

Socio-economic Profile and Outcome of Poisoning Cases in a Tertiary Care Center of Nepal

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Abstract :-

Background: Poisoning is one of the major public health problems gripping developing countries like Nepal. Among variety of poisons, pesticides and insecticides are easily available in Nepal, and thus commonly linked to self-harm and suicide. Establishment of a socio-clinical profile of poisoning would help to endorse pertinent preventive and management strategies. In this regard, this study aimed to determine the socio-clinical profile and outcome of acute poisoning cases admitted to Bheri hospital, a tertiary care center in Nepalgunj.

Methods: A retrospective observational study was conducted from 16th July 2019 to 15th July 2020. Demographic details, circumstances of poisoning, name and chemical nature of the poisonous substance(s), poisonous substance and various other parameters were reviewed and analyzed using by SPSS 20.

Results: A total of 257 cases of poisoning were recorded, out of which 168(65.4%) were females and 9(34.6%) were males, the F:M ratio being 1.9. Poisoning was most common among the age group of 11-20 years- 85(33.07%) and 21-30 years- 85(33.07%). Most of the cases were housewives 118(45.91%) followed by students 47(18.28%). It was prevalent among people of disadvantaged ethnic group(s): Dalit 66(25.68%) followed by Tharu 58(22.56%). The most common poisonous substance used was cypermethrin 60(23.34%) followed by organophosphate 53(20.62%). Suicidal poisoning was the representative cause accounting for the maximum number of cases i.e. 245(95.33%). Domestic quarrel 129(50.19%) followed by financial insecurities 44(17.12%) were the common triggering events. 10(3.89%) patients expired during the course of treatment.

Conclusions: This study highlighted that adolescent and adults especially females are at higher risk of poisoning. Social backwardness and financial instability were also factor predisposing to poisoning. Pesticides are deliberately misused to commit suicide. It can be prevented through restriction of easy availability of poisons, establishment of poison information centers and community mental health programs.

Keywords:- Poisoning; Organophosphate; Pesticides; Suicide.

I. INTRODUCTION

Acute poisoning is one of the urgent medical problem requiring hospitalization. Poisonous response refers to interference of normal body function by toxins or chemicals. Poisoning can be due to the intake of poison through swallowing, inhaling or absorption.[1]

Every year intentional poisoning with pesticides attribute to 14–20% of world wide suicides, an around 110,000–168,000 deaths each year, down from an estimated 371,000 in the late 1990s.[2] A study in year 2015 from central region of Nepal showed that 90% of all poisoning cases were due to intentional ingestion of pesticides.[3]

In Nepal, due to failure of strict implementation of narcotic drug control Act 1976 and pesticide Act 1991, pesticides are misused as agent for suicide.[4] Preventive strategies requires information on nature and extent of poisoning which is scarce in this region. Thus, we aimed to determine the socio-clinical profile and outcomes of poisoning patients admitted to Bheri hospital, Nepalgunj.

II. METHODOLOGY

This study was a hospital based retrospective, observational study conducted in the Emergency department of Bheri Hospital, a Tertiary Care Centre in Lumbini Province, Nepal during the period of one year from 15th July, 2019 AD to 14th July 2020 AD. Ethical clearance for research was taken from Nepal Health Research Council. Case sheets of all the poisoning cases during the study period were studied and the findings were noted. Data regarding age, sex, ethnicity, occupation, reasons for exposure, circumstances of poisoning, nature of poisonous substance(s), duration of hospital admission and treatment outcomes were obtained. Food poisoning, snake or insect bite, and alcohol consumption investigation brought by police were excluded from the study. The obtained data were entered into Microsoft Excel 2010 and analyzed with Statistical Package for Social Sciences version 20 software. Frequency and percentage were calculated. They were represented in tables and figures to intensify the results

III. RESULTS

A total of 257 patients were included in the study, out of which 89 (34.63 %) were male and 168 (65.36 %) were female, which give Female: Male sex ratio to be 1.9: 1. Most of the cases belonged to age group of 11-20 year 85(33.07%) and 21-30 year 85 (33.07 %) followed by 38 (14.78 %) cases in 1-10 year and 25 (9.72 %) in 41-50 years. Thus incidence of poisoning was high in adolescent and young age population below 30 years.

