PATIENT PROFILE AND MANAGEMENT PATTERN OF POISONING CASES ADMITTED TO A TERTIARY CARE TEACHING HOSPITAL IN WESTERN NEPAL

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Summary

The present study analyzed the clinical profile and the management pattern of poisoning cases admitted to the Manipal Teaching Hospital (MTH). The poisoning cases treated at Manipal Teaching Hospital from January 2003 to June 2006 were studied. A total of 98 poisoning cases (0.51% of Emergency department admissions) were treated (female 54.08 %) and age group 21-40 years (44.90 %). Nearly one third (32.65%) reached the hospital with in two hours of poison consumption. The median (interquartile range) duration of the hospital stay was 4 (2) days. The poisoning was intentional in 79.59% cases. The route of exposure was mainly oral (96.94%). Rat poison was the commonest poison (31.68%) followed by drugs (22.77%). Majority (83.67%) received symptomatic treatment. Secondary complications were observed in 28.57% and the overall fatality rate was 18.37%. Rat poison was responsible for 5 deaths. Nearly two thirds (65.31%) received psychological counseling prior to the hospital discharge.

Keywords: Drug over dosage, Pesticide poisoning, Poisoning profile, Rodenticide, Western Nepal.

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Introduction

Poisoning is referred as the development of harmful effects following the exposure to chemicals, drugs or other xenobiotics [1]. It is a common problem world wide. The incidence of poisoning and their death rates vary according to the places. Over a million cases of acute poisoning occur in the United States of America (USA) every year. Most deaths due to poisoning in USA are due to intentional overdose by an adolescent or adult [2]. A study from Bangladesh has reported that 445 of overall deaths among 10-50 year women in the country were related to poisoning [3]. A recent study from the neighboring country, India identified organophosphorous compounds as the common poison responsible for suicidal attempts in the southern part of India. The authors found the incidence of poisoning to be high in males (69.6%) [4]. One of the earlier studies from a tertiary care hospital from Kathmandu, Nepal poisoning accounted for 2.9% of total hospital admissions. The authors also notified a seasonal variation among in the number of poisoning cases with summer having more number of cases [5]. Another study from a teaching hospital in Kathmandu identified that poisoning was responsible for 1.1% of total patients attending the casualty [6].

Nepal is an agro based country and hence people have an increased access to pesticides and rodenticides. This predisposes the population to choose organophosphorous and rodenticide compounds for poisoning. One study from Patan hospital, Kathmandu, Nepal has identified that drugs were responsible for 25% of the total poisoning cases treated in the hospital.[1] In Nepal, even narcotic and psychotropic drugs can be obtained from a pharmacy without having a prescription. Rarely these drugs are monitored. Several studies have been published from Nepal in relation to poisoning. The studies conducted on Nepal are mainly from the Eastern and Central region of Nepal. There is a lacking in the studies from Western region of Nepal. Moreover, those studies analyzed only few parameters. Many parameters like the poison responsible for death, management pattern of secondary complications; discharge medications, psychological counseling etc are not studied. Hence the present study was conducted with the following objectives.

1. To study the clinical profile of the patients who consumed poison
2. To study the common types of the poisons consumed by the victims and the poisons responsible for death of the patients
3. To study the management pattern and the drugs used in managing the poisoned patients
4. To study the management pattern of the secondary complications developed by the patients
5. To study the prescribing pattern of the discharge medications in the patients

Patients and methods

The detail methods and materials are discussed below.

a. Study type: Retrospective, document based study.

b. Setting: The study was carried out at the Manipal Teaching Hospital (MTH). MTH is a 700 bedded tertiary care hospital located in Pokhara, Western region of Nepal with average bed occupancy of about 250 patients and an average out patients of about 500 per day. On each day about 50 patients get admitted to the hospital.

c. Data source : The patients getting treatment at MTH are provided with a patient record in which the details of the patient along with the treatment pattern and other ancillary information are entered. The patient confidential case records were obtained from the Medical Records Department (MRD). Necessary patient details were collected from these files. The Clinicians and Pharmacists reviewed the files of the poisoned patients and entered in the patient profile form developed for the purpose of the study. The filled patient profile forms were used to obtain the necessary information.

d. Inclusion and exclusion criteria: Any patient who visited the MTH with history of poison intake during the period January 1st 2004 till June 2006 was included in the study. The patients who were treated for poisoning due to living things such as snakebites, wasp stings etc were excluded.

e. Data analysis: The Microsoft excel program was used for carrying out the result analysis.

