# Characteristics of poisoning cases in adult intensive care unit in Sanliurfa, Turkey

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## ABSTRACT

**Objective:** The aim of this prospective study was to analyze the rate and characteristics of acute poisoning cases admitted to adult intensive care unit (ICU).

**Methods:** All cases of acute poisoning admitted to ICU of the Harran University Hospital, Turkey, between July 2002 and May 2005, were included in this study. Clinical, laboratory, and demographic characteristics, type of poison and patient's outcomes were recorded.

**Results:** There were 86 poisoning cases among 844 patients admitted to the ICU. The mean age was 26 ± 9 years and the majority of the patients (56.9%) were 15-24 years of ages. Eighty percent of acute poisonings were self-inflicted and 65.2% of these patients were singles. Medical drugs overdose were the major cause (51.2%) of intoxication followed by agricultural chemicals (37.2%). The most frequently involved medicinal drugs were benzodiazepines, antidepressants and analgesics. Eleven patients in pesticides-rodenticides and 9 patients in other medical drugs poisoning have required mechanical ventilation between 1-12 days. The duration of the intensive care stay was 6.4 ± 4.3 days. Five cases (5.8%) with acute poisonings were fatal.

**Conclusion:** There was a high rate of suicides attempt in young singles, predominantly female population. These data were the highest agricultural activity of the country that provide important information about the characteristics of poisoning at the city.

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Intoxication, both suicidal and accidental, has become a significant problem in acute medical emergency. They may occur due to various reasons that threaten human life. In addition to herbal, food, pesticides, alcohol and gas poisoning, stings and bites, an accidental overdose of a drug or an intentional intake of medications may lead to poisoning.[1] There may be marked differences in the pattern of poisoning between centers in various countries.[2-8] In the developed countries, the annual incidence of human poisoning varies between 0.2 and 9.3 poison exposure per 1000 heads of population.[9] We believe that well-rounded data on the etiological features of the poisonings may help us develop a better treatment policy for poisoned patients in critical care units and lead to more effective preventative measures being developed both by medical staff and by the public. The primary research goal in the present study was to evaluate the patients who were hospitalized because of acute intoxications, in the Intensive Care Unit (ICU) of Harran University Hospital, Sanliurfa, Turkey. We report the reasons of intoxications, socio-demographic, laboratory, and clinical features of cases, mortality rate, and the results of our treatment modalities.

**Methods.** A prospective hospital-based study was conducted on patients with acute intoxication

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admitted to our 15-bed ICU of Harran University Hospital in Sanliurfa, Turkey between July 2002 and May 2005. Sanliurfa is an ancient city which located in the Southeast Anatolian region of Turkey. The region is the center of a great agricultural development project of the country. The projects of Southeast Anatolia referred by Turkish "Guneydogu Anadolu Projesi (GAP)". The population is approximately 1,500,000 and 42% of people live in rural areas.

