

## Profile of Acute Poisoning at Moodabidri, Karnataka (South India): Retrospective Survey

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### ABSTRACT

#### Objective

To study the clinical and demographic profile of acute poisoning cases admitted to Alva's Health Centre, Moodabidri, Karnataka, South India over a retrospective period of five and half years, with particular reference to the nature of poison, time delay in hospitalization, associated complications, and final outcome.

#### Results

A total of 150 patients (0.6%) were admitted for acute poisoning during the study period out of a total 23,350 admissions with a mortality of 8%. Females comprised 58.8% cases, with commonest age group affected being 12-25 years (58%). Most cases of poisoning were intentional (96%), the vast majority of whom consumed agrochemical poisons (51.3%) followed by drugs (23.3%). There was significant preponderance of carbamates in the agrochemical poison group (41.6%). Drugs were the second most-preferred agents with benzodiazepines topping the list.

Agrochemical compounds caused the highest mortality (91.7%) with organophosphorus compounds being the most lethal (54.5%). Mortality was significantly higher in those who co-ingested alcohol along with the poison (18.5%) and those who vomited prior to hospitalization (12.2%).

**Key Words:** Poisoning; Karnataka; Agrochemicals; Organophosphorus compounds; Carbamates, Alcohol; Benzodiazepines

### Introduction

Poisoning is a common cause of medical emergencies and a threat to public health. It is one of the preferred ways of committing suicide among both males and females in India.<sup>1</sup> The poison-associated morbidity and mortality varies from place to place, and changes over a period, due to the use of new agents. Deliberate self-poisoning carries a high risk of death and puts immense strain on the emergency services of any hospital. Deliberate ingestion of pesticides has become one of the commonest methods of suicide globally. It is estimated that nearly 3 million people suffer from pesticide poisoning and almost 300,000 people succumb to it, accounting for about one-third of the world's suicides.<sup>2,3</sup> Organophosphorus pesticides are one of the most important causes of poisoning in the southern part of India, as also in many other parts of the country, as well as other developing countries.<sup>4,5</sup> Early and correct diagnosis, followed by appropriate treatment, are often life saving. Therefore, some knowledge with regard to the general pattern of poisoning in a particular region would help in effective diagnosis and management of poisoning with reduction of morbidity and mortality.

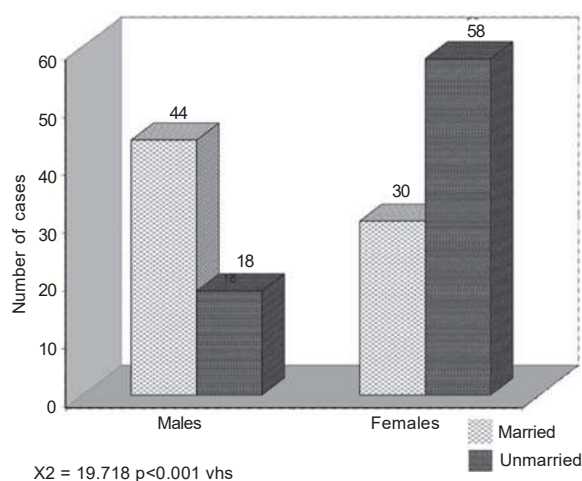
### Materials and Methods

This is a retrospective study of all cases admitted to the emergency department of Alva's Health Centre, Moodabidri, Karnataka, between January 2004 and August 2009 with history of consumption of poison. Other causes of acute poisoning such as snakebite, insect bite/sting, etc., were excluded from the study. Patient data were obtained from the hospital inpatient records, and

included age, sex, marital status, date and time of admission, nature of poison, time delay in hospitalization, type of poisoning (homicide, accidental or intentional), co-ingestion of alcohol with the poison, history of vomiting, and the final outcome. Statistical analysis of the collected data was done using the following software - SPSS-11.5. Chi Square test was done and  $p < 0.05$  was considered significant.

