cause of poisoning was attempted suicide in 955 [92%] patients and drug intoxication was the agent involved in 932 (90%) and patients with attempted suicide were younger than patients with accidental poisoning (Table-2). In the 15-24 year age range, there were 469(76%) female patients. Of the total female population in the study, 716(94%) attempted suicide.

The median time from substance exposure to admission to the ED was 2 hours, with most patients presenting within 3 hours after exposure (Tables-2,3). The median hospital stay was 24 hours. Patients with carbon monoxide poisoning usually stayed for >72 hours. Median duration of hospitalisation was greater for accidental poisoning than poisoning from attempted suicide (p<0.001) (Table-3).

Table-1: Demographic Characteristics.*

Characteristic	Sex		Total
	Male N (%)	Female N (%)	N (%)
Age (years)			
< 15	4 (0.4)	10 (1)	14 (1)
15 to 24	148 (14)	469 (45)	617 (60)
25 to 34	61 (6)	188 (18)	249 (24)
35 to 44	28 (3)	58 (6)	86 (8)
45 to 54	19 (2)	15 (2)	34 (3)
55 to 64	5 (0.5)	9 (0.9)	14 (1)
≥ 65	7 (0.7)	15 (1)	22 (2)
Educational level			
Illiterate	5 (0.5)	51 (5)	56 (5)
Primary school	94 (9)	151 (15)	245 (24)
High school**	156 (15)	498 (48)	654 (63)
University***	17 (2)	64 (6)	81 (8)
Marital status			
Married	97 (9)	304 (29)	401 (39)
Single	157 (15)	414 (40)	571 (55)
Widowed	18 (2)	46 (4)	64 (6)
Occupation			
Student	92 (9)	303 (29)	395 (38)
Housewife****	4 (0.4)	405 (39)	409 (40)
Employed****	71 (7)	41 (4)	112 (11)
Unemployed	93 (9)	13 (1)	106 (10)
Retired	12 (1)	2 (0.2)	14 (1)
Total	272 (26)	764 (74)	1036 (100)

* Data reported as number (%)
** Currently enrolled to an high school or high school graduate
*** Currently enrolled to a university or university graduate
**** While the status of females was evaluated, the ones who had never worked were regarded as housewives and those who were employed once but not working any more were regarded as unemployed.

In the 932 patients with drug poisoning, the most common used were drug combinations 249(27%), unidentified pharmaceutical drugs 234(25%), antidepressants or antipsychotics 162(17%), and analgesics 130(14%) (Table-4). Median mean arterial pressure was significantly increased in 32(3%) patients with carbon monoxide poisoning, and the GCS score was normal in 964(93%) patients (Table-5).

The median white blood cell (WBC) count in the ED was normal in patients hospitalised for >72 hours compared to the rest, while the median glucose level on the first and second hospital days and the median urea nitrogen and potassium levels varied significantly between patients having shorter or longer hospital stays (Table-6). Al these parameters varied significantly between different types of poisoning (Table-7).

Table-2: Clinical Characteristics.

Characteristic	Sex		Total
	Male N (%)	Female N (%)	N (%)
Cause of poisoning*			
Attempted suicide	239 (88)	716 (94)	955 (92)
Accident	33 (12)	48 (6)	81 (8)
**Age (years) ** **			
All patients	23.0 (13 - 84)	22.0 (11 - 92)	22.0 (11 - 92)
Attempted suicide	22.0 (13 - 66)	21.0 (11 - 74)	21.0 (11 - 74)
Accident	44.0 (16 - 84)	31.5 (14 - 92)	37.0 (14 - 92)
Time from substance exposure to emergency department admission (h) **	2.0 (0.5 - 19)	2.0 (0.5 - 25)	2.0 (0.5 - 25.0)
No. patients admitted to emergency department within 3 hours after exposure*	213 (78)	596 (78)	809 (78)
Poisonous substance			
Drug (alone)†	218 (80)	686 (90)	904 (87)
Organophosphate and carbamate	9 (4)	25 (4)	34 (3)
Carbon monoxide	14 (5)	18 (2)	32 (3)
Drug and alcohol (combined)†	18 (7)	10 (1)	28 (3)
Rat poison	3 (1)	11 (1)	14 (1)
Corrosive substance	5 (2)	8 (1)	13 (1)
Mushroom	1 (0)	6 (1)	7 (1)
Alcohol	4 (1)	0 (0)	4 (1)
Total	272 (100)	764 (100)	1036 (100)

*: Data reported as number (%)

**: Data reported as median (minimum - maximum)

† Drugs with or without alcohol: male, 236 patients (87%); female, 696 patients (91%); total, 932 patients (90%).

Table-4: Drugs Reported by Patients.

