

# Clinical and Socio-Demographic Profile of Poisoning Cases - A Retrospective Study from Dharwad, Karnataka

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## ABSTRACT

### BACKGROUND

Poisoning is a major healthcare issue in our country. There is a recent increase in trend of non-OP compound usage. We wanted to study the socio-demographic, and clinical profile in terms of outcome with different poisons.

### METHODS

A total of 100 patients were included in this retrospective study conducted in tertiary care hospital in Northern Karnataka. Data was collected and analysed using pre-structured questionnaire regarding demographic details, mode of poisoning, precipitating factors, duration of hospitalization, and final outcome. Descriptive statistics and chi-square test were done to find the association between the two attributes. Odds ratio was also calculated.  $P < 0.05$  was considered to be statistically significant.

### RESULTS

Mean age of the study population was 31.48 years. Majority of the study population was females (63 %,  $N = 63$ ), homemakers or students (32 % each), illiterates (68 %) and married (62 %). Mode of poisoning was suicidal in 78 % of the patients. Among the compounds used for poisoning, non-OP compound- especially pharmaceutical drugs accounted for 40 % of the cases. Mean duration of hospital stay was 5 days and 16 % had prolonged hospitalisation. Family fight, depression, and consumption of ethanol at the time of poisoning were the common precipitating factors. Mortality was 3 %. Homemakers and students ( $\chi^2 = 4.33$ ,  $df = 1$ ,  $OR = 3.33$ , 95 %  $CI = 1.02-10.7$ ,  $P < 0.05$ ), unmarried individuals ( $\chi^2 = 5.31$ ,  $df = 1$ ,  $OR = 3.75$ , 95 %  $CI = 1.16 - 12.1$ ,  $P < 0.05$ ) and teetotallers ( $\chi^2 = 18.94$ ,  $df = 1$ ,  $OR = 11$ , 95 %  $CI = 3.26 - 37$ ,  $P < 0.05$ ) had higher proportion of non-OP compound consumption and this was statistically significant.

### CONCLUSIONS

Educational awareness and regulation of drug availability over the counter, to prevent such emergencies, is essential. Awareness of good mental health and support systems has to be publicised to prevent the precipitating factors.

### KEYWORDS

Poisoning, Drug Overdose, OP Compound, India

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*DOI: 10.18410/jebmh/2021/264*

*How to Cite This Article:*

*Patil NS, Aithal SR, Gururaj H. Clinical*

*and socio-demographic profile of*

*poisoning cases - a retrospective study*

*from Dharwad, Karnataka. J Evid Based*

*Med Healthc 2021;8(19):1386-1390.*

*DOI: 10.18410/jebmh/2021/264*

*Submission 24-11-2020,*

*Peer Review 04-12-2020,*

*Acceptance 25-03-2021,*

*Published 10-05-2021.*

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**BACKGROUND**

A case of poisoning is defined as overdose of drugs, medicaments and biological substances given or taken in error [T36 - T50, International Statistical classification of diseases and related health problems - 10<sup>th</sup> revision (ICD-10)]. Poisoning is classically also defined as any substance which when introduced into the living body or brought in contact with part, will produce ill effects or death by its local or systemic action or both.<sup>1</sup> These cases are a major burden on a developing country like India as it has high mortality and is a major cause of hospitalization. Majority of the poisoning cases is seen among people in productive age group, hence causing not only morbidity to the patient, but also causing distress and financial burden to the dependent family members and affecting economy of the nation, especially in a developing country like India<sup>2</sup>

Outcome, duration of hospitalization and financial burden caused by the poisoning depends on various factors including characteristics of poison like - chemical and physical properties of the poison like quantity of the poison consumed and mode of poisoning, and characteristics of the individual who has consumed the poison like - functional reserve of the vital organs which is further dependent on patient's age and comorbidities. Other than these factors governed by the poison and affected individual, early initiation of treatment has better prognosis.<sup>3</sup>

