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Original Research Article

Trend and outcome of acute poisoning case: an experience from emergency department of eastern Nepal

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ABSTRACT

Background: Poisoning is common in Nepal. The objective of the study was to describe the profile of poisoning cases presenting to the emergency of a medical university in eastern Nepal. The specific focus was on to describe the presentation, demographics, delay to care and describe the triage parameters at presentation.
Methods: An observational study was done. The secondary data from case files of all poisoning patients starting February 2012 to March 2013 were analyzed after retrieving them from Hospital record.
Results: Poisoning constituted 3.89% of total emergency visits. Mean age was 24 years with female: male 1.32. Median time delay to presentation from the incident was 4 hours. Mortality rate was 5.1%, intubation rate 6.3%. Agricultural products ingestion (763/1399) was the commonest modality. The triage vitals were noted as median 110 mm of Hg (Q25, Q75 100, 120) for systolic blood pressure, median 87 mm of Hg (Q25, Q75 73, 93) for mean arterial pressure and median 97 (Q25, Q75 94, 98) for SPO2 by pulse oximetry. The level of consciousness was noted as alert (87.6%), response to verbal stimuli (3.7%), response to pain stimuli (7.1) and unconscious (1.6%). Comparison between mortality and no mortality groups showed significant difference for mean arterial pressure (n 1399, $p<0.001$, Kruskal Wallis Test), SPO2 (n 1399, $p<0.001$, Kruskal Wallis Test) and state of consciousness (n 1399, $p<0.001$, Chi Square test).
Conclusions: Agricultural products are commonest, drugs and unknown poisons are significant. A large proportion is still unknown poisoning. Triage parameters can help to identify patients in risk of high mortality.

Keywords: Emergency, Mortality, Outcome of poisoning, Poisoning, Trend of poisoning

INTRODUCTION

Poisoning is a common presentation in Emergency department involving all age groups, although most affected is the young population.[1-4] The reasons for poisoning are mostly intentional self-harm, accidental and sometimes homicidal. It poses a significant burden on the health resources with an appreciable mortality and morbidity. Poisoning falls under top 50 causes of mortality with age-standardized death rates of 6.76 per 100000 populations in Nepal.[5]

Poisoning is an acute presentation and demands a need for early and aggressive management in Emergency. Early identification and triage helps to guide the needed resuscitation efforts and other management priorities like use of antidotes, supportive measures and psychiatric care if needed. Previous literatures have identified agricultural products as the commonest poison in almost all regions of Nepal.[2,6,7] A similar pattern is also noted for other countries in Africa and India.[8,9-12] The local emergency medical practitioner should be familiar with changing trend in the use of poison as the pattern of poison may vary from region to region over time.[1,8,12]

The objective of the study was to describe the profile of poisoning cases presenting to the Emergency of BP Koirala Institute of Health Sciences (BPKIHS), a medical university in eastern Nepal. The specific focus was on to describe the presentation, demographics, delay to care and need for resuscitation at presentation.

METHODS

This is an observational study done in the Department of General Practice and Emergency Medicine at BP Koirala Institute of Health Science (BPKIHS), a medical university that also serves as major referral center for the region. The study period was from February 2012 to March 2013. The emergency sees an average of 125 unsorted cases mix per day, predominantly a mix of rural to semi-urban population.

The secondary data from case files of all poisoning patients were analyzed after retrieving them from Hospital records. All the files were exhaustively searched for triage record and doctors' note to identify the variables of interest viz the demographic profile of the patient, triage time, triage findings, clinical history with examination findings and intubation notes. The researchers went through all the case files and filled the preformed questionnaire developed for the purpose.

All patients with alleged history of poisonings via oral route were included in the study. All the other forms of poisonings apart from oral route were excluded.

The current practice at the emergency mandates the nurses to complete the triage form for each patient immediately on arrival. The triage form is designed to fill a brief targeted history along with patient's vital signs including SpO_2. Then they announce the higher acuity patient on mike to doctors who attend the case. This allowed us to record our variables of interest and reduce the missing data to a minimum.