This study includes 86 consecutive poisoning patient. The nature of the poison was decided by history. The diagnosis was based on information taken either from the patient or from the patient's family members and friends about the agent involved in the exposure. Suicidal intent was diagnosed from patients who had clear consciousness or from their families. Sociodemographic features included age and gender, marital status, education level, economical status, suicidal purpose, and demographic region. In addition, type of poisons, follow up times and clinical symptoms were recorded. In the absence of a classic poisoning presentation or any toxic syndromes, separating patients with suspected poisoning into broad categories based on vital signs (heart rate, blood pressure, temperature, respiratory rate), myosis-mydriasis, pupil size, nystagmus, mental status, behavior, and coma, stupor, lethargy, delirium, confusion, alertness, seizures, altered muscle tone were used for determining the drug or toxins. Any other clinical symptoms (hypersecretion, nausea, vomiting, and diarrhea) were also recorded. A 5-point poisoning severity scores (PSS), based on European Association of Poisons Centres and Clinical Toxicologists[10] were used for grading the severity of poisoning. The Poisoning Severity Scores were graded as (0) none, (1) minor, (2) moderate, (3) severe, and (4) fatal poisoning. We could not confirm the specific toxin by toxicology screening since these test are not performed in our hospital. Complete blood count (hematocrit, leukocytes, thrombocytes), other biochemical analysis (serum glutamate oxaloacetate transaminase [SGOT], serum glutamate pyruvate transaminase [SGPT], creatine phosphokinase [CK], lactate dehydrogenase [LDH], glucose, urea, creatinine, electrolytes- sodium- potassium- chloride) and electrocardiography (ECG) were also performed to all patients. Diagnoses were confirmed with plasma cholinesterase levels for organophosphate (OP) poisoning, with alcohol level for alcohol intoxications and carboxyhemoglobin levels for carbon monoxide poisoning as long as the test are available. National poison control center consultation and their advices have been applied especially in cases of suspected poisoning. After establishing IV access, a "cocktail" of thiamine, dextrose, and naloxone were administered to patients with depressed mental status with unknown etiology. Flumazenil have been used as diagnostic and therapeutic agent in benzodiazepine overdoses. Gastric lavage followed by administration of activated charcoal via a gastric tube, and cleansing of the patient's body with soap and water was started if indicated. Forced diuresis and urinary pH manipulation have been used to augment elimination of renally excreted toxins. If indicated a specific antidotes therapy initialized. Causative agents of intoxication, the way of intoxication (accidental or suicide), the route of intoxication (gastrointestinal system, inhalation, skin, intravenously), underlying diseases (major depression, debility) mortality and morbidity, specific and supportive treatments has been recorded. Toxic agent were classified as medical drugs (analgesics, antidepressants, sedative/hypnotics/antipsychotics, stimulants, cardiovascular drugs, alcohols), agricultural chemicals (insecticides-pesticides, rodenticides), and others unclassified poisons (carbon monoxide, plants, corrosives, and miscellaneous chemicals). The indication for endotracheal intubation and mechanical ventilation were as follows: excessive secretions; a depressed level of consciousness, which causes an inability to protect the airway; poor gas exchange, which was unresponsive to oxygen treatment; cardio respiratory arrest; and severe metabolic acidosis with hemodynamic instability (systolic blood pressure <80 mm Hg). Synchronized intermittent mandatory ventilation plus pressure support mode in either pressure-controlled or volume-controlled form was started. The positive end expiratory pressure was initially applied as 5 cm $H_2O$ and then titrated to keep $SaO_2$ above 94% with 40% $FiO_2$. Weaning for mechanical ventilation was carried out with pressure support weaning and T-tube trials. If the poisoning resulted in suicidal attempt psychiatric consultation and supportive care were performed during and after ICU treatment. Hospitalization time and morbidity and mortality rate were also recorded.

Statistical analyzes were made using SPSS for windows release 11.5.0 (SPSS Inc. USA) software using $\chi^2$ test (Fisher's exact) and one way ANOVA (post hoc Bonferroni) test. A difference of $p<0.05$ was considered as statistically significant. Data are presented as mean ± standard deviation.

**Results.** We recorded 86 poisoning cases among 844 patients admitted to ICU. This was 10.2% of all ICU admissions. There were 51 (59.3%) female and 35 (40.7%) male patients. The female-to-male ratio was 3:2. The mean age was 26 ± 9 years (range 15-62)

and the majority of the patients (56.9%) were 15-24 years of ages. Sociodemographic characteristic of the cases are summarized in **Table 1**. Sixty-nine (80.2%) poisonings were suicide attempts and 17 (19.8%) were accidental exposure. Most suicide attempts were carried out by females (51 cases, 59.3 %, $p<0.05$), and unmarried persons (52 cases, 60.4%, $p<0.05$). Previous psychiatric disorders were recorded in 24 (27.9%) patients. Seventy (81.3%) cases were city dwellers, while 16 (18.7%) of the patients were from the rural area. Most patients (41.8%) were hospitalized during summer period. Medical drugs overdose were the major cause (51.2%) of the cases followed by agricultural chemicals such as organophosphate pesticides, insecticides, and rodenticides (37.2%). A small portion of cases (11.6%) intoxicated with carbon monoxide, plants and petroleum. The route of administration was as follows: 87.2% orally, 10.5% by inhalation and 2.3% by trans-dermal. The most frequently involved medicinal drugs were benzodiazepines, antidepressants and analgesics. There were 18 different types of poisoning agents involved (**Table 2**). The estimated average time for the admission to the ICU after the exposure was 5 ± 4 hours (range, 1-16 hours). The most frequent clinical signs were nausea and vomiting, cardiac arrhythmia, change in mental status, agitation, coma and respiratory depression (**Table 3**). Poisoning Severity of Scores were higher in agricultural chemicals than medical drugs poisoning ($p<0.01$, **Table 4**). Mean plasma cholinesterase levels in OP poisoning were measured as 320 ±153 IU/L (normal ranges is 4.500-11.000 IU/L). PT and aPTT were increased at anticoagulant rodenticides. Carboxyhemoglobin values were higher than 20% in arterial blood gases in carbon monoxide poisoning. All of the patients who intoxicated via oral

