

Original Research Paper

A Toxidromic based Assessment of Patterns of Poisoning in a Tertiary Hospital in India

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Abstract

Acute poisoning is an important and common medical emergency. Acute poisoning is one of the major health challenges both in developing as well as developed countries^{2,3} **Aim of the Study**-We had conducted a study with the objective to investigate the pattern of acute poisoning cases by utilizing the toxidromic approach in a tertiary care hospital in Uttar Pradesh. **Material & Methods** We had done an observational study on acute poisoning patients presenting in the Emergency, Medicine, and Pediatrics department of Dr RMLIMS from January 2020 to January 2021. All consenting patients of both sexes with suspected poisoning were studied. Toxidromic approach based on clinical presentation of poisoned patients was utilized in identification of the type of poisoning. **Observations & Results** –total 82 cases were studied, we came across a total of 82 poisoning cases seen over a period of 1 year in the emergency, medicine and paediatric wards of RMLIMS. There were 40 males and 42 females, with Cluster A containing 28 males and 27 females, whereas Cluster B had 12 males and 15 females, The relative risk and Odd's ratio of total cases came out as 0.49 and 0.45 respectively. Majority of the cases in Cluster A & B showed features of Cholinergic Toxidrome, followed by corrosives and sympatholytics, anticholinergic toxidromes and medical toxins. **Conclusion:** we need to develop appropriate medical facilities like extracorporeal membrane oxygenation (ECMO) as a rescue modality for patients with acute reversible life threatening cardiopulmonary conditions. Poison control centre with Analytical Toxicology laboratory should be developed to handle and assist in advising the specific and appropriate management of poisoning cases.

Keywords: *Toxidrome, Cholinergic, Extracorporeal membrane oxygenation (ECMO)*

Introduction

Acute poisoning is an important and common medical emergency. The pattern or the nature of poisoning varies significantly according to the geographical location, depending mainly on the availability of that particular poison, which in turn is determined by the season, as

well as various socio economic factors. Prior information related to the prevalence of a particular poison in a particular season, could not only help in prevention of such incidents, it may also help in preparedness for proper management of acute poisoning cases. This in turn will help in improving the prognosis of such cases of acute poisoning. 1

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There is a significant increase in the rate of intentional poisoning worldwide. Acute poisoning is one of the major health challenges both in developing as well as developed countries^{2,3,4} Intentional poisoning via consuming various pesticides accounts for about one-third of the world's suicides. The proportion of all suicides using pesticides varies from 4% in the European

region to over 50% in the Western Pacific region, but this proportion is not concordant with the volume of pesticides sold in each region; Fatality is determined mainly by the type and toxicity of pesticide used, rather than the amount consumed or exposed.⁴ With the progress in the industrial and agricultural field and advances in medical sciences a vast number of insecticides have become available, which on exposure may produce severe toxicity. In India, we have limited information with reference to poisoning in adults, especially among the hospitalised patients^{5, 6, 7}. Various studies have shown that paediatric poisonings are mainly accidental in nature, whereas the adult poisonings especially among young adults are mainly intentional⁵. It is important to know the nature and severity of poisoning in order to take appropriate preventive measures. Studies of this nature will be a useful tool in planning and management of critically ill acute poisoning cases. In this context, we had conducted a study with the objective to investigate the pattern of acute poisoning cases by utilizing the toxidromic approach in a tertiary care hospital in Uttar Pradesh.

Material & Methods

We had done an observational study on acute poisoning patients presenting in the Emergency and medicine department of Dr RMLIMS from January 2020 to January 2021. All consenting patients of both sexes with suspected poisoning were studied. Toxidromic approach based on clinical presentation of poisoned patients was utilized in identification of the type of poisoning. Detailed history of underlying comorbidities was obtained from all the patients. Predisposing conditions triggering suicidal attempts were also tabulated. We had segregated the cases further in unintentional and intentional toxin exposure groups. We also noted down the demographic data of the patients including the Age, Sex, Marital status, socio economic status of acute poisoning patients. The Poisoning patients were assessed on the basis of Autonomic effects of the suspected poison-HR/BP, RR, Temperature, pupils, skin, secretions, mental status etc.

Data Analysis

We had divided the individuals into 2 clusters. Cluster A comprised of those patients who were less than 30 years of age and Cluster B had poisoning patients of 30 years and above.

We used the multivariate analysis and the variables that were studied were age, sex, type of poison, category of event, effects produced, route of exposure, suspected toxidrome, time lapse between exposure and treatment, poisoning severity score, and evolution of case or outcome (complete recovery without sequelae, recovery with sequelae, death).

For the analysis, values of $p < 0.05$ were accepted. The statistical software used was the IBM SPSS Statistics 21. frequency and descriptive analysis with the continuous and string variables.