The term "poisoning" was used to denote ingested poison only and incorporated both toxic agent ingestion and drug overdose. 'AVPU' scale (alert, response to verbal stimuli, response to pain stimuli, unconscious) was used to measure the level of consciousness. MAP was later calculated from systolic and diastolic blood pressure. Triage system in use was Australasian Triage Score (ATS). It is a five tiered score where urgency increase from ATS 5 to ATS 1. Surrogate markers used to identify the need for resuscitation and describe the triage parameters were "need for intubation", "SpO_2" and "mean arterial pressure".

Ethical clearance was taken from Institutional Review Committee, BPKIHS. The research uses the secondary data from the case files and this could in no way compromise the quality of care the patient had received. The identification of the patient cannot be done from the analyzed data.

Microsoft Excel 2007 was used for initial data entry which was exported to SPSS software version 17 for final analysis. Data was described in terms of median values with interquartile range and percentages. Chi square test was used to test for association for categorical variables and Kruskal-Wallis test for numerical variables.

RESULTS

A total of 1437 patients were diagnosed as poisoning patients according to the hospital record which constituted 3.89% of total emergency visits during the period. Only 1399 case files were included in the final analysis as 38 case files were missing.

The median age of patients was 24 years (Q25, Q75, minimum, maximum 18, 35, 1, 99). By age distribution, age less than 12 years consisted of 12% and elderly population aged 60 years or more consisted of 6%. The female: male ratio was 1.32. The median time delay to presentation from the incident was 4 hours (Q25, Q75, minimum, maximum value 2, 7, 0.5, 96). The proportion of patients who arrived within an hour was 13% and 10% of patients arrived after 10 hours. The distribution of cases by triage score was 2%, 90.1% and 7.1% for ATS 1, 2 and 3 respectively. Mortality rate was 5.1%. Emergency discharge rate was 13% and 12% patients were discharged against medical advice after persistent request.

Agricultural products ingestion (763/1399) was the commonest modality to poisoning and formed a major proportion of pediatric poisoning as well. Organophosphates contributed to 398 cases of poisoning. Classified under others there were rare agents that are locally available like oleander and other local seeds/roots (13 in number), fertilizer (16 in number) and formalin (2 in number). The common drug ingestions were paracetamol, benzodiazepine, and opioids. When age was less than 12 years accidental kerosene ingestion and drug ingestion was common (Table 1).

The triage vitals were noted as median 110 mm of Hg (Q25, Q75, minimum, maximum 100, 120, 0, 200) for systolic blood pressure, median 87 mm of Hg (Q25, Q75, minimum, maximum 73, 93, 0, 147) for mean arterial pressure and median 97 (Q25, Q75, minimum, maximum 94, 98, 0, 100) for SPO2 by pulse oximetry. The level of consciousness at presentation was noted as alert (87.6%), response to verbal stimuli (3.7%), response to pain stimuli (7.1) and unconscious (1.6%) which totaled to 12.4% patients with altered consciousness. The total number of emergency intubations performed were 88 (6.3%), 40 of these were for organophosphate poisoning. Comparison between mortality and no mortality groups showed significant difference for mean arterial pressure (n 1399, $p<0.001$, Kruskal Wallis Test), SPO2 (n 1399, $p<0.001$, Kruskal Wallis Test) and state of consciousness (n 1399, $p<0.001$, Chi Square test) (Figure 1).

Table 1: Poisonous agents distributed according to age groups.

Poisonous substances	Age group in years					Total patients
	0-12	13-19	20-39	40-59	60+	
Organophosphates	13	94	167	50	8	332
Phosphide	7	51	92	15	10	175
Organophosphate in combination	1	14	37	9	5	66
Organochlorine	16	44	102	21	7	190
Medicinal agents	12	27	52	5	6	102
Kerosene	44	2	3	0	0	49
Mushroom	12	20	38	14	7	91
Others (herbal and local products)	31	33	47	23	6	140
Unknown	27	41	127	33	26	254
Total	163	326	665	170	75	1399