Fig 1: Age group wise distribution of Poisoning cases

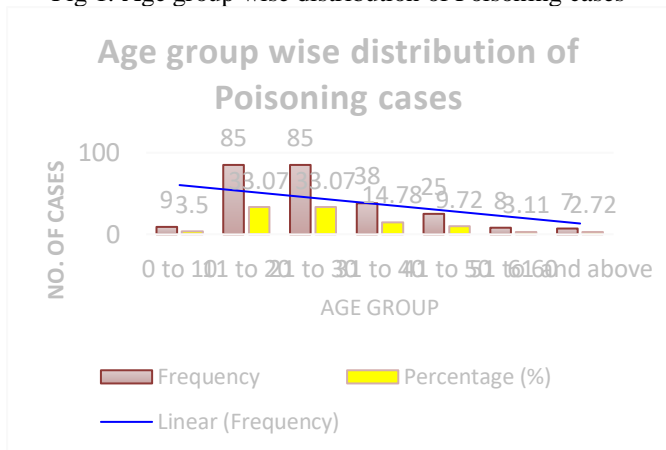


Table 1. Demographic Distribution

Variable	Frequency	Percentage	
Ethnicity	Hill Brahmin	6	2.33
	Hill Chhetri	47	18.28
	Terai Brahmin/Chhetri	5	1.94
	Hill Dalit	32	12.45
	Terai Dalit	34	13.22
	Hill Janjati (tribe)	13	5.05
	Tharu	58	22.56
	Other Terai/Madhesh Caste	37	14.39
	Muslim	22	8.56
	Others	3	1.16
Residence	Urban	82	31.90
	rural	175	68.09

The poisoning was higher in socially disadvantaged Dalit community 66 (25.68 %) followed by tharu 58 (22.56 %) and Terai/ Madhesh caste 37 (14.39 %) indicating socioeconomic angle towards poisoning. 151(58.75%) patients were from Banke districts, 59(22.95%) from Bardiya district, 17(6.61%) from Dang, 11(4.28%) were from Surkhet. Similarly, 9 from Kalikot, 4 Salyan, 3 Dailekh, 1 Jumla, 1 Rukum, 1 Achham.

Socioeconomic Distribution

Twelve (4.66 %) cases were accidental poisoning whereas the remaining 245 (95.33%) were intentional. Domestic quarrel was the predominant reason for poisoning 129 (50.19%) followed by financial issues 44 (17.12%). Table 2.

Table 2. Socio economic Distribution

Socio economic	Frequency	Percentage	
Occupation	House wife	118	45.91
	Student	47	18.28
	Farmer/labor	29	11.28
	Business/service	20	7.78
	No job/cannot work	41	15.95
Reason	Domestic quarrel	129	50.19
	Financial	44	17.12
	To threaten Family	38	14.78
	Love /tragedy	28	10.89
	Chronic illness	6	2.33
	Accidental	12	4.66

Seasonal Distribution

Poisoning was more prevalent in summer from June to August 79(30.73%) than that of winter December to February 64(24.90%). Similarly during autumn 62(24.12%) and spring 52 (20.23%) (Figure 2).

Fig 2: Seasonal Distribution

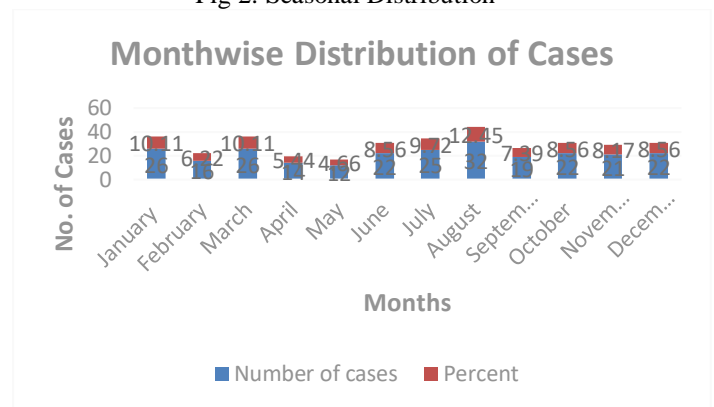


Table 3. Type of Poisoning substances

Type of Poison	Frequency	Percentage
Cypermethrin	60	23.34
Organophosphate	53	20.62
Zinc Phosphide (Rat Kill)	45	17.50
Aluminium phosphide (Celphos)	25	9.72
Oleander	17	6.61
Paracetamol/Drugs overdose	14	5.44
Herbicide	12	4.66
Harpic / phenol	9	3.50
Shampoo/Detergent	6	2.33
Others (Petroleum/kerosene, (5,1.94%), Fertilizers (4, 1.55%), Mushroom (3, 1.16%), Dhatura (3, 1.16 %), Carbon monoxide (1, 0.38%)		

Hospital Stay

The average stay was 2.15 days. Maximum Hospital stay in day was 11 days (4.28%) and Minimum Hospital stay was 1 day (0.38%). Table 4.

