

## STUDY THE ASSESSMENT OF POISONING CASES IN A RURAL TERTIARY CARE TEACHING HOSPITAL BY A CLINICAL PHARMACIST

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### ABSTRACT

**Background:** Mortality of Poison with various substances is common everywhere. Various agents such as pesticides, drugs have been used intentionally/accidentally as a poisoning in different countries. In the Indian scenario, pesticides are the most commonly used poisoning agents. Management of poisoning is one of the biggest challenges, faced by the health care professionals globally. Clinical pharmacist can play an important role in the management of poisoning.

**Objective:** To assess the poisoning cases admitted to the rural tertiary care hospital.

**Methodology:** A prospective, observational study was carried out in emergency department for a period of 9 months in Adichunchanagiri hospital and research center.

**Results:** A total of 73 poisoning admissions were identified during the study period. Among them male population are more i.e 63.0% compare to females 37.0%. Majority of victims belonged to age group of 21-40 years. Intentional Poisoning was observed in 80.8% followed by accidental poisoning 19.2%. Among the poisoning cases pesticide exposures was observed in 57.5% followed by bites i.e. 13.6%, household products 8.3%, and medicine 5.6% and miscellaneous were 15%. The treatment assessment results showed that appropriateness with specific treatment was 78.7% and remaining 21.3% were not received the specific appropriate treatment. Therapeutic outcome results showed 59 (80.8%) were recovered, mortality was observed in 9 (12.3%), discharge against medical advice was 4 (5.5%) and 1 (1.4%) patient was recommended for higher center. During study period eight poison information queries was provided to the requestor. A poison treatment guideline also developed/prepared to manage the poisoning cases.

**Conclusion:** Clinical pharmacist intervention in the poisoning management will reduce the mortality and it will improve the therapeutic outcome. The most poisoning cases were observed with a pesticide which was handled by the farmers in the agriculture fields.

**Key words:** Poisoning, Clinical pharmacist

### INTRODUCTION

Poison is defined as any substance that causes a harmful effect when administered, either by accident or designed to a living organism.<sup>1</sup> Its dose related adverse effects caused due to exposures of chemicals, drugs or other xenobiotics, are responsible for morbidity and mortality which vary from country to country.<sup>2,3</sup>

Worldwide intentional poisoning was increasing day by day due to change in the life style and social behavior are responsible for mortality and morbidity. The various reasons responsible for poisoning are distress due to loss in the business, failure in romance or differences with the intimate partner or examination, emotional disturbances and chronic diseases are the common reasons for intentional poisoning. Acute pesticide poisoning is one of the most common causes of intentional deaths worldwide. The various bites and stings are responsible for accidental poisoning.<sup>4,5</sup>

World Health Organization published in 1990, around 3 million poisoning cases with 220,000 deaths occur annually. Recently some review articles reported that the number of intoxications with organophosphate pesticides was 3 million per year, and the number of deaths and casualties are 300,000 per year worldwide.<sup>4,6</sup>

Agriculture pesticides are used in Asian region for self poisoning particularly in rural areas with a fatality range of 10-20%. Majority of pesticide exposure are seen more in middle and low income countries due to increased use/accessibility of agrochemicals in agricultural sector.<sup>5</sup>

The data from poison information center of All India Institute of Medical Sciences (AIIMS) reveals that highest incidence of poisoning cases was found in the age group of 14-40 years with male preponderance.<sup>7</sup>

Pesticide poisoning is a significant problem in India. Because, predominantly it is an agrarian country about 60 to 80% of rural population depend on agriculture. Pesticides are routinely used for advanced farming and are readily available over the counter for agriculture purposes. Therefore, a pesticide is an easy accessing source for suicidal purpose.<sup>6,8</sup> Several studies have revealed that

Pesticides are the commonly used poisoning agents for intentional poisoning in India.<sup>5</sup>

Organophosphorus pesticides are also used widely for agriculture, vector control and domestic purposes. Despite the apparent benefits of these uses, acute organophosphorus pesticide poisoning is increasing worldwide and particularly even in rural areas.