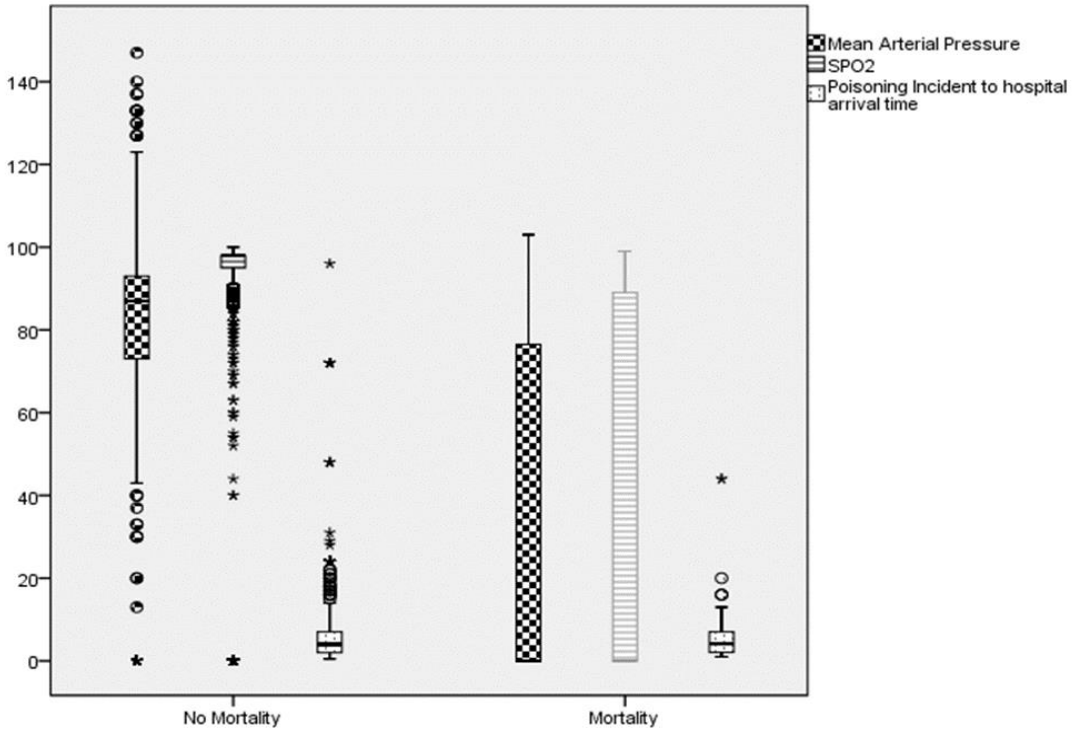

Figure 1: Mortality and presentation characteristics.

DISCUSSION

We described emergency poisoning and triage findings at emergency, a topic much less reported from Nepal till date. Previous publications from the same hospitals have shown that poisoning cases presenting to us are higher acuity needing urgent interventions, similar to what we have observed.[2,13] Poisoning is a regular presentation in emergency departments of Nepal and cases of poisoning over one to three years have been reported to be 137 to 276 in number.[2,6-7] The number of poisoning, however, is increasing year by year.[1,11,14] Periodic researches can be useful to document the evolving trend of poisoning especially in countries with lesser poisoning centers and resources. The number of poisoning cases (1437) reported here are by far the largest reported from the country. The reason for such a large number could be because we included all the cases of suspected poisoning that presented to the emergency.

The pattern of poison and the predominance of young age which is working group is similar to other publications reported from the country and outside.[2,6-9,12] A proportion of these have occurred in children (13%) emphasizing the need for preventive strategies and public awareness. Various studies have noted poisoning in the elderly population from 1-5%.[2,3,6-8,11] The higher proportion in elderly poisoning (10%) in our study may mirror the changing population dynamics of the country. Previous literatures from the country have also identified that elderly population are more conflicted and isolated due to society in transition.[15,16] Its relation with poisoning is a topic for further research. Accidental poisoning due to senility and related problems has been reported from

America.[17] Our study shows a slightly higher female involvement in contrast to with higher male involvement as noted by others.[9,11,18] This could be due to socioeconomic vulnerability of the group.