**Table 1 -** Sociodemographic parameters of cases according to cause of poisoning.

| Parameters | No. of causes of poisoning (%) | |
|---|---|---|
| | Suicidal purpose | Accidental |
| ***Gender*** | | |
| Male | 27 (39.2) | 8 (47.1) |
| Female | 42 (60.8) | 9 (52.9) |
| ***Age (year)*** | | |
| 15-24 | 41 (59.4) | 8 (47.1) |
| 25-34 | 16 (23.2) | 7 (41.2) |
| 35-44 | 7 (10.1) | 2 (11.7) |
| ≥45 | 5 (7.3) | 0 |
| ***Marital status*** | | |
| Single | 45 (65.2) | 7 (41.2) |
| Married | 24 (34.8) | 10 (58.8) |
| ***History of drug overdose or suicide attempt*** | | |
| Yes | 9 (13.1) | 0 |
| No | 60 (86.9) | 17 (100) |
| ***History of psychiatric disorder*** | | |
| Yes | 16 (23.9) | 0 |
| No | 51 (76.1) | 17 (100) |
| ***Settlement*** | | |
| City | 57 (82.6) | 13 (76.5) |
| Rural | 12 (17.4) | 4 (23.5) |
| ***Economical status*** | | |
| High | 10 (14.5) | 0 |
| Middle | 24 (34.8) | 6 (35.3) |
| Low | 35 (50.7) | 11 (64.7) |
| ***Education level*** | | |
| Illiterateness | 10 (14.5) | 7 (41.2) |
| Primary school graduates | 42 (60.9) | 6 (35.3) |
| High school graduates | 15 (21.7) | 4 (23.5) |
| University graduates | 2 (2.9) | 0 |

**Table 2 -** The category of poisoning agents involved.

| Agents (%) | n | No. of mortality | Agents |
|---|---|---|---|
| ***Medical drugs (51.2%)*** | | | |
| Analgesics | 9 | | |
| Antipsychotics | 4 | 1 | Haloperidol |
| Antibiotics | 3 | | |
| Benzodiazepines | 9 | | |
| Beta-blockers | 3 | | |
| Calcium-channel blockers | 4 | | |
| Cyclic antidepressants | 7 | | |
| Lithium | 1 | | |
| Theophylline | 3 | | |
| Colchicines | 1 | 1 | Colchicines |
| ***Agricultural drugs (37.2%)*** | | | |
| Organophosphate insecticides | 14 | 1 | Malathion |
| Carbamate and related pesticides | 6 | | |
| Chlorinated hydrocarbon insecticides (endosulphan) | 3 | | |
| Synthetic organic rodenticides | 8 | | |
| Inorganic rodenticides | 1 | 1 | Zinc phosphide |
| ***Others (11.6%)*** | | | |
| Plants | 4 | | |
| Petroleum | 1 | 1 | Petroleum |
| Carbon monoxide | 5 | | |
| **Total** | **86** | **5** | |

**Table 3 -** Clinical features mandating consideration of toxic ingestion of poisoned cases.

| Parameters | Kind of poisons | | |
|---|---|---|---|
| | Agricultural chemicals (n) | Medical drugs (n) | Other (n) |
| ***Stupor or coma*** | | | |
| Yes | 19 | 18 | 6 |
| No | 13 | 26 | 4 |
| ***Delirium or confusion*** | | | |
| Yes | 23 | 21 | 10 |
| No | 9 | 23 | 0 |
| ***Cardiac arrhythmia*** | | | |
| Yes | 24 | 27 | 9 |
| No | 8 | 17 | 1 |
| ***Hyper/hypotension*** | | | |
| Yes | 18 | 32 | 7 |
| No | 14 | 12 | 3 |
| ***Hyper/hypothermia*** | | | |
| Yes | 22 | 36 | 4 |
| No | 10 | 8 | 6 |
| ***Gastrointestinal symptoms*** | | | |
| Yes | 28 | 23 | 9 |
| No | 4 | 21 | 1 |
| ***Mechanical ventilation*** | | | |
| Yes | 11 | 9 | 9 |
| No | 21 | 35 | 1 |
| ***Hospitalization time*** | | | |
| <3 days | 6 | 6 | 8 |
| 3-7 days | 9 | 25 | 1 |
| >7 days | 17 | 13 | 1 |
| ***Outcome*** | | | |
| Exitus | 2 | 2 | 1 |
| Alive | 30 | 42 | 9 |
| **Total** | **32** | **44** | **10** |