Drug type	Sex		Total
	Male N (%)	Female N (%)	N (%)
Drug combination (varied)	57 (24)	192 (28)	249 (27)
Unidentified pharmaceutical drug*	64 (27)	170 (24)	234 (25)
Antidepressant or antipsychotic	41 (17)	121 (17)	162 (17)
Selective serotonin reuptake inhibitor	11 (5)	50 (7)	61 (7)
Tricyclic antidepressant	15 (6)	33 (5)	48 (5)
Anxiolytic	8 (3)	13 (2)	21 (2)
Antipsychotic	5 (2)	10 (1)	15 (2)
Narcotic	1 (0.4)	3 (0.4)	4 (0.4)
Other	1 (0.4)	12 (2)	13 (1)
Analgesic	41 (17)	89 (13)	130 (14)
Acetaminophen	29 (12)	42 (6)	71 (8)
Nonsteroidal anti-inflammatory drug	5 (2)	32 (5)	37 (4)
Metamizole	7 (3)	15 (2)	22 (2)
Gastrointestinal drug	3 (1)	24 (3)	27 (3)
Antibiotic	5 (2)	19 (3)	24 (3)
Antiepileptic	8 (3)	14 (2)	22 (2)
Antianaemia	4 (2)	11 (2)	15 (2)
Myorelaxant	2 (0.8)	9 (1)	11 (1)
Cardiovascular	2 (0.8)	8 (1)	10 (1)
Antiinfluenza	2 (0.8)	7 (1)	9 (1)
Antihypertensive	1 (0.4)	6 (0.9)	7 (0.8)
Hormone	0 (0)	6 (0.9)	6 (0.6)
Respiratory system drug	1 (0.4)	5 (0.7)	6 (0.6)
Antidiabetic	1 (0.4)	4 (0.6)	5 (0.5)
Antihistaminic	0 (0)	3 (0.4)	3 (0.3)
Other pharmaceutical drugs**	4 (2)	8 (1)	12 (1)
Total	236 (100)	696 (100)	932 (100)

*The specific drug could not be identified because the patients did not know the drug or were not willing to give information. **Drugs that cannot be classified either of the listed classes.

Table-3: Comparison of Type of Poisoning and Time from Poison Exposure to Emergency Department Admission and Duration of Hospital Stay.

Type of poisoning (hours)**	Total	Time to admission*		Number of patients at hospital stay durations*				Hospital stay duration
Time (h)		≤3	>3	≤24†	25-48	49-72	>72	
Cause of poisoning								
Attempted suicide	955	756	199	813	101	26	15	24 (24 -168)
Accident	81	53	28	39	6	2	34	48 (24 - 1824)
Poisonous substance								
Drug intoxication	904	713	191	775	95	22	12	24 (24 - 168)
Organophosphate and carbamate	34	21	13	19	6	1	8	24 (24 - 432)
Drug and alcohol (combined)	28	26	2	25	2	1	0	24 (24 - 72)
Carbon monoxide	32	21	11	2	1	2	27	180 (24 - 1824)
Rat poison	14	11	3	10	2	2	0	24 (24 - 72
Corrosive substance	13	10	3	11	1	0	1	24 (24 - 48)
Mushroom	7	4	3	7	0	0	0	24 (24 - 24)
Alcohol	4	3	1	3	0	0	1	24 (24 - 96)
Total	1036	809	227	852	107	28	49	24 (24 - 1824)

* Data reported number of patients

** Data reported as median (minimum - maximum)

Table-5: Comparison of Type of Poisoning and Mean Arterial Pressure and Glasgow Coma Scale score.

Type of poisoning	No. patients	Mean arterial pressure (mm Hg) *	Glasgow Coma Scale score**					
			3	6	12	13	14	15
Drug (alone)	904	83 (50 - 133)	2	1	3	14	36	848
Organophosphate and carbamate	34	87 (67 - 127)	0	0	0	1	1	32
Carbon monoxide	32	99 (83 - 133)	0	0	0	0	1	31
Drug and alcohol (combined)	28	87 (73 - 93)	0	0	1	3	8	16
Rat poison	14	83 (73 - 93)	0	0	0	0	0	14
Corrosive substance	13	83 (73 - 93)	0	0	0	0	0	13
Mushroom	7	83 (73 - 97)	0	0	0	0	0	7
Alcohol (alone)	4	90 (87 - 110)	0	0	0	0	1	3
Total	1036		2	1	4	18	47	964

* Data reported as median (minimum - maximum)
** Data reported as number of patients.

