

A study on poisoning cases in a tertiary care hospital

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Abstract

Acute poisoning with various substance is common everywhere. The earlier the initial resuscitations, gastric decontamination and use of specific antidotes, the better the outcome. The aim of this study was to characterize the poisoning cases admitted to the tertiary care hospital, Warangal district, Andhra Pradesh, Southern India. All cases admitted to the emergency department of the hospital between the months of January and December, 2007, were evaluated retrospectively. We reviewed data obtained from the hospital medical records and included the following factors: socio-demographic characteristics, agents and route of intake and time of admission of the poisoned patients. During the outbreak in 2007, 2,226 patients were admitted to the hospital with different poisonings; the overall case fatality rate was 8.3% ($n = 186$). More detailed data from 2007 reveals that two-third of the patients were 21–30 years old, 5.12% ($n = 114$) were male and 3.23% ($n = 72$) were female, who had intentionally poisoned themselves. In summary, the tertiary care hospitals of the Telangana region, Warangal, indicate that significant opportunities for reducing mortality are achieved by better medical management and further sales restrictions on the most toxic pesticides. This study highlighted the lacunae in the services of tertiary care hospitals and the need to establish a poison information center for the better management and prevention of poisoning cases.

Key words: Drugs, organophosphorus compound, poisons, mortality and morbidity

INTRODUCTION

Death due to poisoning has been known since time immemorial. Poisoning is a major problem all over the world, although its type and the associated morbidity and mortality vary from country to country. According to the legal system of our country, all poisoning death cases are recorded as unnatural death and a medico-legal autopsy is routine. Toxicology is defined as the study of the effects of chemical agents on biological materials. Modern toxicology is a multidisciplinary science and forensic toxicology is required to determine any exogenous chemical agent present in biological specimens made available in connection with medico-legal investigations.^[1]

Organophosphorus poisoning occurs very commonly in southern India, where farmers form a significant proportion of the population who commonly use organophosphorus compounds like parathion as insecticides. Thus, due to the easy accessibility of these compounds, a large number of suicidal cases are encountered in this region.^[2] In addition

to that, snakebite is a common acute medical emergency faced by rural populations in tropical and subtropical countries with heavy rainfall and humid climate.^[3] Some 35,000–50,000 people die each year from snakebite, which is a common cause of morbidity and mortality in India.^[4] (Common venomous snakes found in the Mahad region of India are kraits and *Echis carinatus*.)^[5] Kraits are nocturnal in habit. They enter human dwellings during the night in search of prey such as rats, mice and lizards. The peak incidence of snakebite cases is reported during the paddy sowing and harvesting periods, June to November. The common krait, *Bungarus caeruleus*, is regarded as the most dangerous species of venomous snake in the Indian subcontinent.^[6] The objective of this study is to characterize the poisoning cases admitted to the tertiary care hospital, Warangal district, Andhra Pradesh, Southern India.

MATERIALS AND METHODS

The present study was conducted at the emergency

departments and intensive care units (ICUs) of tertiary care hospital, i.e., Mahatma Gandhi Memorial Hospital, Warangal, Andhra Pradesh, which is a 1,000-bedded multidisciplinary super specialty government hospital. The study was carried out for the period of 1 year. The patients included in the study were those who had undergone exposure to poison either by household or agricultural pesticides, stings bite, snake bite, industrial toxins, toxic plants, drug or miscellaneous products. All cases of poisoning, irrespective of age, sex, type and mode of poisoning, ingredients of poisons and the status of patients after poisoning were recorded in the proforma prescribed by WHO guidelines. The emergency department serves residents up to 6 miles west of the middle town area. Data collection was performed according to hospital regulations after approval by the hospital authorities. The setting was the emergency department of an inner city level-one trauma center with approximately 85,000 visits per year. Patients between 1 and 89 years of age and exposed to poisons counting chemical, recreational and/or pharmaceutical agents were selected. The study population consisted of 2,226 poisoning cases admitted between the months of January 2007 and December 2007. The study was conducted in various phases.

PHASE I

Step 1: Identify the type of poisoning inclusion in the study

The general medicine, pediatrics and emergency care department cases from the medical record department were selected for the study as there were many cases of different poisonings being admitted for the treatment of poison with various comorbid conditions.

Step 2: Design of the study

Study period: The study was planned to be carried out for a period of 1 year consent from the hospital authority.

The protocol of the study, which includes the objective and the methodology, were submitted to the Superintendent, MGM Hospital, Warangal, Andhra Pradesh, and authorization was obtained to carry out the study.

Step 3: Defining criteria, standards and design of data entry format

Inclusion criteria: Inpatients having OP poisoning, snake bite, drugs, acid, scorpion stings, food poison and any comorbid conditions were included in the study.

Exclusion criteria: Inpatients having hypertension, cardiac disorders, diabetes mellitus, malaria and terminally ill patients were excluded from the study.

PHASE II

Step 1: Literature survey

The literature supporting the study was collected and analyzed. The different sources used to collect the literature were Micromedex drug information services and various websites such as www.pubmed.com, www.sciencedirect.com and DOAJ.