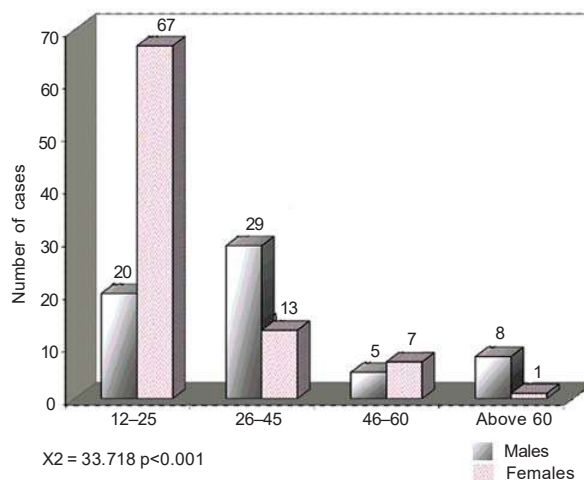
## Results

A total of 23,350 patients were admitted to the hospital during the study period of Jan 2004 to August 2009. Out of these, 150 patients were hospitalized due to acute poisoning amounting to 0.6% of total hospital admissions. 138 patients (92%) recovered and 12 patients (8%) succumbed to the poison. 58.8% ( $n=88$ ) of the patients were females and 41.2% ( $n=62$ ) were males. 49.3% of the patients ( $n=74$ ) were married. Highest incidence of poisoning, i.e., 66% ( $n=58/88$ ) was seen in the unmarried females group, followed by married males which was statistically significant ( $p < 0.001$ ) (Fig 1). On comparing the various age groups, the highest incidence of poisoning, i.e., 58% ( $n=87$ ) was seen in the group 12 to 25 years, followed by patients belonging to 26 to 45 yr group (28%). The highest incidence of poisoning, i.e., 77% ( $n=67/87$ ) was seen in females belonging to the age group 12 to 25 years, followed by males belonging to age group 26-45 years, 47% (29/62), and the observations were found to be statistically significant ( $p < 0.001$ ) (Fig 2).



**Fig 1** No. of males and females in relation to their marital status

Ninety six percent ( $n=144$ ) of the patients had consumed the poison intentionally, 4% ( $n=6$ ) accidentally, while there



**Fig 2** Age wise distribution of the patients among males and females

were no cases of homicidal poisoning. The vast majority of the patients (51.3%;  $n=77$ ) ingested agrochemical poisons, and among them, there was significant preference for carbamates 41.6% ( $n=32$ ;  $p=0.0316$ ), as compared to other agents. Therapeutic drugs were the next most preferred agents, viz, 23.3% ( $n=35$ ), and among them benzodiazepines were taken by 45.7% ( $n=16$ ) of the patients. Highest mortality was seen in patients who consumed agrochemical poisons, (91.7%;  $n=11$ ) and of these, organophosphorus poisons resulted in higher mortality of 54.5% ( $n=6$ ) (Table 1). Forty four percent ( $n=66$ ) of the patients arrived at the hospital within two hours of consumption of the poison, and 49.3% ( $n=74$ ) patients reached between two and six hours after poisoning. The mortality (7.6%) was less in those who arrived early, i.e., within two hours, as compared to the late arrivals, i.e., 2-6 hours. However, statistically significant relation could not be proved between the time delay in hospitalization and final outcome (Table 2).

Majority of the patients did not consume alcohol along with the poison ( $n=123$ ), and those who did, i.e., 27 (18%), preferred to take it along with agrochemicals: 85.2% ( $n=23$ ). This observation was statistically very significant ( $p < 0.001$ ) (Table 3). There was significantly higher mortality ( $p=0.026$ ), in those who consumed alcohol (18.5%; 5/27) as compared to those who did not take alcohol: 5.7% (7/123). There was statistically significant increase in mortality in those who vomited before admission (12.2%,  $n=11$ ) as compared to those who did not vomit before admission (1.7%,  $n=1$ ) ( $p=0.0426$ ).

Table 1

Nature of Poison	No. of Patients	Percentage (n=150)	No. of Deaths	Percentage (n=12)
<b>Agrochemicals</b>				
Organophosphates	17	11.4	06	50
Zinc Phosphide	14	9.3	00	00
Organochlorides	04	2.7	01	8.3
Carbamates	32	21.3	04	33.3
Pyrethroids	10	6.7	00	00
<b>Total</b>	<b>77</b>	<b>51.4</b>	<b>11</b>	<b>91.7</b>
<b>Drugs</b>				
Benzodiazepines	16	10.7	00	00
Antihypertensives	01	0.7	00	00
Oral Hypoglycaemics	01	0.7	00	00
NSAIDs	10	6.7	00	00
Others	07	4.7	00	00
<b>Total</b>	<b>35</b>	<b>23.3</b>	<b>00</b>	<b>00</b>
Acids	01	0.7	00	00
Plant Poisons	08	5.3	00	00
Kerosene	05	3.3	00	00
Copper Sulphate	05	3.3	01	8.3
Household Chemicals	17	11.4	00	00
Unknown	02	1.3	00	00
<b>Total</b>	<b>150</b>	<b>100</b>	<b>12</b>	<b>100</b>

Table 2

Time Delay in Hours	No. of Cases	Percentage (n=150)	Deaths
Less than 2 hours	66	44.0	05
2-6 hours	74	49.3	07
More than 6 hours	10	06.7	00

Table 3

Type of Poison	With Alcohol	Without Alcohol	Total
Agrochemicals	23	54	77
Copper Sulphate	01	04	05
Household Chemicals	00	17	17
Others	03	48	51
<b>Total</b>	<b>27</b>	<b>123</b>	<b>150</b>

## Discussion

Acute poisoning is one of the common problems in the emergency department of most of the hospitals in India. Self-poisoning is one of the oldest methods of committing suicide and it holds good even today. The only difference has been the agents used for the act, with newer pesticides, fungicides and various pharmacological drugs being used today. Identifying the underlying factors which triggered the suicidal attempt definitely helps physicians in preventing and reducing the incidence of deliberate self-harm.