Table 4. Hospitalization and Hospital Stay

Hospitalization time after Exposure	Frequency	Percentage
Less than 60 minutes	64	24.90
More than 60 minutes	193	75.09
Admission in ward	229	89.10
Admission in Intensive care	28	10.89
Number of days in hospital		
≤ 5 days	241	93.77
> 5 days	16	6.22

Table 5. Outcome

Variable	Frequency	Percentage
Recovered	237	92.21
Expired	10	3.89
Leave Against Medical Advice	7	2.73
Refer	3	1.16

IV. DISCUSSION

Among variety of cases presenting to emergency room, poisoning cases need immediate intervention. This public health issue vary from accidental poisoning to suicidal and homicidal, often need of multidisciplinary management. Early recognition of poisoning, treatment and prevention are cornerstone in reducing the morbidity and mortality of poisoning..

This study included 257 poisoning cases presented in ER over a period of one year. There were 168 female with female: male sex ratio 1.9: 1 (F:M). This finding was similar with the study done in Chitwan and Palpa with F:M ratio of 1.99:1 and 2.01:1 respectively.[3,5] Similarly female predominance was found in numerous studies over Nepal however the ratio was lower than that of the present study, F:M ratio of 1.13:1.[6-10] A study from Turkey had F:M ratio of 3.5:1 which was much higher than the present study.[11] Female predominance in poisoning in this study may be attributed for the reason that they are vulnerable to physical and mental stress of day to day life in family and society.

Age group wise distribution

Most of the cases of poisoning belonged to the age group of 11-20 year 85(33.07%) and 21-30 year 85 (33.07 %). This finding was similar with the study done at Palpa where 32.3% of the patients belonged to 11-20 years and followed by 24.6% in 21-30 years.[5] At TU Teaching Hospital, Kathmandu most of the poisoning cases belonged to the age group 16-25 with 70% but at Bharatpur Hospital majority of cases 40% were below 15 years of age.[9] A study done at Dhulikhel Hospital, the majority of the patients

29.63% were above 40 years followed by 25.93% in the age group 21 to 30 years which was inconsistent with that of the present study.[8] The study done in Kathmandu medical college revealed that majority of the cases (38.8%) were in age group 21-30 years.[12] A study done in different hospitals across Nepal revealed Subjects between the age of 14 – 24 years were mostly at risk of poisoning with the 49% which was higher than that of the present study.[4] The age 11-20 is the age of physical, psychological, emotional, cultural development to reach adult hood transition from childhood to adulthood where they are subjected to various stress in life however not mature enough to handle these problems. Thus they are at risk of committing suicides to get rid of the problems.

The poisoning was higher in socially disadvantaged Dalit community 66 (25.68 %) followed by tharu tribe 58 (22.56 %) and Terai/ Madhesh caste 37 (14.39 %), this finding was similar with the study done in major hospitals of Chitwan districts where poisoning was 14.8% in dalit and 37.8% disadvantaged ethnic groups.[3] Social backwardness , financial crisis, and disparities in society are related with higher rates of suicide.[13-15]

175 (68.09 %) of poisoning cases were from rural and village areas. This was similar with the study from Chitwan with 71.3% of patients from rural area.[3] High suicides rate were found in the rural areas of several Asian countries.[16,17] This accounts to the facts that rural population are mostly dependent on agriculture and socioeconomically deprived. Poverty and dis satisfaction with life trigger for suicidal attempts.

Occupation

Poisoning was most common among house wives 118 (45.91 %) followed by students 47 (18.28 %) and farmers 29 (11.28%). However farmers (40.74%) were commonly effected followed by 31.49% housewives and students 16.67%.[8] However students were mainly involved in poisoning (35.8%) followed by housewives (22.3%).[12] Similarly in study from Palpa 36.92% of the patients were students, followed by farmer and house wives 26.16% and 21.53% respectively.[5] Poisoning was more prevalent among house wives in the present study. Females are at higher risk of poisoning which may be attributed to the fact they are vulnerable to day to day stress in managing house hold activities as well as working in fields, moreover also in risk of domestic violence.