As emphasized by the previous studies, usage of pesticides, especially organophosphorus (OP) compounds forms majority of the self-poisoning cases world-wide, ranging from 4 % to 50 % across the globe, and is much commoner in Indian subcontinent.<sup>2,3</sup> These OP compounds are the major cause for poison related deaths due to high mortality and increased frequency of usage.<sup>4</sup> Usage of pharmacological substance is rising, and few studies showed it to surpass usage of OP compound.<sup>5</sup>

Snake bites are a usual occurrence in India and global death rate annually secondary to venomous snake bite nears 125,000 and is commonly seen in rural areas due to increased exposure and lack of primary treatment and facilities of tertiary care.<sup>6</sup>

Early treatment initiation followed by supportive care to maintain vitals, prevention of further toxin exposure / absorption, favouring elimination of the poison, antidote administration and avoidance of re-exposure forms the treatment goals in any poisoning or snake bite cases.

Due to rise in incidence of such poisoning and snake bite cases, there is increase in hospitalization, mortality and financial burden in the country, necessitating better approach to management of such cases.<sup>2</sup> There is also need to identify the latest pattern of poisoning at present with regard to compound consumed, in comparison to previous studies due to availability of over the counter drugs, urbanization, higher incidence of mental health disorders and easy access to information on poisoning via social network or internet.

Hence, this retrospective study was conducted with a purpose of identifying common compounds utilized for poisoning, outcome, mortality, presence of mental health disorders and to conclude with better strategies in

management of poisoning cases to reduce mortality and duration of hospitalization.

**METHODS**

The study was a descriptive study conducted retrospectively among 100 poisoning and snake bite patients who presented to emergency department of our tertiary care hospital in Dharwad, India from January 2019 to June 2019.

Exclusion criteria included patients who were brought dead or died immediately before any primary treatment was provided.

Demographic data including age, sex, occupation, education, marital status, data related to poison like type of poison, mode of poison, precipitating factors like mental health disorders and ethanol consumption at the time of poison intake and data regarding outcome like mortality, duration of hospital stay and final outcome of the patients were collected from hospital records. Laboratory data like pseudocholinesterase levels were collected when available in OP compound consumption cases.

**Statistical Analysis**

All data were entered in SPSS (statistical package for social sciences) ver 11.0 and were analysed and represented in terms of descriptive statistics (percentage, mean  $\pm$  standard deviation) and chi-square test was done to find the association between two attributes. Odds ratio was also calculated.  $P < 0.05$  was considered to be statistically significant.

**RESULTS**

Mean age of the study population was 31.48 years. Majority of the patients were noted to be in middle aged group of 18-45 years (75 %,  $N = 75$ ) and 10 % ( $N = 10$ ) of the patients were below 18 years of age and 15 % ( $N = 15$ ) of the patients were above 45 years of age. Female preponderance (63 %,  $N = 63$ ) was noted in our study with remaining male population was 37 % ( $N = 37$ ). Greater proportion of the patients were housewives and students (32 %,  $N = 32$  each), and remaining were farmers (24 %,  $N = 24$ ) and 12 % ( $N = 12$ ) had private / other occupation. Educational qualification among the cases constituted majorly of illiterates (68 %), followed by 22 % who underwent primary education, 4 % who underwent secondary education and 6 % of them entered for professional education. Study of marital status showed predominantly married (62 %,  $N = 62$ ) patients in comparison to unmarried patients (38 %,  $N = 38$ ).

Majority of the poisoning was suicidal in nature (79 %,  $N = 79$ ) and accidental poisoning was noted in 21 % of the study population ( $N = 21$ ). Common compound consumed were non-OP compounds which accounted for 70 % of the study population ( $N = 70$  %), of which majority were consumption of tablets available over the counter ( $N = 40$ ), followed by OP compound consumption (24 %,  $N = 24$ ) and

followed by snake bite (6 %, N = 6). Pseudocholinesterase levels studied for the study population showed significant difference between the patients who had consumed op compound (mean pseudocholinesterase level - 5360) and non-op compound (mean pseudocholinesterase levels - 13387).