Table-6: Comparison of Duration of Hospital Stay and Blood Test Results.*

Hospital stay (hours)	No. patients	White blood cell count ($x10^{-9}/L$)	Glucose (first hospital day) (mg/dL)	Glucose (second hospital day) (mg/dL)	Urea nitrogen (mg/dL)	Potassium (mmol/L)
≤24	853	8.6 (3.4 - 342)^{a}	97 (36 - 412) a	96 (47 - 364) c	22 (8 - 83) a	4.0 (2.8 - 8.6)^{a}
25 to 48	107	8.6 (3.1 - 27.4)^{a}	96 (63 - 269) ab	91 (49 - 186) ab	21 (9 - 177) a	3.9 (3.0 - 4.8)^{b}
49 to 72	28	7.9 (3.9 - 17.9)^{a}	103 (77 - 350) ab	101 (62 - 225) bcd	26 (12 - 116) a	4.0 (3.4 - 5.1)^{ab}
73 to 96	16	12.5 (5.8 - 21.2)^{b}	107 (76 - 159) abc	102 (81 - 153) cde	24 (11 - 64) a	4.0 (3.1 - 5.0)^{ab}
97 to 120	6	11.6 (8.1 - 20.5)^{b}	111 (95 - 230) bc	118 (96 - 195) de	19 (11 - 155) ab	4.1 (3.5 - 5.0)^{ab}
> 120	26	10.9 (4.6 - 27.7)^{b}	130 (83 - 284) c	115 (83 - 251) e	33 (12 - 153) b	4.0 (2.8 - 5.2)^{ab}

*Median (minimum - maximum) of groups. Any groups with different superscripts indicate statistically significant differences ($P<0.05$).

Table-7: Comparison of Type of Poisoning and Blood Test Results.*

Type of poisoning	White blood cell count ($x10^{-9}/L$)	Glucose (first hospital day) (mg/dL)	Glucose (second hospital day) (mg/dL)	Urea nitrogen (mg/dL)
Drug (alone)	8.6 (3.4 - 27.4)^{a}	96 (36 - 412)^{bd}	96 (47 - 374)^{c}	21 (8 - 83)^{c}
Organophosphate and carbamate	8.8 (5.1 - 25.6)^{a}	100 (71 - 248)^{cde}	98 (83 - 141)^{ac}	24 (8 - 49)^{ac}
Carbon monoxide	11.1 (4.6 - 27.7)^{b}	115 (78 - 284)^{a}	120 (95 - 251)^{b}	34 (11 - 177)^{b}
Drug and alcohol (combined)	10.1 (5.5 - 34.2)^{ab}	109 (74 - 350)^{ac}	104 (83 - 323)^{a}	25 (11 - 45)^{ac}
Rat poison	8.6 (4.6 - 10.8)^{a}	100 (85 - 169)^{ad}	95 (57 - 146)^{ac}	24 (14 - 30)^{ac}
Corrosive substance	9.0 (5.9 - 13.3)^{a}	94 (82 - 126)^{cde}	98 (89 - 126)^{ac}	21 (17 - 39)^{ac}
Mushroom	9.5 (4.7 - 14.0)^{ab}	125 (90 - 256)^{ae}	98 (83 - 125)^{ac}	26 (24 - 36)^{ab}
Alcohol (alone)	9.5 (6.2 - 12.1)^{ab}	108 (81 - 124)^{abc}	98 (89 - 126)^{abc}	27 (17 - 32)^{abx}

*Median (minimum - maximum) of groups. Any groups with different superscripts indicate statistically significant differences ($P<0.05$).

Psychiatric consultation was done for all of suicidal poisonings. There were 908(88%) patients who were advised to seek further evaluation at the psychiatry clinic, and 9(0.9%) patients were admitted to the psychiatry inpatient units after medical treatment.

In patients who were hospitalised and followed up, 1 (0.1%) died because of multiple drug poisoning. Overall, 766 (74%) patients were treated and discharged, 236 (23%) refused treatment at various stages and left against medical advice, while 33(3%) were referred to neighbouring hospitals because of lack of intensive care unit (ICU) space at the time of presentation.

Discussion

The present study showed that poisoning was most

frequently caused by drugs used during a suicide attempt by young females (Table-2).

The treatment of poisoning is similar in most emergency departments. In our department, admitted patients are evaluated initially for vital signs. Gastric lavage is performed as needed and active charcoal is given. The patients are evaluated for the type of poisoning and specific treatment protocols are applied as indicated. Acetaminophen overdose, the leading cause of analgesic poisoning (Table-4), is treated with N-acetylcysteine. Flumazenil is given for benzodiazepine intoxication, sodium bicarbonate for tricyclic antidepressant poisoning, pralidoxime for organophosphate poisoning, and 100% oxygen for carbon monoxide intoxication.

The epidemiology of poisoning varies between different countries and geographical regions, and the clinical profile of patients who are admitted to the ED may vary in terms of age, gender, occupation, and socioeconomic factors.[5] In various studies in Turkey, the reported frequency of poisoning from attempted suicide is from 59% to 87%.[6-11] It was higher in the present study (92%). The frequency of poisoning from attempted suicide may be low in Islamic countries because of the religious prohibition against self-harm, but the present results are similar to those from non-Islamic countries even though the Turkish population is 99% Muslim.[12-14]

Poisoning was more frequently observed in younger (15-24 years) than older age groups, which is consistent with previous studies.[5,15] In younger individuals, hormonal changes and emotional fluctuations may contribute to depression and suicidal tendencies.[16,17] In the present study, data for patients aged <15 years was limited because children aged 0-13 years were admitted to the paediatric wards.