Reason

Domestic quarrel 129(50.9%) was the most common reason of poisoning followed by financial 44(17.12%), threaten the family 38(14.78%), love tragedy 28(10.89%). This finding was similar to the findings of study where domestic quarrel 65.2% was the predominant cause. However Love tragedy 13%, threaten family 10.9%, finance issues 10.9% were contrary from the present study.[5] The finding from another study was much lesser than the present study where 37.04% was due to domestic quarrel, 20.37% due to threatening the family, 11.12% due to financial problems, 11.12% due to love life failures and rest 24.08% due to

failing exams, disputes with neighbor and job insecurity. Thus, misunderstanding between family members has been major responsible event for deliberate poisoning.[8]

Hospital stay

75.09% of the patients reached hospital after one hour in this study which was higher than the study from Biratnagar where 60.7% reached hospital more than 1 hour interval.[6] While another study conducted in Nepal had more than one-third of the patients arriving within an hour of exposure.[18] The early arrival of the patient to the hospital diagnosis and can reduce the chances of mortality.[6] Delay in the admission to the hospital can be attributed to delay detection of poison intake, traffic jams, lack of ambulance facilities, traditional treatments and a referral from other centers.

Substance causing Poisoning

Cypermethrin was the most common agent of poisoning 60(23.34 %) followed by organophosphate 53(20.62%), zinc phosphide 45(17.50%) and Aluminum phosphide 25(9.72%). Organophosphate 40% were most common agent used for deliberate suicide attempts followed by Phosphide 15%.[4] 46.67% of the poisoning cases noted at TU Teaching Hospital used Pesticides, mainly organophosphate followed by drugs. Rodenticides poisoning were the most common poisoning at Bharatpur District Hospital followed by pesticides.[9] The study done at Dhulikhel Hospital revealed, organophosphorous poisoning was the commonest 74.07%, followed by drugs like antidepressant 16.66%, Zinc phosphide 5.55%, benzodiazepines 1.85% and alcohol 1.85% respectively.[8] Organophosphorus compound was the most common poison used between 32 to 74 % in various studies.[8,19,20]

However, Phosphides and rodenticides are replacing organophosphate due to their fast and more effective actions and cheaper price.[21] Cypermethrin is a synthetic pyrethroid with eight chiral isomers. They are used as pesticide in agriculture, household and animal husbandry.[22] This may be the reason of abundance of cypermethrin and phosphides rather than organophosphate in this group of population in this study. In industrialized countries, poisoning are due to over doses of analgesics, tranquilizers, antidepressants- which are relatively non-toxic.[23] Wild mushroom poisoning and and dhatura (belladonna) consumption commonly resulted in intentional poisoning. Poisoning by drugs and accidental intake was less in this study. Insecticides are easily available and freely sold in the local shops moreover are cheaper which have made them common suicide agent in the present study.

Outcome

The recovery rate of poisoning 92.21 % in this study was similar with that of study from Biratnagar.[6] This study also stands consistent with the finding of the study from Chitwan where 87.3% of the patients improved, 3.8% left hospital against medical advice and 3.8% were referred to other centre. However there was no mortality.[3] 3.89% mortality of the present study was lesser than that of death of 14% at TU Teaching Hospital but it was comparable with that of Bharatpur District Hospital where 96.75% of cases recovered.[9] Worldwide studies report mortality rates from 3%

to 30%.[7] Similar outcome of 89% cure and mortality of 4.5% was noted in a multi center study from Nepal with average stay of 3.34 days stay in hospital.[4] However in the present study 93.7% of patients were discharged within a period of 5 days with average stay of 2.15 days. The mortality depends on multiple factors e.g. inherent toxicity of the poison, time taken to bring the patient to health care facility, amount ingested and facility of good medical treatment.[7]

Limitations

Food Poisoning, snake envenomation cases were excluded in this study. Though the study centre covers wide geographic range including Terai, hills and mountain region. Being a unicentric study is itself a limitation.

V. CONCLUSIONS

Pesticides are misused intentionally to commit suicide. Cypermethrin and organophosphate were the common pesticides for poisoning. This study has highlighted that adolescent and adults especially females are at higher risk of poisoning. Socioeconomically backward ethnic groups are also at greater risk. Domestic quarrel was the most common cause of suicide attempts. The free availability of pesticides should be banned by law. It should be sold at specific centers on recommendation of local bodies and a family witness. Mental health program regarding poisoning and suicide prevention should be launched at community level. The victims should under go psychological evaluation and treatment for prevention of similar attempts in future.