Results

A total of 98 cases of poisoning were admitted in the hospital during the study period. This accounts of 0.51% of the total emergency department admissions.

Table 1. Year and month distribution (n=98)

Year	Months	Number of patients	Percentage
2003 (n=15)	Jan-March	4	4.08
	April-June	4	4.08
	July-Sept	2	2.04
	Oct-December	5	5.10
2004 (n=25)	Jan-March	4	4.08
	April-June	10	10.20
	July-Sept	7	7.14
	Oct-December	4	4.08
2005 (n=33)	Jan-March	2	2.04
	April-June	6	6.12
	July-Sept	14	14.29
	Oct-December	11	11.22
2006 (n=25)	Jan-March	6	6.12
	April-June	19	19.39

Patient demography: During the study period, 53 (54.08%) females and 45 (45.92%) males were treated for poisoning. The female to male ratio was 1.18: 1. It was found that 38 (38.78%) of the patients belonged to the age group up to 20 years followed by 44 (44.90%) in the age group of 21-40 years, 14 (14.29%) in the age group 41-60 years and 2 (2.04%) in the age group above 60 years. The mean ± SD age group of the poisoned cases was 26.92±14.2 years. The monthly distribution of the patients was found out and the details are listed in Table 1.

Duration of hospital stay: The duration of stay in the hospital was calculated. Majority of the patients stayed in the hospital for 1-2 days. The median (interquartile range) duration of the hospital stay was 4 (2) days. The details are listed in table 2.

Table 2. Duration of Hospital stay (n= 98)

Duration	**Number of patients**	**Percentage**
Less than 1 day	9	9.18
1-2 days	35	35.71
3-4 days	32	32.65
5-6 days	6	6.12
7-8 days	6	6.12
More than 8 days	10	10.20

Time gap between poison intake and hospitalization: Most of the patients reached the hospital with in 2 hours of the poison intake. The details are listed in table 3.

Table 3. Time gap between poison intake and hospitalization

Time gap (In hours)	Number of patients	**Percentage**
Up to 2	32	32.65
Between 2-4	16	16.33
Between 4-6	20	20.41
Between 6-8	3	3.06
Between 8-10	2	2.04
More than 10	14	14.29
Unknown	11	11.22

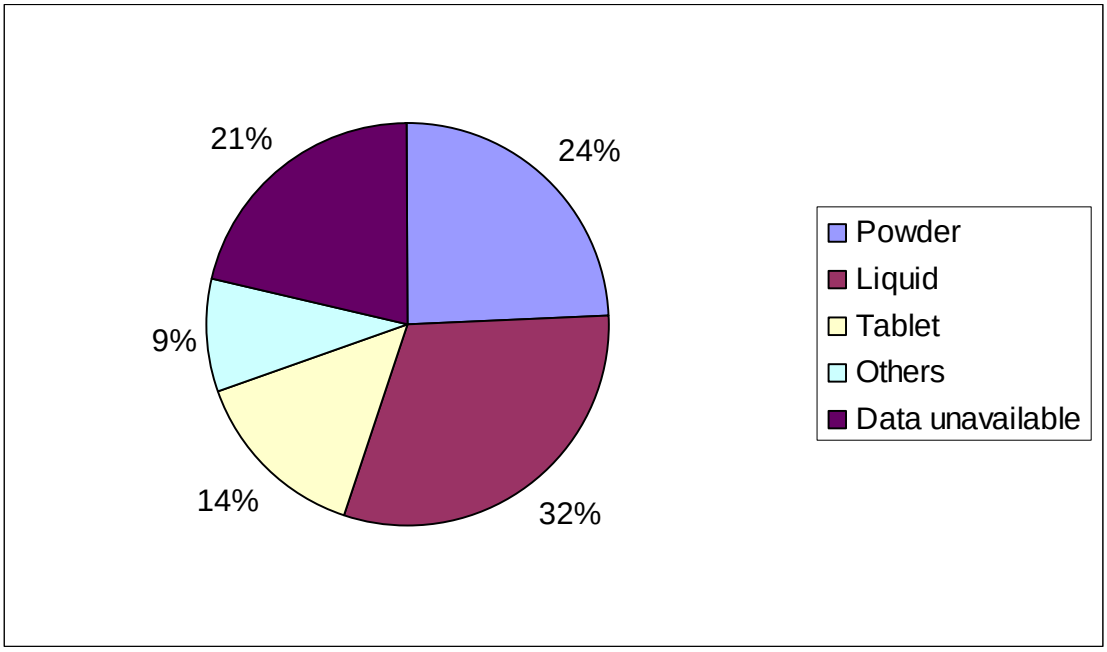
Type of hospitalization: Among the 98 patients, 46 (46.94%) visited the hospital directly with out getting any medical help, 41 (41.84%) visited after getting the emergency treatment, 8 (8.16) visited the hospital due to the failure of treatment in the other hospitals. The details were not available for 3 (3.06%) of the patients.