Mean duration of hospital stay was for 5 days. Hospital stay of more than 7 days was noted in 16 patients (16 %). Among the 100 patients studied, eight of them (8 %) were intubated with endotracheal tube during their hospital stay and majority of them were patients who had consumed op compound (87 %, N = 7) and one patient of non-op compound. This association was found to be statistically significant. Three patients (3 %) underwent tracheostomy during their hospital stay and all the cases were patients who had consumed OP compound. Total of 51 % (N = 51) of the cases studied were referred from other hospitals.

Precipitating factors were noted in 24 % of the patients (N = 24) and majority of them had family fight prior to consumption (N = 10), followed by depression (N = 7), anxiety (N = 3) and under influence of alcohol and adjustment disorder (N = 2 each). Ethanol consumption at the time of poisoning was present in 16 % (N = 16) of patients.

Among the 100 patients studied, three of them (3 %) had succumbed to death, and two of them were patients who had consumed op compound and one of them died due to consumption of an unknown compound. Causes of death in these patients were aspiration pneumonia (N = 2) and autonomic failure secondary to op compound (N = 1). Fourteen patients (14 %) had got discharged against medical advice during their stay and remaining 83 % (N = 83) recovered from the toxic effects and were discharged. The clinical and socio-demographic factors studied are shown in table 1.

Parameters		N (Percentage)
Age group (years)	< 18	10 (10 %)
	18 - 45	75 (75 %)
	> 45	15 (15 %)
Sex	Female	63 (63 %)
	Male	37 (37 %)
Occupation	Housewives	32 (32 %)
	Student	32 (32 %)
	Farmer	24 (24 %)
	Private/Others	12 (12 %)
Education	Illiterate	68 (68 %)
	Primary education	22 (22 %)
	Secondary education	4 (4 %)
	Graduates	6 (6 %)
Marital status	Married	62 (62 %)
	Unmarried	38 (38 %)
Mode of poisoning	Suicidal	79 (79 %)
	Accidental	21 (21 %)
Type of poison	OP compound	24 (24 %)
	Non-OP compound/ tablets	70 (70 %) / 40 (40 %)
Precipitating factors	Snakebite	6 (6 %)
	Family fight	10 (10 %)
	Depression	7 (7 %)
	Anxiety	3 (3 %)
	Adjustment disorder	2 (2 %)
Ethanol consumption at the time of poisoning	Yes	16 (16 %)
	No	84 (84 %)
Patient outcome	Recovered	83 (83 %)
	Death	3 (3 %)
	Discharge against medical advice	14 (14 %)

**Table 1. Clinical and Socio-Demographic Profile of Patients (N = 100)**

Factors predicting the type of poisoning were analysed using chi-square test and odds ratio was calculated and are demonstrated in Table 2. Teetotallers, unmarried individuals, homemakers and students were more prone to take non-organophosphorous compound as analysed by chi-square test. Age, gender, precipitating factors, mode of poisoning, outcome and duration of hospital stay did not affect the type of poisoning.