Step 2: Data collection

Data were collected from patient's case sheets and transferred to data entry format for evaluation. All the data were collected from the Medical record department.

PHASE III

Step 1: Data analysis and interpretation

The collected data were analyzed for their appropriateness and suitability. The interpretation was made for the collected data.

RESULTS

The present study was conducted on 2,226 patients with different poisonings. The patients were admitted to the Emergency Department, MGM Hospital, Warangal, Andhra Pradesh. For diagnosis of poisoning history, intake of poisoning and clinical features like nausea, vomiting, restlessness, excessive thirst, epigastric pain, hypotension, garlic odor in breath and tachypnoea were taken into account. All patients were shifted to the ICU without any delay. For each patient, the following characteristics were recorded: age, gender, deliberate or accidental poisoning, previous suicide attempts and time between poisoning and admission to the ICU. Gastric lavage was performed for all patients approximately 2 h after admission to the emergency room before ICU admission. When monitoring of vital signs showed hypotension or shock, intravenous fluids were administered according to the central venous pressure, which was combined with dopamine or dobutamine infusion to maintain the systolic blood pressure above 80 mmHg. Oxygen was given immediately with the monitoring of clinical respiratory effort of poisons pulse oximetry and arterial blood gas if respiratory distress was present. We used mechanical ventilation in a separate respiratory ICU for suitable cases, alkalization was used if severe metabolic acidosis was present. We also recorded the length of stay in the ICU, mortality rate and results of the postmortem examination.

The majority of poison cases were between 21 - 30 years of age. This is represented in Table 1 (included in the text). There were more male patients than females, with 52.15% ($n =$

Table 1: Number of poisonings by age group and sex

Age group (in years)	Sex				Total	
	Male	%	Female	%	No.	%
1–10	17	0.76	9	0.40	26	1.1
11–20	186	8.3	215	9.6	401	18
21–30	517	23.2	368	16.5	885	40
31–40	187	8.4	193	8.6	380	17
41–50	132	5.9	128	5.7	260	11.68
51–60	67	3	118	5.3	185	8.3
61–70	33	1.4	26	1.1	59	2.65
71–80	12	0.5	18	0.8	30	1.34

Table 2: Type of poisoning and its related mortality

Type of poisoning	Number of patients	%	Total number of deaths
Snake bite	208	9.3	19
Organophosphorus	383	17.2	37
Overdose	187	8.4	16
Scorpion bite	280	12.5	6
Unknown pill	173	7.7	21
Hair dye	58	2.6	2
Corrosive substance	65	3	11
Endosulphan	143	6.42	29
Rodenticide	71	3.1	16
Kerosene ingestion	48	2.15	6
Unknown bite	112	5.03	7
Alcohol intoxication	134	6	4
House hold item	63	2.83	3
Nail polish	31	1.33	0
Multitables	270	12.1	9

1161) and 47.84% ($n = 1,065$) male and female, respectively. Male poisoning cases were predominantly from rural areas (65%), with reports from urban areas at 35%. The overall case fatality rate was 8.3% ($n = 186$). Most patients were uninsured (80%), while 20% were covered by the insured, i.e. med claim policy, etc. The pediatric cases were between 1 and 10 years of age, which constituted 1.1% ($n = 26$) of the total cases. The exposure substances identified as most commonly encountered in the emergency department included snakebite 9.3% ($n = 208$), OP 17.2% ($n = 383$), overdose of drugs 8.4% ($n = 187$), scorpion stings 12.5% ($n = 280$), unknown pill 7.7% ($n = 173$), hair dye 2.6% ($n = 58$), corrosive 3% ($n = 65$), endosulphan 6.42% ($n=143$), rodenticide 3.1% ($n= 71$), kerosene ingestion 2.15% ($n = 48$), unknown bite 5.03% ($n = 112$), alcohol intoxication 6% ($n = 134$), house hold item, i.e. All Out, Baygon Spray 2.83% ($n = 63$), nail polishes 1.33% ($n = 31$) and multitablet 12.1% ($n = 270$). This is represented in Table 2. The exposure circumstances included abuse 32% ($n = 720$), suicidal 52% ($n = 1160$), adverse drug reaction (ADR) 9% ($n = 208$) and others 6% ($n = 134$). The total mortality rate was 8.3% ($n = 186$); male 5.1% ($n = 114$) and female 3.2% ($n = 72$) exposure.

DISCUSSION

Poisoning exposure was grouped into 15 toxic substances. Pharmaceutical or medicinal drug use, recreational drug use and chemical exposure were also captured and categorized into intended groups, which included suicide abuse, misuse, unintentional exposure, therapeutic use and adverse drug events (ADE). Males were affected more (52.15%). This finding is similar to that of other studies.^[7-9] The high incidence of poisoning in males may be because of the high exposure to stress and strain and also because occupational poisoning occurs due to inappropriate handling (e.g., spraying with high concentration). The signs and symptoms occur due to exposure duration, spraying against wind or lack of personal protection.^[10]

Self-poisoning is one of the oldest methods tried for committing/attempting suicide. There are reports available from different parts of the world highlighting various substances abused for acute poisoning and their toxicity. From Western countries, drugs (sedatives and analgesics) have been reported as the most common substances abused, with mortality rates varying between 0.4% and 2.0%.^[11-13] Reports available from certain Asian (Pakistan and Sri Lanka) and African countries (Uganda) describe organophosphates (crop sprays) and drugs as the commonly abused toxic substances, with reported mortality rates varying from 2.0% to 2.1%.^[14-16] The mortality/morbidity in any case of acute poisoning depends on a number of factors such as nature of poison, dose consumed, level of available medical facilities and the time of interval between intake of poison and arrival at hospital, etc.