Cause of poison intake: Among the total 98 patients, 78 (79.59%) took the poison intentionally, 15 (15.31%) took the poison accidentally. The details are not available in case of 5 (5.10%) patients.

Route of poison intake: Ninety five (96.64%) of the subjects had taken the poison orally. The details were not available for the remaining 3 (3.06%) patients.

Form of poison: Majority 30 (30.61%) of the patients took the liquid form of poison. The details regarding the form of the poisons are listed in Figure 1.

Figure 1. Form of poison



Time gap between poison intake and gastric lavage: Among the total patients, gastric lavage was done for 60 patients. The details regarding the time gap between the poison intake and the gastric lavage are given in the Table 4. The details regarding the time gap between poison intake and gastric lavage are not available for 38 patients.

Table 4. Time gap between poison intake and gastric lavage

Time gap	Number of patients	**Percentage**
Up to 2	20	20.41
Between 2-4	17	17.35
Between 4-6	12	12.24
Between 6-8	4	4.08
Between 8-10	2	2.04
More than 10	5	5.10
Details not available	38	38.78

Chief complaints at the time of hospitalization: At the time of visit at the hospital, 50 (51.02%) patients had gastrointestinal related complaints followed by CNS related 26 (26.53%), and respiratory complaints 1(1.02%). Fifteen (15.31%) had multisystem involvement and 6 (6.12%) did not have any systemic involvement.

General condition of the patient: At the time of hospital admission 58(59.18%) of the patients were conscious, 22 (22.455) were semiconscious, 13 (13.27%) were unconscious. In 5 (5.10%) of the patients, either the data was not available or were unable to be interpreted.

Name of poison (n=101): Among the patients, in 6 of them the poison was not identified. The remaining 92 patients had taken a total of 101 compounds. The details are listed in Table 5.

Table 5. Name of poison (n=101)

Name of the poison	Number of patients	**Percentage**
Rat poison	32	31.68
Kerosene	2	1.98
Organophosphorous	15	14.85
Mushroom	5	4.95
Drugs	23	22.77
Phenolic compounds	6	5.94
Pyrethins and pyrethroids	6	5.94
Herbal	5	4.95
Carbamates	3	2.97
Miscellaneous	4	3.96

Note: Few patients might have had more than one poisonous substance

Drugs responsible for poisoning (n=24): Altogether 23 patients have taken drugs as the poison. The various drugs responsible for the poisoning were analyzed. The details are listed in Table 6.

Table 6. Drugs responsible for poisoning (n=24)

Drugs	Number of patients	**Percentage**
Alprazolam	3	12.50
Amitryptyline	3	12.50
Clonazepam	2	8.33
Diazepam	1	4.17
Diclofenac	1	4.17
Dothepin	1	4.17
Herbal medicine	2	8.33
Lorazepam	2	8.33
Multiple drugs	1	4.17
Paracetamol	2	8.33
Propranolol	1	4.17
Ranitidine	1	4.17
Risperidone	1	4.17
Scaboma lotion	1	4.17
Miscellaneous	2	8.33

System affected by the poison (n=142): Altogether in 98 patients 2 did not have any systemic manifestations due to the poison. The remaining 96 patients had a total of 142 systems involved. The details are listed in Table 7.