Acute organophosphorus pesticides consumption are the most important cause of severe toxicity and death worldwide, more than 200 000 deaths are found in developing countries in each year. The incidence of severe acute organophosphorus pesticide poisoning is very less in developed countries.<sup>9</sup>

Organophosphorus compounds cause most self-poisoning deaths in southern. Farmers form a significant proportion of the population who commonly use organophosphorus compound like parathion as insecticides. Thus, due to the easy accessibility or improper handling of these compounds, a large number of suicidal cases are encountering.<sup>3</sup>

Adichunchanagiri Hospital and Research Center is a 750 bedded tertiary care teaching hospital situated in a rural area of B.G.Nagara, admitting of various poisoning cases. There were no studies conducted previously in this rural setup. Hence the present study was taken in rural population.

### OBJECTIVES

The main objective of the study was to assess the various poisoning cases admitted and the impact of clinical pharmacist in the management of poisons.

### MATERIALS AND METHODS

A prospective, observational study was carried out in emergency department for a period of 9 months in Adichunchanagiri hospital and research center. Ethical clearance was obtained from the Institutional Human Ethical Committee of Adichunchanagiri Institute of Medical Sciences (AIMS) and SAC College of Pharmacy, B G Nagara.

The data was collected in a well designed form, after taking the consent from the poisoned victims/victims care taker. The demographic details, poisoned history and clinical presentation were collected from patient/patient care taker interview and from case sheet. Toxicity rating of the substance was identified by using standard tertiary resources. Treatment details was collected from case sheet and it was assessed by using standard poison information resources available, and therapeutic outcome of the patient was identified by following the patient from the day of admission to till discharge. The poison information was provided to the requester by using standard poison information resources and consulting the poison information center. The poison treatment guidelines were prepared after taking the experts opinion. The obtained data was subjected for descriptive statistical analysis.

## RESULTS AND DISCUSSION

A total of 73 poisoning admissions were identified during the study period. The demographic details of the victims showed (Table 01) based on age group, 1-20 years was 16 (21.9%), 21-40 years was 43 (58.9%), 41-60 years was 11 (15.1%) and >60 years was 3 (4.1%) victims/cases respectively. Majority of victims belonged to age group of 21-40 years; It is known fact that this age group peoples are more prone for this issues due to work pressure, marriage, quarrel with family and other life settlement factors. Male population are more 63.0% compare to females 37.0% this may be because of males are more often exposed to the stress and strain in day to day life, as well as to the occupational hazards than the females. The economic status of victims showed low socioeconomic status was observed in 69 (94.5%), remaining 4 (5.5%) had medium socioeconomic status.

**Table 1: Distribution of poisoning cases/victims demographic details**

Demographic details	Number of patients	%
<b>Age in years</b>		
• 1-20	16	21.9
• 21-40	43	58.9
• 41-60	11	15.1
• >60	3	4.1
<b>Gender</b>		
• Male	46	63.0
• Female	27	37.0
<b>Socio economics status</b>		
• Low	69	94.5
• Medium	4	5.5
• High	0	0.0
<b>Domicile</b>		
• Rural	73	100.0
• Urban	0	0.0
<b>Education</b>		
• Primary education	14	19.2
• Secondary education	29	39.7
• Higher education	4	5.5
• Illiterate	26	35.6
<b>Marital status</b>		
• Single	32	43.8
• Married	40	54.8
• Unmarried	0	0.0
• Widow	1	1.4
<b>Occupation</b>		
• Farmer	28	38.4
• Student	7	9.6
• Housewife	16	21.9
• Business	3	4.1
• Labour	13	17.8
• Others	6	8.2
<b>Total</b>	<b>73</b>	<b>100.0</b>

**Table 2: Comparison of interval between intake of poison and time taken to arrival to the hospital for treatment Vs clinical outcomes (recovery, Recommended for higher center, DAMA, Death)**

Interval between intake & arrival to Hospital	Number of poison victims	%	Outcome			
			Recovery	Recommended for higher centre	Discharge against medical advice	Death
< 3 hour	48	65.8	44(74.6%)	-	2(50%)	2(22.2%)
3-6 hr	20	27.4	12(20.3%)	1(100%)	1(25%)	6(66.7%)
6-12 hr	2	2.7	1(1.7%)	-	-	1(11.1%)
Undetermined	3	4.1	2(3.4%)	-	1(25%)	-
<b>Total</b>	<b>73</b>	<b>100.0</b>	<b>59(100%)</b>	<b>1(100%)</b>	<b>4(100%)</b>	<b>9(100%)</b>

Low economic group are more vulnerable for poisoning which may be due to they are under continuous financial stress or other stress (eg: unable to meet the basic demand) during their life.