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REFERENCES

- [1]. World Health Statistics Annual 1988. Geneva, World Health Organization, 1998
- [2]. Bonvoisin, T., Utyasheva, L., Knipe, D. et al. Suicide by pesticide poisoning in India: a review of pesticide regulations and their impact on suicide trends. *BMC Public Health* 20, 251 (2020).
- [3]. Gyenwali, D., Vaidya, A., Tiwari, S. et al. Pesticide poisoning in Chitwan, Nepal: a descriptive epidemiological study. *BMC Public Health* 17, 619 (2017).
- [4]. Pokhrel D, Pant S, Pradhan A, Mansoor S. A comparative study of poisoning cases in central, zonal and district hospitals . *KUJSET*. 2008;5:40-8.
- [5]. Shakya R, Adhikary S, Bajracharya R. Pattern of Acute Poisoning Attending a Tertiary Care Hospital of Western Nepal. *Journal of Lumbini Medical College*. 2016;4(2):90.
- [6]. Sigdel D, Jha S, Kathet R, Mainal U, Pokharel R, Dwivedi A. Pattern and Outcome of Acute Poisoning Cases in a Tertiary Care Hospital in Eastern Nepal. *International Journal of Contemporary Medical Research [IJCMR]*. 2019;6(4).

- [7]. Bhattarai N, Rauniyar A, Chaudhary D, Jaiswal S, Banthia P, Rana BB. Patterns of organophosphorous poisoning attending a teaching hospital. *JNMA J Nepal Med Assoc.* 2006 Apr-Jun;45(162):228-32.
- [8]. Marahatta SB, Singh J, Shrestha R, Koju R. Poisoning cases attending emergency department in Dhulikhel Hospital- Kathmandu University Teaching Hospital. *Kathmandu Univ Med J (KUMJ).*
- [9]. Ghimire, R. H., Sharma, S. P., & Pandey, K. R. (2004). A comparative study of acute poisoning in Nepal at Tertiary and secondary level hospitals. *Journal of Nepal Medical Association*, 43(153).
- [10]. Gupta, S. K., & Joshi, M. P. (2002). Pesticide poisoning cases attending five major hospitals of Nepal. *Journal of Nepal Medical Association*, 41(144), 447–56.
- [11]. Gulohglu C, Kara IH. Acute poisoning cases admitted to a university hospital emergency department in Diyarbakir. Turkey. *Human and experimental toxicology.* 2005;24:49- 54
- [12]. Khadka SB, Ale SB. A study of poisoning cases in emergency Kathmandu Medical College Teaching Hospital. *KUMJ.* 2005; 3: 388-91.
- [13]. Konradsen F. Acute pesticide poisoning—a global public health problem. *Dan Med Bull.* 2007;54(1):58–9.
- [14]. Lorant V, Kunst AE, Huisman M, Costa G, Mackenbach J. Socio-economic inequalities in suicide: a European comparative study. *Br J Psychiatry.* 2005; 187(1):49–54.
- [15]. Manuel C, Gunnell DJ, Van Der Hoek W, Dawson A, Wijeratne IK, Konradsen F. Self-poisoning in rural Sri Lanka: small-area variations in incidence. *BMC Public Health.* 2008;8(1):1.
- [16]. Konradsen F. Acute pesticide poisoning—a global public health problem. *Dan Med Bull.* 2007;54(1):58–9.
- [17]. Chen Y-Y, Wu KC-C, Yousuf S, Yip PS: Suicide in Asia: opportunities and challenges. *Epidemiologic reviews* 2011;mxr025.
- [18]. Sarkar D, Shaheduzzaman M, Hossain MI, Ahmed M, Mohammad N, Basher A. Spectrum of acute pharmaceutical and chemical poisoning in northern Bangladesh. *Asia Pac J Med Toxicol* 2013; 2:2-5.
- [19]. Lohani SP. An epidemiological study of poisoning cases Reported to the Nepal Drug and poison information center, Kathmandu, Nepal Drug and Poison Center.
- [20]. National Survey on Drug Use and Health (NSDUH). Available from: <https://www.samhsa.gov/data/population-data-nsduh>.
- [21]. Karki RK, Risal A. Study of Poisoning Cases in a Tertiary Care Hospital. *Kathmandu Univ Med J.* 2012;10(4):70-3.
- [22]. Valles S, Koehler P. Insecticides Used in the Urban Environment: Mode of Action. Available from: <https://edis.ifas.ufl.edu/publication/in077>
- [23]. Michel K, Ballinari P, Bille-Brahe U, et al. Methods used for parasuicide: results of the WHO/EURO Multicentre Study on Parasuicide. *Social Psychiatry & Psychiatric Epidemiology.* 2000;35:156–163.