Multiple logistic regression analysis. MLRA was used to evaluate the dependent variable and predict changes as responses in the independent variables. The dependent variable was "evaluation of cases", which was recorded into two categories, more severe and less severe. The independent variables were the continuous or categorical. The MLRA was qualified by a linear model that establishes a method based on Likelihood research. It was estimated by the "odds ratio" with a 95% confidence interval³, which indirectly calculates the relative risk. The calculated model established a predictive situation measured by the value of r^2 .

No intervention was done.

1. All cases of suspected Poisoning who gave their consent for participation in the study
2. Guardian's consent was taken in those patients who are too sick to give their consent.

We excluded those patients who refused to participate in the study, pregnant females, and chronic poisoning cases

Observations & Results –Total 82 Cases**Table-1 Multivariate comparison of Cluster A & Cluster B**

Serial no.	Clusters	Variable	Parameters	N	Std. Deviation
1.	Cluster A <30 years of age	Gender	Male	28	5.943
			Female	27	
		Toxidrome	Anticholinergic	4	
			Cholinergic	25	
			Corrosives	12	
			Medical Toxin	3	
			Sympatholytic	11	
			PSI	1	
		2		26	
		3		5	
		4		-	
		Outcome	Recovered	51	
			Died	4	
		2.	Cluster B >30 Years of age	Gender	
Female	15				
Toxidrome	Anticholinergic			3	
	Cholinergic			15	
	Corrosives			3	
	Medical Toxin			1	
	Sympatholytic			5	
	PSI			1	10
2				12	
3				3	
4				2	
Outcome	Recovered			23	
	Died			4	

Statistical Calculations

Mean Cluster A= 19.56; SD=5.943

Mean Cluster B=36.11; SD=7.968

P value and statistical significance:

The two-tailed P value is less than 0.0001

by conventional criteria; this difference is considered to be extremely statistically significant.

Confidence interval:

The mean of Group One minus Group Two equals -16.55000

95% confidence interval of this difference: From -19.66864 to -13.43136

Intermediate values used in calculations:

t = 10.5609

df = 80

Standard error of difference = 1.567

Table-2 Relative Risk & Odd's Ratio Estimation

Serial. No.	Parameter	Relative risk	Odd's ratio
1.	Total cases	0.49	0.45
2.	Cluster A(Gender based)M:F	0.32	0.3
3.	Cluster B(Gender based)M:F	3.75	4.67

Table: Association of Age with the Type of Poison

TYPE OF POISON	Mean	N	Std. Deviation
ATROPINE	18.00	1	.
CELPHOS	27.29	7	9.656
CHLOROQUINE	15.00	1	.
CHLORPHENIRAMINE	32.00	2	8.485
DHATURA	39.67	3	23.352
HERBICIDE	22.00	2	7.071
INSECTICIDE	24.67	18	10.482
PCM	26.67	3	4.163
PEPPERMINT OIL	3.00	1	.
PHENOL	21.29	14	7.690
RODENTICIDE	26.23	13	7.748
SANITIZER	19.25	4	6.652
SEDATIVE	28.08	12	10.850
TCA's	20.00	1	.
Total	25.01	82	10.254

Table-4: Association of Age with Manner of Poisoning

AGE			
MANNER OF POISONING	Mean	N	Std. Deviation
ACCIDENTAL	23.67	6	23.611
INTENTIONAL	25.12	76	8.732
Total	25.01	82	10.254

Table 5: Association of Age with Duration of Hospital stay in (days)

AGE			
DURATION OF STAY(DAYS)	Mean	N	Std. Deviation
1	25.07	41	9.639
2	25.00	34	11.696
3	23.17	6	6.080
4	34.00	1	.
Total	25.01	82	10.254

Table 6: Association of Time lapse with Outcome

TIME LAPSE			
OUTCOME	Mean	N	Std. Deviation
DIED	458.25	8	788.316
RECOVERED	136.55	74	283.928
Total	167.94	82	368.214

Discussion

We came across a total of 82 poisoning cases seen over a period of 1 year in the emergency, medicine and pediatric wards of RMLIMS. There were 40 males and 42 females, with Cluster A containing 28 males and 27 females, whereas Cluster B had 12 males and

15 females. Acute poisoning cases generally showed a female preponderance as shown by **Naveen et al** and **Dogan et al** in their respective studies ^{8, 9}. However similar studies done by **Indu et al** and **Singh et al** have shown higher rate of suicidal poisonings among males ^{10, 11}. **Ali et al** noted a higher incidence of poisoning among males (59.8%).¹²

Cluster A (55) comprising of young population of under 30, had more number of cases in comparison to Cluster B (27). This reflects that the younger minds are more at risk of poisoning and as a person becomes older, he acquires maturity and stability, as well as resilience to deal with the stressful events of life. These findings are inconsistent with similar studies done by **Kumar & Nayak et al**¹³

Exiara et al observed the mean age of poisoning to be 37.1 years in males, and 33.4 years in females, with psychotropic substances as the most common cause of poisoning¹⁴.