**Table 4 -** Poisoning severity scores (PSS) of cases.

| PSS | Kind of poisons | | |
|---|---|---|---|
| | Agricultural chemicals (n) | Medical drugs (n) | Other (n) |
| 0 (none) | 0 | 2 | 0 |
| 1 (minor) | 3 | 22 | 0 |
| 2 (moderate) | 18* | 11 | 1 |
| 3 (severe) | 9 | 7 | 8 |
| 4 (fatal) | 2 | 2 | 1 |
| **Total** | **32** | **44** | **10** |

*$p<0.01$ when compared with medical drugs.

route received multiple doses of activated charcoal. Fluid resuscitation, vasopressor agents, and atropine were used if indicated. A total of 5 (35.7%) patients received pralidoxime in OP intoxications. Fresh frozen plasma was administered to all severe OP intoxication and coagulopathies due to warfarin-type rodenticides. Prolonged muscle weakness (intermediate syndrome) has been observed in 2 (14.3%) of the OP intoxication patients and they weaned from the mechanical ventilator. Eleven patients in pesticides-rodenticides and 9 patients in other medical drugs poisoning have required mechanical ventilation between 1-12 days. Mean mechanical ventilation days were 3.2 ± 2.8 days. The duration of the intensive care stay was 6.4±4.3 days (range 1-23 day). Hospitalization time were longer in agricultural chemicals poisoning than medical drugs poisonings ($p<0.05$). There were only 5 deaths (5.8%) among 86 admission of acute intoxication. Two of the death was due to pesticides-rodenticides poisoning (one malathion and one zinc phosphide), and the other was due to colchicines, haloperidol (neuroleptic malignant syndrome) and petroleum aspiration.

**Discussion.** Since human intoxication rates are increasing around the world, intoxication has been very important health and socio-economical problem.[1] A strong clinical suspicion is necessary to make an early diagnosis and treatment of acute poisoning. Therefore, it is crucial to know the etiologic and demographic aspect of acute poisoning.[7,11] Intensivist are confronted with poisoned patients on a routine basis, with clinical scenarios ranging from known drug overdose or toxic exposure, illicit drug use, suicide attempt, or accidental exposure. A high index of suspicion for intoxication is warranted in the practice of critical care medicine. The protean manifestation of intoxication challenges even the most astute clinicians, particularly when patients present with altered mental status or when there is no history of intoxication. Recognition of a specific toxic syndrome helps, but symptoms are often non-specific or masked by other conditions.[1,12] According to reports of the Ministry of the Turkish Republic, 27144 poisoning were admitted to hospitals throughout the country.[13] Thus, the incidence of poisoning in Turkey can be estimated to be 0.043%. The population of Sanliurfa between study periods was around 1,500,000. When compared with the Turkey statistics, incidence of poisoning found out in this study may be thought so much small. However, it may be explained by the fact that, first we have only reported the cases which needed the ICU treatment; second our hospital is not the only reference unit around the Sanliurfa so it is