In the present study, most poisonings were in female patients. The frequency of poisoning in females was greater in illiterate patients. Furthermore, female poisonings occurred mostly in suicide attempts. The National Poison Information Centre reported that 58% of patients were female, 20% patients were young adults, and 44% were suicide attempts.[18] The frequencies were greater in the present study because we did not include the 0-14 age group. Patients with attempted suicide should be evaluated in detail for psychosocial issues to help design preventive measures. Psychiatric consultation was requested for 88% of patients in the present study, and 9 (0.9%) were admitted to the psychiatry department, because most patients were young adult women who had attempted suicide to attract attention. It has been stated in studies that along with a psychiatrist, a toxicology expert should work to reduce psychosocial stress and to assist patients and family members due to high rates of repeated suicide attempts.[19]

In the present study, pharmaceutical drugs were the main substances that were involved in poisoning, which was similar to other reports from Turkey.[6-8] However, the specific drug could not be identified in many patients because the patients did not know the drug or were not willing to share information, and this was much higher in frequency than previously reported (2%).[20] The high frequency of acetaminophen poisoning has been previously reported.[12,21] In addition, the high frequency of poisoning from antidepressant or antipsychotic drugs may be attributed to the frequent sale without prescription of these drugs.

In the present study, poisoning from alcohol, alone or combined with other drugs, was more frequent in men than women. This may be attributed to alcohol addiction in men from lower socioeconomic groups, lower frequency of alcohol use in women, and difficulties for women in obtaining alcohol. Although alcohol use is forbidden in Islam, the frequency of alcohol poisoning is higher in the present study than in studies from other Islamic countries, albeit lower than the studies from other regions of Turkey and European countries.[12,14,20,22]

In a previous study, 54% patients with poisoning were admitted to the ED within the first 3 hours.[23] In the present study, the relevant data was 78%. The higher frequency may have occurred because of the high frequency of young people who attempted suicide for secondary gain.

The significantly greater median mean arterial pressure in patients who had carbon monoxide than other poisoning is consistent with previous reports that showed increased mean arterial pressure in patients with carbon monoxide poisoning.[24]

In the present study, the high frequency of normal GCS scores was greater than previously reported (88%),[1] possibly because the present study included many younger patients who had suicide attempts for secondary gain, with low drug dose and low mortality.

In the present study, patients who had an increased WBC count on admission to ED had significantly longer hospital stay than patients with normal count, and this suggests that greater inflammation may have occurred

in patients who had more severe toxic exposures that required hospital admission. Therefore, we would suggest that patients who have a high WBC count on admission should be evaluated more carefully for severe poisoning. Most patients had hospital stay ≤24 hours, and longer hospital stay of >72 hours was more commonly required for patients with carbon monoxide, drug, and organophosphate and carbamate intoxication. In poisonings from drugs that have a long half-life, long-term clinical effects may appear, and longer observation in the hospital may be required. In our study, the mean hospital stay was consistent with previous studies that reported hospital stay from 0.7 to 3 days.[6,25] However, in the present study, the median hospital stay was prolonged because of the high frequency of acetaminophen poisoning that required N-acetylcysteine treatment and the prolonged hospital stay required for patients with carbon monoxide intoxication.

It was stated in a study conducted in Turkey that when all suicide attempts were evaluated in 2-year period, the most common agent was drugs (97.5%).[26] When all suicides resulting in death were compared in other studies carried out in Turkey, the most common methods were hanging (60%) and use of firearms (20%). As such,it has been established that the number of deaths caused by drug-based suicide attempts has been much lower (6%).[27] The data supports the lower mortality rate in our study. Only 1 patient treated in this study died. The low mortality in the present study may be attributed to referral patterns, because patients with severe poisoning were either referred to university hospitals or died before admission to ED. Besides, no further follow-up was available on patients who were referred for further treatment. Also, the present data is reflective of the experience of a community hospital and its results may not be applicable to the general population of Turkey because it was performed in a secondary healthcare facility. Previous studies, for instance, have shown that fatal poisoning may occur from methyl alcohol, pesticides, mushrooms and carbon monoxide.[3,28,29]

Conclusion

There were differences noted between the present data and previous studies from different geographical regions and countries, in part because of differences in age, gender, occupation, education, culture and socioeconomic factors. In the present study, acute poisoning most commonly affected young women who took drugs in a suicide attempt. Data may help mould national healthcare policies and guide future studies.

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