Table 7. System affected by the poison (n=142)

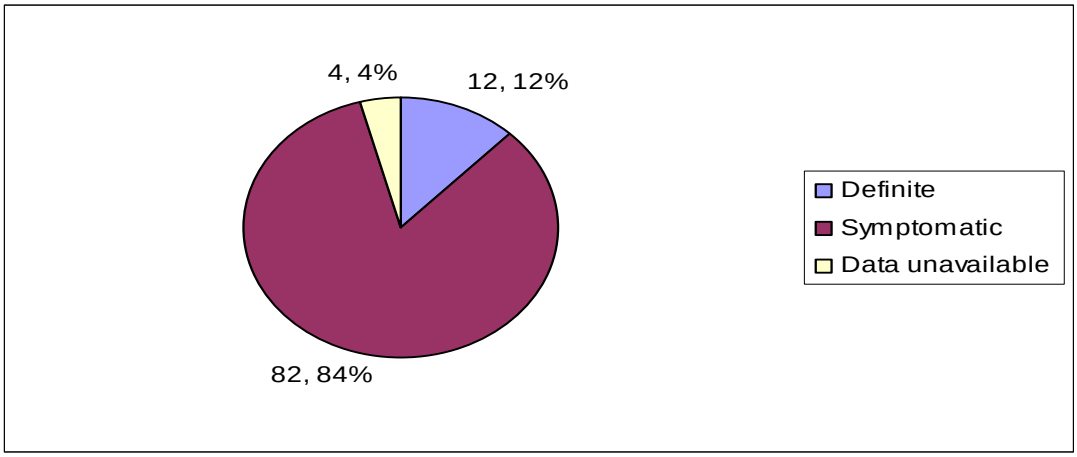
System affected	Number of cases	**Percentage**
Gastrointestinal	53	37.32
Hematological	1	0.70
Hepatobiliary	6	4.23
Respiratory	15	10.56
Cardiovascular system	14	9.86
Central nervous system	43	30.28
Miscellaneous	2	1.41
Data unavailable	8	5.63

Note: Some patients might have had more than one system involved

Laboratory abnormalities encountered: Among the total 98 patients 25 (26%) had abnormalities in their biochemical tests, 4 (4.08%) had microbiological, 33 (33.67%) had pathological abnormalities, 16 (16.33%) had radiological abnormalities and 21 (21.43%) had changes in the ECG during the stay in the hospital.

Treatment type: The treatment type of the poisoned patients is listed in Figure 2.

Figure 2. Treatment type



Therapeutic category of drugs prescribed (n= 306): All the 98 patients had required at least one drug for managing the poison. The total number of drugs used was 306 with an average of 3.12 drugs per patient. The details are listed in Table 8.

Table 8. Therapeutic category of drugs prescribed (n= 306)

Therapeutic classification	No. of drugs (n=306)	Percentage
Central nervous system	27	8.82
Antimicrobials	44	14.38
Cardiovascular, renal and blood	4	1.31
Antihistamines	1	0.33
Analgesics and anti-inflammatory	1	0.33
Vitamins, minerals and dietary supplements	18	5.88
Gastrointestinal system	106	34.64
Autonomic nervous system	27	8.82
Activated charcoal	33	10.78
Intravenous fluids	26	8.50
Antidotes (Pralidoxime/ Atropine)	13	4.25
Miscellaneous	6	1.96

Note: More than one drugs have been used in some patients

Development of secondary complications: Among the total 98 patients 28 (28.57%) of them developed some secondary complications. The drugs used in the management of secondary complications are listed in Table 9.

Table 9. Drugs use to manage the secondary complications

Drugs	No. of drugs (n=16)	Percentage
Central nervous system	3	18.75
Antimicrobials	4	25.00
Cardiovascular, renal and blood	2	12.50
Steroids	1	6.25
Analgesics and anti-inflammatory	1	6.25
Vitamins, minerals and dietary supplements	1	6.25
Gastrointestinal system	2	12.50
Autonomic nervous system	1	6.25
Intravenous fluids	1	6.25

Outcome of the treatment: Among the 98 patients, 79 (80.61%) of them improved, 18 (18.37%) died in the hospital and one (1.02%) absconded.