In this study, a total of 150 patients were admitted for the treatment of poisoning, i.e., 0.6% of the total admissions. A similar study done at Mangalore, geographically quite close to Moodabidri, revealed that 1.0% hospital admissions were accounted for by poisoning.<sup>2</sup> The incidence was 0.3% and 1.16% in a study done in Haryana in the year 1983 and 1994 respectively.<sup>6</sup>

In this study, poisoning was more common among females as compared to males (1.41: 1) broadly similar to the findings of other studies.<sup>7-10</sup> We also found a significantly higher incidence of poisoning (66%) among unmarried females, followed by married men. Unmarried girls are subjected to stressful situations such as jilted love, disharmony existing between family members, lack of attention from the working parents, especially the mother, academic failure, ongoing physical and psychological changes after attaining puberty, etc. These factors may trigger suicidal attempts. However, Petrovic et al in their study found married women committing more suicides by poisoning than those who were unmarried.<sup>11</sup> In the Indian family system, men are usually the bread winners, and invariably take the responsibility of running the family. Hence, married men are subjected to stress, inability to cope with stress being the triggering factor for suicide.

In this study, the highest incidence of poisoning (58%, n=87) was found in the age group ranging from 12-25 years, and again females had the highest incidence of poisoning in this age group (77%, n=67). Thus it appears that adolescent and young adult females are a high-risk group for deliberate self-harm or intentional poisoning. In another study on acute poisoning, Ramesha et al found more than 60% of victims were between the ages of 12 and 29 years, while the 20-29 year age group accounted for 30.2%.<sup>12</sup> Similar findings have been seen in other studies.<sup>2,7</sup> In this study, the majority of the victims (96%, n=144) consumed the poison intentionally. Similar trend

of intentional self-poisoning has been seen in many other studies.<sup>2,7,13,14</sup>

Agrochemical poisons were the most commonly chosen agents for poisoning in our study: 77 patients (51.3%) consumed agrochemical poisons. In this group, there was significant preference for carbamates (41.6%, n=32). A similar observation was made by Cyric Job in his study.<sup>15</sup> This appears to be a new trend as previous studies had documented organophosphate pesticides to be the commonest agents of poisoning over most parts of India and Asia.<sup>2,5,16-18</sup> Aluminium phosphide is however the commonest poison used for self-poisoning in North India.<sup>19,20</sup> It is a well known fact that pesticides are the commonest agents for deliberate self-poisoning in agriculture-based developing countries of the world,<sup>21,22</sup> while in developed countries there is generally low preference for pesticides, and high affinity for pharmacological agents.<sup>23-25</sup> Drugs were the second most preferred agents for poisoning (23.3%, n=35) in our study with benzodiazepines topping the list. A similar observation was found on analysis of postmortem data from Brazil, and a study on deliberate self-poisoning done in Pakistan.<sup>26,3</sup>

We observed 8% (n=12) mortality in our study, and this death rate was comparable to other studies done in the Karnataka state by other researchers.<sup>2,12</sup> Highest mortality was in those who consumed agrochemical poisons (91.7%, n=11). Many other studies on poisons have shown similar results.<sup>27,28</sup> Among the agrochemical poisons, organophosphorus pesticides resulted in maximum deaths (54.5%, n=6). Several studies have concurred with this observation.<sup>29</sup>

In this study, a majority (49.3%, n=74) of patients reached the hospital between 2 to 6 hours after the poisoning. The mortality was lowest (7.6%) in those who arrived early, i.e., within 2 hours of poisoning. However, these observations were found statistically not significant in our study. However, many other studies have shown distinct relationship between the time of arrival to hospital and the final outcome.<sup>31,32</sup>

There was a significant relationship between the consumption of alcohol and type of poison selected in our study. Most of the patients who consumed alcohol preferred agrochemical poisons (85.2%, n=23). The death rate was higher (18.5%, 5/27) in those who co-ingested alcohol with the poison as compared to those who did not take alcohol. This practice is probably due to an effort at masking the bad taste and odour of the agrochemical

pesticide. Eddleston et al in their study have found that alcohol intoxication enhances the complications of organophosphorus pesticide toxicity.<sup>33</sup> In addition, ethanol may affect the metabolism of the toxic agents in the liver by inducing microsomal enzymes.<sup>34</sup>

In our study, it was found that the patients who vomited prior to hospitalization had a higher mortality than those who did not vomit. Zyoud et al in their study on acetaminophen found that those who vomited prior to admission had a poor prognosis when compared to those who did not.<sup>35</sup> We are of the opinion that spontaneous vomiting was due to the higher toxicity of the poison ingested, and it is this toxicity which increased mortality as well. The spontaneous vomiting might have also led to aspiration of the stomach contents causing aspiration pneumonia. This has been found to be a common complication of severe form self poisoning as shown by Liisanantti et al.<sup>36</sup>

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