probable that others might have been admitted to those hospitals. The numbers of intoxicated females were greater than males in our study. These findings were comparable with the previous studies.[3,4,7,14-16] According to the Toxic Exposure Surveillance System of American Association of Poison Control Centers (2,168,248 human toxic exposures were reported in USA in 2000 and 3% of these patients required critical care).[1] In poisoning cases, the incidence of critical care required was 0.026%. These results were similar to the Turkish poisoning statistics. We considered that poisoning incidences among developing and developed countries were not differ but poisoning agent were closely related with development. Suicide is defined as a voluntary desire of a person to put end to his own life and this is the most important cause of death in psychiatry. Suicidal behavior is one of the most important reasons for hospitalization in adolescents. Hopelessness and severity of depression emerge as the most important predictors of suicidal behavior both adult and adolescent populations.[17] According to the Institute of Statistics in Turkey, the mean suicidal ratio between 15-24 years of age were 34.5%; however, the suicidal attempts in our study were recorded as 59.4%.[18] Social and family pressures are the main causes of suicidal attempt in these age group especially in females. In 25-34 age group the suicidal ratios were 23.2%, which is similar with the Turkish population. Male to female ratios in suicides with medical drugs were also found similar with all of the Turkey.[18] In the year 2000, the statistical data of illiterate people in Sanliurfa city were 19.4% in female and 6.1% in male. In our study, the accidental poisoning were seen higher in illiterates people. People living in more urbanized areas are at a higher risk of suicide than their counterparts in less urbanized areas.[19] Sanliurfa city's people live in municipal areas at the rate of 58.3%. The major part of suicidal attempt (82.6%) occurred at urban area. High suicide rate in urban areas is influenced by exposures to risk factors for suicide other than rural areas. According to American Association of Poison Control Centers, the categories of substances/toxins with the largest number of deaths were analgesics, antidepressants, sedative/hypnotics/antipsychotic, stimulants, "street" drugs, cardiovascular drugs, and alcohols.[1] Medical drugs overdose were the major cause (51.2%) of the cases in our study. The most frequently involved medicinal drugs were similar with this report. There were 18 different types of poisoning agents involved in our study (**Table 2**). However, we never observed any stimulants, alcohol or illicit drug poisoning. This may be related with Islamic beliefs which forbid the illicit drug using. On the other hand, sometimes no body, even strong religious belief cannot prevent them from suicidal attempt. In spite of the fact that in Turkey the sales of acetaminophen have increased, this does not correlate with the number of patients poisoned by this substance.[20] Two patients with acetaminophen intoxication were successfully cured by N-acetylcysteine during study period. Despite the low incidence, cyclic antidepressant must not be forgotten in acute poisoning, because of their known toxic risk. We record 7 cyclic depressant intoxication and some of them have serious cardiac dysrhythmia during ICU therapy. Acute carbon monoxide poisoning is a common problem that occurs during winter and leads to serious complications.[21] In our study, 5 cases of carbon monoxide poisoning were recovered completely with 100% oxygen and supportive treatments. As in the rest of other agriculture countries,[6,7,15,22] organophosphate insecticides-pesticides, and rodenticides occupy a large place agent of intoxication in our study. In the United States, most exposures are accidental, but in some developing countries, organophosphates are commonly used for suicide.[7,12,15,22] In our study, agricultural chemicals are second most poisoning agents (37.2%) and the majority of them (43.8%) were OP. In addition, PSS were higher in agricultural chemicals poisoning. This can be explained by easy accessibility and potent effects of OP and other agricultural chemicals. Sungur and Guven,[22] reported that the major reason for mortality in OP intoxication were respiratory failure (mean mortality rate is 25.5%). Careful monitoring, appropriate management and early recognition of this complication may decrease the mortality rate among these patients. Our mortality rate for all intoxicated patients and OP poisoning were 5.8% and 4.34% consequently. Our 15 bed intensive care unit equipped with full hemodynamic monitors and 10 mechanic ventilators. Our low mortality rate in OP intoxication may be related with the availability of adequate equipment and the close patient observation. The intensive care unit must continue to be one of the best sites to manage poisoned patients with respiratory depression and coma. We have recorded 34% patients have required mechanical ventilation in insecticides-rodenticides poisonings. Intermediate syndrome is a state of muscle paralysis that occurs after recovery from cholinergic crisis and probably results from post-synaptic neuromuscular junction dysfunction in OP poisoning.[22] Two (14.3%) patients with intermediate syndrome has successfully weaned from prolonged mechanical ventilation. In our study, one patient was poisoned by OP died with sudden

cardio respiratory arrest, and one patient was poisoned by inorganic rodenticides (zinc phosphide) died with cardiac failure due to massive hyaline degeneration in cardiac muscle. The death of other 2 patients were caused by cardiac failure due to colchicines poisoning and pulmonary necrosis due to petroleum aspiration.

As a conclusion, despite being a hospital-based study, we believe that these data provide important preliminary information on the pattern symptomatic poisoning in this particular region of Turkey. In our region, intoxication especially affects young unmarried females, and most of them results from suicidal attempts. The poisoning related mortality could be decreased by improving ICU condition and appropriate supportive care.

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