Variables	Compound		Chi-Square Value	Chi-Square P Value	OR (CI)	OR P Value
	OP (N = 24)	Non-OP (N = 70)				
Sex	Male	10	24			
	Female	14	46	0.42	0.624	1.36 (0.53 - 3.53) 0.517
Age group	< 45 years	20	61	0.22	0.733	1.35 (0.37 - 4.88) 0.642
	> 45 years	4	9			
Occupation	Homemaker /student	4	28	4.33	0.047	3.33 (1.02 - 10.7)* 0.045
	Others	20	42			
Ethanol intake	Present	11	5			
	Absent	13	65	18.94	0.000	11 (3.26 - 37)* 0.000
Marital status	Married	20	40			
	Unmarried	4	30	5.31	0.027	3.75 (1.16 - 12.1)* 0.027
Mode of poison	Accidental	2	13	1.39	0.340	2.5 (0.5 - 12.5) 0.250
	Suicidal	22	57			
Duration of hospital stay	< 7 days	15	63	3.41	0.106	3.2 (0.9 - 12) 0.062
	> 7 days	9	7			
Intubation	Yes	7	1	17.66	0.000	28.4 (3.27 - 246)* 0.002
	No	17	69			
Precipitating factor	Present	9	15			
	Absent	15	55	2.42	0.124	2.22 (0.8 - 6.0) 0.124
Outcome	Recovered	22	69	5.64	0.553	1.72 (0.4 - 8.2) 0.452
	Death	2	1			

**Table 2. Comparison of Factors Affecting OP and Non-OP Poisoning (N = 94)**

\*P < 0.05 was considered significant

## DISCUSSION

Poisoning is a common problem witnessed in developing country like India where it forms a major burden. The age group commonly involved in suicidal consumption of poisons range from 18 - 45 years which forms the major proportion of Indian population and is also the most productive age group resulting in increased financial burden on the country and affected families. A study conducted by Mate VH et al. in Pune and Mathew R et al. in Delhi also showed a similar age group distribution, probably due increased exposure to work pressure, poor education, unemployment and inability to overcome failure.<sup>3,7</sup> Our study showed that age did not affect the type of poisoning, though higher proportion of tablet consumption for suicidal poisoning was noted in middle age group, this association was not found to be statistically significant on analysis.

Female preponderance was noted in our study (67 %) which was in contrast to the previous studies which showed increased incidence among male population.<sup>2,3,7-10</sup> This is probably due to under-reporting in female population, increased mental health related disorders and family fights. Studies done by Yamashita M et al. in Japan and Tufekci IB et al. in Turkey also showed female preponderance.<sup>11,12</sup> Though there was an increase in proportion of poisoning cases among females, there was no significant association between gender and type of poisoning in our study.

Illiteracy was noted in about 68 % of the individuals which was significantly higher in comparison to previous study conducted by Mathew R et al. in Delhi and is probably the reason for increased incidence of accidental poisoning. It also might indirectly increase the incidence of poisoning due to increase in social stress, poor knowledge on mental health, improper knowledge on pesticides and unemployment associated with it.<sup>7</sup> Larger proportion of patients who were illiterate or had primary education, consumed OP compound. OP compound is known to produce higher mortality in comparison to other commonly used substance for poisoning, hence this population needs to be targeted to reduce mortality associated with poisoning. Higher incidence of non-OP compound consumption was noted in people with educational background above secondary school in our study and the proportion is on rising trend due to increase in literacy rate in our country.

A study conducted by Prashar A et al. in southern India showed that incidence of poisoning was more in farmers and later followed by students and housewives, but our study showed changing trend with nearly one-third of the population being housewives and students each, suggesting that they are more prone to poisoning and care has to be taken to prevent such incidents in such vulnerable population. This defines the changing trend of occupations associated with poisoning and non-bread earners have higher tendency to attempt suicidal poisoning in the present study. This study also demonstrated increased usage of non-OP compounds in these populations, which was found to be having statistically significant association. Probable reason for higher incidence in them is due to inability to handle pressure with lack of emotional and financial support. This defines the present susceptible population to attempt suicidal poisoning.<sup>13</sup>

Married population had higher incidence of poisoning, which was also supported by previous studies, probably due to increase in family fights and incompatibility.<sup>13-15</sup> Our study showed increased usage of non-OP compounds in unmarried individuals and this association was found to have statistical significance. Though married individuals constituted the major proportion of our study population, incidence of usage of non-OP compounds, especially tablet consumption was more among unmarried population, pointing at the vulnerable population in future as incidence of non-OP compound usage is on rising trend, which is noted in our study as well.