The literacy status of the victims showed 47 (64.4%) was literate, out of which 14(19.2%) were primary education, 29 (39.7%) were secondary education, 4 (5.5%) were higher education and illiterates

was 26 (35.6%). The marital status of the victims showed married was 54.8% followed by single 43.8% and 1.4% widows respectively. Married person are more exposed to poisoning when compare to

Other this may be because of more stressful situation exposure and weak minds. The occupation details of victims showed farmers were 38.4% followed by housewife 21.9%, labour 17.8%, student 9.6%,

business 4.1% and others was 8.2%. Farmers are found to be a greater in poison consumption because of working in agricultural sector, easily exposed to the hazards and easy availability of agrochemicals and failure of crops or financial crisis etc.

The interval between intake of the poison & arrival of victim to the hospital (Table 2) was observed < 3 hour in 65.8% followed by 3-6 hours was 27.4%, 6-12 hour was 2.7% and Undetermined was 4.1%. Early arrival to the hospital is beneficial for appropriately treating the poisoning cases and for reducing the mortality.

Out of 73 cases, 59 (80.8%) cases are intentional and 19.2% cases are observed as accidental poisoning, the various reasons for intentional poisoning are quarrel with family members i.e 15 (20.5%), 10 (13.6%) were due to depression, 7 (9.6%) were due to financial crisis, 5 (6.9%) were due to health problem, 2 (2.7%) were due to love issue, 2 (2.7%) were due to suicidal act and remaining 14(19.0%) cases were due to accidental, 18(24.8%) cases were due to unknown reason.

**Table 3: Details on distribution of type of poisoning (substance) and number of victims belonging to each poison.**

Type of Poisoning agents	Number of patients	%
<b>Pesticide</b>	<b>42</b>	<b>57.5</b>
• OP	26	35.6
• O.P + Pyrethroids	9	12.3
• Pyrethroid	2	2.7
• Organochlorine	3	4.1
• Neonicotinoids	1	1.4
• Carbomates	1	1.4
<b>Bites</b>	<b>10</b>	<b>13.6</b>
• Snake bite	6	8.3
• Beestings	4	5.5
<b>Medicine</b>	<b>4</b>	<b>5.6</b>
• Alprazolam	1	1.4
• Salbutamol	1	1.4
• Carbamazepine	1	1.4
• Amitriptylin	1	1.4
<b>Household product</b>	<b>6</b>	<b>8.3</b>
• Rat poison	3	4.1
• Hydrocarbons	1	1.4
• Turpentine	1	1.4
• Simethicone	1	1.4
<b>Miscellaneous</b>	<b>11</b>	<b>15</b>
• Fungicide	2	2.7
• Herbicide	1	1.4
• Micronutrients	1	1.4
• Unknown	7	9.5
<b>Total</b>	<b>73</b>	<b>100.0</b>

The type of poisoning (substance) and number of victims belonging to each poison (Table 4) showed, majority of poisoning incidences was with pesticide category. The Pesticide exposures were observed in 57.5% followed by bite 13.6%, household products 8.3%, and medicine 5.6% and miscellaneous were 15% respectively. Several studies had reported that pesticides were the most commonly used agents for poisoning in Asia Pacific Regions. Even our study findings

also shows that pesticides contributed 57.5% poisoning cases and associated with high mortality rate was 66.7% followed by unknown compounds 9.5% of poisoning cases with mortality rate was 33.3%. Among the 73 poisoning cases toxicity rating was observed only with 33 substances (Table 4) out of which majority of the substances had moderate toxicity rating 28 (38.35%) remaining 5 (6.84%) substances has high toxic.