Poison responsible for death (n=18): Altogether 18 patients leading to a mortality rate of 18.37%. Rat poison was the commonest poison responsible for the death of 5 patients. The details regarding the poisons responsible for death are listed in Table 10.

Table 10. Poison responsible for death (n=18)

Type of poison	Number	Percentage
Rat poison	5	27.78
Organophosphorous	4	22.22
Mushroom	3	16.67
Drugs	2	11.11
Phenoloic compounds	1	5.56
Herbal	1	5.56
Miscellaneous	1	5.56
Unknown	1	5.56

Discharge medications: At the time of discharge from the hospital, patients are usually prescribed with medications. The commonly prescribed discharge medications are related to the central nervous system (36.69%). The various discharge medications used in the patients are listed in Table 11.

Table 11. Discharge medications

Drug category	Number (n=169)	Percentage
Central nervous system	62	36.69
Antimicrobials	10	5.92
Cardiovascular, renal and blood	4	2.37
Antihistamines	2	1.18
Analgesics and anti-inflammatory	2	1.18
Vitamins, minerals and dietary supplements	19	11.24
Gastrointestinal system	57	33.73
Autonomic nervous system	1	0.59
Anthelmenthics	1	0.59
Respiratory	4	2.37
Antifungal	1	0.59
Miscellaneous	6	3.55

Note: few patients might have been prescribed more than one drugs

Psychological counseling: Seventy nine of the patients improved and got discharged. Among these patients 64 (81.01%) received counseling by a psychiatrist or a clinical psychologist. Fifteen (18.98%) did not receive counseling.

Discussion

Poisoning is a worldwide recognized problem. Studies from Nepal also acknowledged poison as a major problem leading to an increased morbidity and a significant mortality [1,5,6]. Our study analyzed the clinical profile and management pattern of poisoned patients admitted at the MTH during the study period. The mean ± SD of the age of patients were 26.92±14.2 years. A study from the US [7] found the mean age as 16.9 years for the patients attempting suicides. The age group 21-40 years was the highest in number in our study. A similar finding was observed by *Khadka etal* [8] from Nepal and *Gajri et al* [9] from India reported the patients with 21-30 years at a higher in number encountering poisoning. In general this middle aged group is more prone to stress and might have a increased risk for suicidal poisoning.

Earlier studies from Nepal identified a seasonal variation with most cases occurring during summer [1]. However, a study from India found an association between the rainy season and occurrence of poisoning [10]. We did not find any such associations. The exact reason behind the seasonal variation behind poisoning is unknown. However in countries like Nepal, many people depend on agriculture and labor works. During summer, due to lack of agricultural income people might attempt suicides. However, we do not have any data to support our statements.

The time gap between the poison intake and hospitalization can be directly associated with the prognosis and the mortality rate. In general, early hospitalization can be beneficial in gut decontamination, initiating antidotes and in providing adequate life saving support. In our study 32.5% of the cases reached the hospital with in two hours of intake of the poison. In a study by *Karki etal* [11] conducted on organophosphorous poisoning, 90% of the patients reached the hospital with in two hours after consuming the poison. However, since our hospital is a tertiary care hospital, only 46.94% of the cases were brought directly to the hospital. The remaining cases received primary treatment in local health centers or referred after a period of time for tertiary care.

The duration of hospital stay of a poisoned patient is an important factor to be observed in a poisoning study. It determines the direct as well as the indirect cost associated with therapy, the loss of wages by the patient care takers etc. In our study, the mean ± SD of the duration of hospital stay was 4.27±4.47 days. One study from Nepal reported the mean hospital stay for poisoning as 7.5 days [1]. The mean duration of stay was thus lower in our case. We could not find the reason behind such a lower duration of hospital stay in our study patients.