The results of our study illustrate that a total of 2,226 patients were hospitalized due to acute poisoning in the hospital. Of these, 186 (8.3%) patients died due to poisoning. The findings of the present study agree with various reports from developing and developed countries, which reveal a considerable increase in mortality and morbidity due to poisoning.^[17-28]

The findings of the present study revealed a higher incidence of poisoning in males than in females in all age groups, corroborating other studies.^[17-19] There are findings of some other countries where the female has a preponderance.^[20,21] The majority of incidences in males was from the age group of 21–30 years. The male preponderance appears to be due to more exposure to occupational hazards and stress or strain as compared with females in this part of the world.

The present study revealed that self-poisoning (suicidal 52%) is the most common manner of acute poisoning,

followed by abuse 32%, ADR 9% and others 6%. Results of a 10-year study in Chandigarh revealed that intention was suicide in 72%, followed by accidental (25%).^[17] Similar observations were made by other researchers.^[18-26] An increase in the number of self-poisonings may be due to many factors such as increases in unemployment, urbanization, break up in family support system and economic instability. Suicide attempts among adults, especially in the age group of 21–30 years, could be due to lack of employment, break up in the family support system, failure of love affairs, an individual's frustrations, inadequacy to cope with some immediate situation, impulsive behaviors, stress due to job and family, etc. Results of some studies reported that many deaths are due to organophosphate pesticides and occur in the young, economically active age group.^[18,27-29] Recent studies have shown that a high mortality is due to depression leading to suicide.^[30-32] It has been established that consistent exposure, especially to organophosphate pesticides, produces a distinct pattern of physical symptoms and has psychological and neurobehavioral effects such as anxiety, depression and cognitive impairment.^[33,34] These findings are corroborated with others findings. The morbidity and mortality due to acute poisoning have been mainly due to agrochemicals, which appear to be a by-product of the "green revolution" in South Asia. There are few published studies of agrochemical poisoning in developed countries. A review of pesticide poisoning deaths in England and Wales found that pesticides were responsible for only 1.1% of poisoning deaths over a 44-year period.^[35-36] A Minnesota regional poison center consulted on 1,428 cases in 1988, in which a pesticide was the primary substance, accounting for approximately 4.5% of all poisoning cases.^[37] The present study revealed that the maximum cases of self-poisoning were due to organophosphate pesticides in South India, which is different from the results of North Indian studies. In North India, the majority of poisoning was due to aluminum phosphide.^[17,19,27] Results of a prospective study (559 cases) conducted at a medical college hospital in Rohtak, Haryana, North India, revealed that aluminum phosphide was the primary substance accounting for approximately 67.8% of all poisoning cases.^[22] This could be because of the easily availability of organophosphate pesticide in this region of the country. Poisoning due to organophosphate was also the most common poisoning in North India before the 1980s.^[17,18,27] Now-a-days, aluminum phosphide is most commonly used for storing wheat grain in North India, and it is easily available in the market and in small shops. A study of 117 cases of poisoning reported from Tamilnadu during 1992–1993 showed that most common poisonings (63%) were due to a plant called "Oduvan," and agrochemicals accounted for only 2.2% of the cases.^[23] Results of the present study show that a higher

Table 3: Intervals between intake of poison and arrival at hospital

Duration (time in h)	Non-expired patients	Expired patients
<3	396 (19.4)	9 (4.8)
3–6	946 (46.3)	74 (39.7)
10–12	398 (19.5)	52 (27.9)
Undetermined	300 (14.7)	51 (27.4)
Total	2,040	186

Figures in Parenthesis are in percentage.

mortality rate resulted due to organophosphate pesticides. This shift of poisoning from plant origin to pesticides is similar to the reports by the other researchers. This may be because of easy availability, and uncontrolled sales and use of these agents. In North India, the switching to other highly toxic agents (aluminum phosphide) from organophosphate^[38] was observed. Among the total deaths reported, the majority (60%) was of patients arriving at the hospital after 6 h. Those patients (80% of total poisoning cases) who reached the hospital early, i.e. within 6 h, managed properly and were discharged from the hospital [Table 3].

CONCLUSION

The tertiary care hospitals of the Telangana region, Warangal, indicate that significant opportunities for reducing mortality exist by better medical management and further restrictions on the most toxic pesticides. This study highlighted the lacunae in the services of tertiary care hospitals and the need to establish a poison information center for the better management and prevention of poisoning cases.

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