Majority of the poisoning were suicidal in nature accounting to about 79 % (N = 79) and remaining were accidental and all the accidental poisoning were seen more among illiterates, which was also noted in one of the previous studies conducted by Mishra PK et al. in Western India, posing the importance of education in prevention of such cases.<sup>13,15</sup> Suicidal poisoning may have multiple risk factors, but accidental poisoning can be definitely reduced with better education and increasing awareness to general public about potential harmful poisons used routinely for household activities.

As compared to previous studies, there was increase in the usage of non-OP compounds which accounted for about 70 % of cases and majority of them were pharmacological

substance consumption accounting to about 40 % of cases and there was decline in OP compound usage which was seen in only 24 % of cases. Increased incidence of tablet consumption was particularly seen in housewives emphasizing the need for regulation of over-the-counter drugs and is also probably due to urbanization and increase in comorbid condition providing access to these drugs.<sup>2,3,5</sup> Our study showed increased usage of non-OP compounds in people who are homemakers or students, unmarried individuals and teetotalers, and this association was found to be statistically significant. Since the trend in consumption of non-OP compounds is rising, these vulnerable populations have to be addressed further to reduce the incidence of poisoning. Further studies on risk factors among these populations might help in defining the population at maximum risk.

Mean duration of hospital stay was about 5 days which was similar to the study conducted in India, but 16 % of the patients had hospital stay of more than 7 days and was particularly common among OP compound consumption patients, but this association was not found to be statistically significant.<sup>2</sup> 8 % of patients were intubated and 3 % underwent tracheostomy owing for prolonged hospital stay in our study, probably due to increased number of referred cases to our tertiary centre. Previous studies showed lesser proportion of patients with prolonged hospital stay in comparison to our study, probably due to increase in first aid management prior to referral and decreased door to needle time in the previous study.<sup>2,3</sup>

Precipitating factors were noted in 24 % of the patients studied and majority of them (N = 10) had conflicts in the family and remaining 50 % (N = 12) had mental health disorders in the form of depression, adjustment disorder or anxiety making them susceptible for such incidents. These findings were similar to the study conducted by Mathew R et al. in Delhi where family conflict was the major precipitating factor.<sup>7</sup> Precipitating factors showed no association with type of poisoning in our study.

Mortality rate was noted to be 3 % (N = 3) in our study and two of them had consumed OP compound which was similar to the study conducted by Mate VH et al. in Pune, where higher mortality was noted in OP compound consumption.<sup>3</sup> Mortality rate in our study was low in our study compared to previous studies, probably due to decrease in number of OP compound poisoning cases in our study.<sup>2</sup> Non-OP compound consumption is showing rising trend but has lesser mortality rate in comparison to OP compounds.

## CONCLUSIONS

There is an increase in the incidence of non-OP compound consumption, especially pharmacological compounds in the form of tablets. Increased incidence in housewives and students, teetotalers, and individuals with higher education with precipitating factors like mental health diseases should be targeted to reduce incidence of poisoning. Awareness of good mental health and support systems has to be publicised to prevent the precipitating factors. Regulation of

over-the-counter drug availability must be ensured to prevent tablet consumption cases. Public must be aware of the change in trend of susceptible population and also the change in composition of commonly used compounds for poisoning. Awareness of potential poisonous effects of commonly used compounds has to be provided to reduce accidental consumption of poisons. National policy makers should be made aware of these findings and necessary national policies must be taken to target the population at risk, in order to prevent the incidence of poisoning in our country.

### Limitations

The study was retrospective in nature and additional history regarding precipitating factors, lag in treatment and availability of first aid prior to referral could not be assessed.

Data sharing statement provided by the authors is available with the full text of this article at jebmh.com.

Financial or other competing interests: None.

Disclosure forms provided by the authors are available with the full text of this article at jebmh.com.

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