In our study, 79.59% of the poisoning cases were intentional. Our result is comparable with the study by Paudyal [1] where 75% of the poisoning was intentional. Another study from Nepal reported intentional poisoning in 58.2% of the cases [8]. One study from South India reported intentional poisoning in 96% of the cases [12]. The causes for intentional poisoning are generally related to psychosocial factors. In our region there was an ongoing insurgence which might have also had an influence. However we failed to analyze the cause behind the intentional poisoning as our study was retrospective one.

The accidental poisoning in 15.31% of the cases was either by pediatric patients, poisoning due to native herbs or due to wild mushroom consumption. In general pediatric patients are at a higher risk of accidental poisoning. One study from Nigeria reported accidental poisoning accountable for 98.4% of the total pediatric poisoning cases [13]. The accidental poisoning in children warrants that the mothers or the case takers should be counseled while prescribing medications to the children and drugs to be kept out of reach of children.

The route of poison intake plays an important role in the prognosis. In case of the contact poisoning the treatment becomes easy whereas in case of parenteral poisoning it becomes difficult. In case of oral ingestion, the prognosis and the treatment pattern depends upon the time duration between the intake and gastric lavage, concurrent drug administration, oral absorption of the drug etc. In case of corrosives however vomiting should not be induced [14]. In our study, 96.64% of the cases took the poison orally. A study by *Khadka etal* from Nepal also identified oral route as the common route responsible for poisoning in 86.57% of the cases [8]. This demands the development of standard treatment protocol for gastric lavage, use of activated charcoal, induction of vomiting etc. At MTH, there is a Drug information center (DIC) which provides authentic, unbiased information to the healthcare professionals and plays an active role in devising these guidelines.

In our study, we found 30.61% of the patients took liquid form and 24% took the powder form of poison. In case of powder form, many times the labels are not present and it becomes difficult for the clinician to identify the nature of the compound as the rat poison is also available in powder form. Moreover, we do not have the laboratory infrastructure to identify the chemical nature of the substances. Gastric lavage is one of the widely accepted methods for removing the unabsorbed portion of the poison [15]. Earlier the gastric lavage, better the prognosis. In our study 20.41% of the patients underwent gastric lavage within 2 hours of poison intake. We do not find any similar data regarding the time gap between poison intake and gastric lavage. The chief complaints of the poisoning cases were found to be gastrointestinal related in 50% of the cases and central nervous system related in 25.53% of the cases. The chief complaints of the patients play an important role in providing symptomatic management of the poisoned patients.

Majority (59.18%) of the patients was conscious at the time of hospitalization and 22.45% were semiconscious and 13.27% were unconscious. In a study by *Garji etal* [9], 61.47% of the cases were conscious, 26.17% were partially conscious and 12.36 % were unconscious. The general condition of the patients plays an important role in managing the patients. In general, the use of CNS depressants and induction of vomiting is better avoided in unconscious patients and in patients with poor Glasgow Coma Scale (GCS) score are to be intubated to prevent aspiration.

We found rat poison as the common poison responsible in 31.68% of the total poisoning substances. In a study by Paudyal [1], organophosphates were the common poisoning. *Singh etal* [16] from South India reported agrochemical pesticides as the common agents. A study on childhoods poisoning in Nigeria reported kerosene as the common poison [13]. Our finding is supported by *Gargi etal* [9] that aluminium phosphide (a constituent in rat poison) as the common poison accounting for 38.23% of the cases and *Siwach etal* [17] reported 67.8% of the cases to be due to aluminium phosphide.

Organophosphorous compounds are also a major cause of poisoning in developing world. In our study it was the second common class responsible for poisoning. Our findings suggest that there is a free availability of rat poison in the region. Rat poison can be of mainly three types, anticoagulant containing, phosphide containing and red squill containing [18]. Since rat poisoning is common in our region, there is need for developing standard guidelines for managing this poison. Oraganophosphorus poisoning is also very common and clinicians should follow standard guidelines for managing the patients with OP poisoning. *Singh S* provides an evidence based approach for managing OP poisoning [19].