**Table 4: Comparison of Toxicity rating and clinical outcomes (recovery, Recommended for higher center, DAMA, Death)**

Toxicity rating	Number of victims	%	Outcome			
			Recovery	Recommended for higher centre	Discharge against medical advice	Death
Low	--	--	-	-	-	-
Moderate	28	38.35	23(39%)	1(100%)	1(25%)	3(33.3%)
Highly toxic	5	6.84	3(5.1%)	-	1(25%)	1(11.1%)
Not identified	40	54.79	33(55.9%)	-	2(50%)	5(55.6%)
<b>Total</b>	<b>73</b>	<b>100</b>	<b>59(100%)</b>	<b>1(100%)</b>	<b>4(100%)</b>	<b>9(100%)</b>

During treatment period 47 (64.4%) patients were received antidote (Atropine, PAM and ASV). Complication was observed only in 5 (6.8%) patients, out of which 2 (2.7%) were ASV induced adverse drug reaction remaining 2 (2.7%) were with seizure and 1 (1.4%) with renal failure. Antisnake venom induced adverse drug reaction was due to inappropriate administration i.e without performing the desensitization test.

The treatment assessment (Table 5) results showed appropriate decontamination was observed in 68.0% and 32.0% was received

Inappropriate decontamination method. Appropriate decontamination method of treatment is due to early hospitalization (<2 hour) of the victims and inappropriate decontamination was due to delayed hospitalization (>3 hour).

Appropriate specific treatment given was observed only in 78.7% and remaining 21.3% were not received the appropriate specific treatment. Appropriate supportive treatment was observed in all except 1 (1.4%). Inappropriateness of specific treatment is due to the unknown compound poisoning and less intervention with poison consumer/patient care taker.

Therapeutic Outcome of the poisoning results showed (Table 6) recovered was observed in only 59 (80.8%), mortality (death) was

observed 9 (12.3%), discharge against medical advice was observed in 4 (5.5%) and 1 (1.4%) victim was recommended for higher center. Death 12.3% was due to victims consumed combination of poisoning substances, like alcohol, delayed arrival to the hospital,

consumption of high toxic substances followed by moderate toxic substance and unknown compound consumption also lead to increases the mortality of the patients.

**Table 5: Details on distribution of poisoning treatment assessment**

Assessment of treatment	Number of patients	%
<b>Decontamination method</b>		
• Appropriate	49	68.0
• Inappropriate	23	32.0
<b>Specific treatment</b>		
• Appropriate	37	78.7
• Inappropriate	10	21.3
<b>Supportive treatment</b>		
• Appropriate	72	98.6
• Inappropriate	1	1.4

**Table 6: Details on distribution of therapeutic Outcome of the poisoning cases**

Therapeutic Outcome	Number of patients	%
<b>Recovered</b>	59	80.8
<b>Recommended for higher center</b>	1	1.4
<b>DAMA(discharge against medical advice)</b>	4	5.5
<b>Death</b>	9	12.3
<b>Total</b>	73	100.0

The maximum hospital stay of poisoning cases was observed i.e >14 days was in one patient. The least stayed in hospital was 1 to 2 days was in 23 patients. The maximum numbers of poisoning cases are stayed for a period of 2-7days i.e 29 (39.7%) patients. The mean  $\pm$  SD: hospital stay was 5.55 $\pm$ 5.34. 2-7 days of hospital stay is normally required for close monitoring and complete observation of the poisoning cases.

During study period total eight poison information queries was provided to the requestor among this queries was related to specific for poisoning and antidote, dose adjustment. Majority of queries received from medicine department followed by pediatric department and they expressed the information was useful.

#### Cost evaluation

In current study mean average cost of the poisoning treatment was Rs: 7270.63, out of which mean cost of antidote was Rs 3795.93 and total medicine mean cost was Rs: 4289.60 (antidote cost accounts for almost >50% of the total medicine cost) followed by hospital cost was Rs: 1913.70 and investigation cost was Rs: 1188.42. Our study showed that low economic people are more prone to poisoning. Financial crisis also one of the reason for poisoning to treating those poisoning cases at least required a mean cost (Rs: 7270.63) it will again burden to the poisoning patients or family.

#### CONCLUSION

Clinical pharmacist intervention/involvement in the poisoning management improved the identification of poison and toxicity rating of substance followed by providing poison information services to the health care professional. The poison treatment guidelines / treatment protocol preparation will helps to the health care professional to take the treatment decisions quickly, there by mortality rate can be reduced and therapeutic out comes can be increased. The poison safety strategies will helps in reducing / prevent the poisoning cases.

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