The commonest poisons reported were organophosphates in adults/elderly population and kerosene poisoning in the children. Household local products including herbals were also common in the children. The reason for poison ingestion was incomplete due to retrospective design and so it was not included in the final analysis. In general, however, the intent was largely suicidal in adults/elderly population and accidental in pediatric. Noteworthy, a child of 12 years had deliberate self-harm intent indicative of changing societal norms in the country. The availability of poison seems to be the main determining factor in the choice of poison as the pattern was similar to the research conducted elsewhere in Nepal.[2,6-7,19-20] The number of local and herbal products are higher (10%) in our study. The abundance of organophosphate was also noted in publications from India and Africa.[9-11,18] although household products and drugs were reported as more common in some studies from Africa and Turkey.[4,12] Less adherence to local regulations, proximity to rural India, agriculture as a major profession of country and "role model" from previous victims may all have a role in an abundance of poisoning from pesticides and other agricultural products. Noteworthy of mention, we found some cases with formalin (in lab workers) and even fertilizer which was available being used as poisoning agents.

Mushroom (n=91) is another toxic agent that is easily accessible locally. Although organized mushroom farming is also present, people in this suburban/rural area also consume wild mushroom as an option for curry. Similar practice has been noted in earlier researches and report vomiting as a common symptom and liver failure and renal failure as the cause of mortality.[21,22] All the reported mushroom cases were accidental in nature. Mushroom consumption as a recreational drug is relatively unheard of in Nepal. A significant proportion of cases (18%) were due to "unknown" poisoning.

The patients often come from far and containers of poison are regularly lost in transit to hospital/s. Anecdotally, the expansion in telephone/mobile networks coupled with a more educated population in the country have decreased this proportion of unknown toxic agents. Currently, the usual practice in our emergency is to request people to call someone at home to find the poison and texts back the names by mobile phones. Still the proportion of unknown poison remains high since people are often not able to tell the names of poison in contrast to a study from Ethiopia which reported that causative poisons were documented in 87%.[3]

The reported delay to hospital reaching time (median 4 hours) mostly excludes the use of ancillary treatment like aspiration of toxic contents from stomach or use of activated charcoal, our usual practice for patients presenting within an hour. The delay in time to presentation is explained by referral time from other primary care centers or small hospitals and identifies a lacunae in the provision of effective supportive and specific care like use of antidotes. In comparison, a study from the capital Kathmandu showed 162/276 patients arrival to hospital within 2 hours.[6] This identifies an area to improve by training and education. For example, identification of signs of organophosphate poisoning and titrated use of atropine to reach end points of care can reduce morbidity and mortality though the use should compare benefits versus harms like overuse of atropine and the competency and resources of health workers in these places. Notably, 40 out of 80 patients who were intubated were patients with organophosphate poison.

The distribution of vital signs recorded at triage shows a marked difference between the "mortality" and "no mortality" groups. Patients who died were more critically ill as evident by the difference in triage score and triage vitals. Mortality rates reported by us is 5.1% as compared to 2.9% to 6.9% as reported by others from the country.[1,6,20] The mortality rate reported from Ethiopia is quite low (<1%), however, the commonest poison reported was household agents in the study.[3] An under-reporting on mortality is possible, however, since a large proportion of patients "left against medical advice" (12%) and their outcome could not be verified. A similar situation was also described by Maskey et al with a mortality rate of 6.9% and 19.4% patients leaving against medical advice.[23]

Triaging helps in timeliness of care and can be useful in a set up with relative resource deficiency besides helping to identify serious patients first.[24] The process of triaging involves measuring simple parameters like blood pressure, pulse rate, respiratory rate, temperature coupled with the patient history. The use of these parameters can serve as early warning system and predictors of mortality.[25-27] However, very few studies have looked as triage parameters as the outcome predictors for poisoning cases in emergency or these were done for single agents.[28-30] Our study shows significant difference in triage findings (SPO2, AVPU scale and MAP) for mortality and no mortality groups (fig 1). Similar findings were noted for triage parameters like body temperature <36 or >37°C, $p < 0.01$, systolic blood pressure <100 or >150 mmHg, $p<0.01$, heart rate <35 or >120 bpm, respiratory rate <16 or >20 per minute to predict mortality of acute poisoning cases in emergency.[30] This highlights the need for a systematic triage especially in our country where there are resource constraints.

CONCLUSION

Poisoning is a common cause of attendance to emergency. Agricultural products are commonest but other important causes like drugs and local products also

contribute significantly. A large portion is still unknown poisoning. Triage parameters like SpO_2, MAP and level of consciousness can be a method to identify patients in risk of high mortality.

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