We found drugs as responsible for 22.77% of the poisoning cases, *Singh etal* [16] identified 17% of cases to be due to drugs. *Paudyal* from Nepal identified drugs responsible for 25% of the total poisoning [1]. Upon occurrence of drug poisoning several parameters should be considered by the clinicians while managing the patients. It includes the protein binding, plasma half-life, peak plasma concentration etc. In Nepal, even narcotics and psychotropic drugs can be purchased from a pharmacy without having a prescription. Worldwide several studies identified paracetamol as a common drug responsible for poisoning. Paracetamol is the commonest drug taken in overdose in the United Kingdom (UK) accounting for 48% of all hospitalizations due to poisoning [20]. In the US, paracetamol alone accounted for 4.1% of deaths from poisoning reported to American poisons centers in 1997 [21] and considered as the second leading cause of toxic drug ingestions [22]. In Singapore, paracetamol is responsible for one half of all deliberate self poisoning among the young people [23]. In our study it was responsible for 8.33% of total drug poisonings.

The common drugs used in the management of poisoning were related to gastrointestinal and antimicrobials. The gastrointestinal agents used were mainly the H2-receptor blockers and proton pump inhibitors to prevent acid secretion. We encountered microbiological abnormalities in 33.67% of the cases during the course of treatment. This suggests the development of secondary infections in these patients. Activated charcoal is used in few patients. The use of activated charcoal is recommended in managing many poisons. The 1997 position statement on gastric decontamination by the American Academy of Clinical Toxicology and the European Association of Poisons Centers and Clinical Toxicologists indicates that single-dose activated charcoal is the agent of choice for most poisoning (although it should not be given routinely), ipecac is effectively obsolete, and gastric lavage is only indicated for patients who ingested potentially lethal amount of toxins not adsorbed by activated charcoal. Effects of gastric lavage are highly variable and also diminish with time. It should only be used, within 60 minutes of ingestion, in patients who ingested a potentially lethal amount of poison. Although activated charcoal is the preferred choice, it should not be administered routinely in the management of poisoning. It has the greatest benefit if administered within 1 hour of ingestion [24] Pralidoxime was used in most (13 out of 15) of the patients with OP poisoning. The use of oximes should be highly evaluated as there are controversies exist regarding their use in OP poisoning [25]. The use of oximes however does not have a definite role in carbamate poisoning [26].

The morality rate was 18.37% in our study. A study by *Srinivas rao etal* [12] reported a fatality rate of 22.6%. Another study from a South Indian tertiary care hospital reported 3.3% of death rate [27]. In a childhood poisoning study, a mortality rate of 11.95 % was observed [13]. The mortality rate can be influenced by many parameters.

We found rat poison as the common poison responsible for mortality. The patients died either due to acute respiratory distress syndrome (ARDS) or due to refractory shock suggesting the poison to be chemically related to aluminium phosphide. However, we could not confirm our statement due to the unavailability of laboratory methods to detect their chemical nature. *Sing etal* [16] found organophosphates responsible for majority of detah. *Srinivas rao etal* identified monocrotophus and endosulphan as the common poison responsible for death [12]. *Thomas etal* identified pesticides to be common cause behind death [27]. We also encountered 3 deaths due to mushroom poisoning among the 5 patients who consumed it with a death rate of 60%. These patients died due to fulminant hepatic failure.

The discharged patients attempting suicides are usually counseled by the Psychiatrist or Clinical Psychologist. More than 80% of the discharged patients in our study received counseling prior to the discharge. Providing counseling can further prevent the occurrence of suicidal attempt. The discharge medications are mainly CNS related and GIT related in our study. While prescribing a CNS related drug to a patient, there is a need for counseling the patient attendants as the patient may not adhere to the treatment.

Limitations: The number of patients was less to apply statistical comparisons. We do not have laboratory support to estimate the levels of the poison and also to identify the specific substance. Hence we failed to characterize certain important poisons like rat poison, herbal poisons, mushroom species etc.

Conclusion: Our study was the first study which studied the pattern of poisoning in Western region of Nepal. Our study was successful in finding the answers for the objectives. Females had a higher preponderance. Rat poison was the common poison and the one responsible for higher mortality. Nearly one fourth of the patients developed secondary complications and nearly one fifth died in the hospital. Majority of the survivors were given counseling prior to their discharge from the hospital. There is a need for developing guidelines for managing the common poisonings and for the common procedures followed during the poison management.

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