We observed that majority of the cases in Cluster A showed features of Cholinergic Toxidrome, followed by corrosives and sympatholytics, anticholinergic toxidromes and medical toxins. Cluster B also showed a predominance of Cholinergic Toxidrome. **Dwipen et al** stated that organophosphates contributed to 37.5% of poisoning cases, with poisoning more common in males 77.5%¹⁵. The most common cause of poisoning by cholinergic agents was by Insecticides (45.0%), Rodenticides (32.5%), Celphos (17.5%), & Herbicide (5%).

There were 5 cases which showed features of Anticholinergic toxidrome, one each of dhatura leaves, lometil syrup, tri cyclic antidepressants, carbamazepine, and chlorpheniramine. There was one fatality seen with accidental ingestion of lometil syrup in a young unmarried female.

Corrosive poisoning is fairly common in the younger age group. (14). The patients were usually took the easily available household cleaning agent lizol, after having an altercation with the spouse or any other family member. There was one girl who presented after 10 Days of acid ingestion with complaints of difficulty in swallowing. **Rakesh et al** found chemicals as the most common cause of poisoning followed by pesticides¹⁶

Among the medical toxins, majority of the cases were of benzodiazepine ingestion (12), and Paracetamol overdose. There were no fatalities seen in this group and most of the patients got discharged same day. **Chan Y et al** in his study on poisoning in Hongkong, reported sedatives and analgesics as the most common agents

involved in poisoning. **Sarah et al** did the multivariate data analysis of Poison control centre, Brazil¹⁸. As per their observation, most observed cases were of mild intoxication correlated with drug of abuse.

Santosh et al showed that although, in majority of the cases (44.9%) of suicidal poisonings, the cause was unknown, interpersonal adjustments (40.1%); financial stress (7.7%); psychiatric disorder (5.3%); and chronic alcoholism (1.9%) were implicated in the remaining cases.¹⁹

The most common route of poisoning among study population was the oral route. This is accordance with study of **Zohere et al** and similar studies which showed that majority of the poisonings occurred via the oral route²⁰. This was attributed to the unrestricted sale, easy availability and low cost of pesticides, household agents and drugs, all of which can be abused orally for committing suicide.

Poison severity Index was also compared in both the Clusters and it was observed that Cluster A contained mild to moderate severity cases whereas Cluster B included more moderate to severe to fatal cases.

The majority of cases were of intentional poisoning (92.6%), out of which there were 4 patients had a past psychiatric history of mental illness and were on antipsychotics. There were 6 cases of accidental poisoning, out of which 4 cases were seen among children, 1 in an adolescent, and 1 in a female of 65 years.

The outcome of poisoning cases was taken as recovery or death. Incidentally both the Clusters showed equal number of deaths, but the recovery number was significantly higher in the younger Cluster as compared to the older Cluster. Maximum deaths were seen in aluminium phosphide poisoning with relative risk (M/F) 11.79. The case fatality ratio was found to be 9.75%. The outcome of poisoning cases depended on type of poison consumed, its dose, and the time lapse between consumption and initiation of treatment. **Arulmurugan C**, and other similar studies showed the mortality rate in acute poisonings in India varied between 0.4% and 8.3%²¹. Dogan et al and other similar studies by **Singh et al** found hospital transportation time has a significant impact on the prognosis of the patients with poisoning;

morbidity and mortality increases with rising time lapse²².

The Relative Risk (male :female) was found to be quiet high in Cluster B (3.75) with an Odds ratio of 4.67. however , the relative risk and Odd's ratio of total cases came out as 0.49 and 0.45 respectively.

Conclusion

Acute poisoning is a very common presentation in hospital emergency departments and fortunately most of the poisoned cases make a full recovery without specific treatment. However certain poisons like Aluminium Phosphide have a very high case fatality and we need to develop appropriate medical facilities like Extracorporeal membrane oxygenation (ECMO) as a rescue modality for patients with acute reversible life threatening cardiopulmonary conditions. At the same time we should focus on developing a Poison control centre in every district to handle to assist in advising the specific and appropriate management of poisoning cases. Analytical toxicology data can turn out to be important in establishing an early diagnosis of poisoning and thereby guiding specific treatment. Therefore, the government should try to develop an Analytical Toxicology Laboratory in the Tertiary Hospitals . The availability of reliable analytical facilities can also assist in assessing illicit drug use or pharmacological drug abuse and can help in managing incidents of accidental or deliberate exposure to chemicals or toxins.

Conflict of Interest –None

Ethical Clearance-taken from the Institutional ethical committee

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