

Epidemiological Profile of Complete Suicidal Poisoning Cases Autopsied at Autopsy Centre, RIMS, Ranchi

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ABSTRACT

Background: Suicidal behaviour is any deliberate action that has potentially life-threatening consequences, such as taking a drug overdose, deliberately consuming poison, hanging, drowning, burn etc. The aim of this study was to illustrate the epidemiological profile of complete suicidal poisoning cases autopsied at Department of Forensic Medicine and Toxicology, Rajendra Institute of Medical Sciences, Ranchi, India.

Methods: All cases autopsied at autopsy centre of department of forensic medicine and toxicology between April 2013 to October 2014 evaluated. Data obtained from the Information regarding the socio-demographic, mode of suicides, time of incidence, place of incidence, occupation, etc were gathered from the police papers like inquest report, dead body challan etc, and through detailed interviews of the relatives, neighbours, friends, and police officials accompanying the dead bodies.

Results: Total 3492 cases were autopsied, out of which only 180 cases were due to acute self-poisoning, suicidal in nature. This was 5.2% of the total cases autopsied at centre. The ratio of male and female suicide by poisoning was almost equal (M: F = 1.22: 1). The majority of victims were married, unemployed, from joint family and middle economic class. The most important agents of poisoning were agrochemical pesticides among these majorities were due to organophosphate.

Conclusion: More than 50% of victims from both male and female were in between 15 years to 30 years. The maximum victims were consumed poison at evening (between 4 PM to 8 PM) during summer season. The Agrochemicals were the preferred agents with organophosphates alone responsible for about 50% of suicidal mortalities followed by aluminium phosphide.

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► *Implication for health policy/practice/research/medical education:* Complete Suicidal Poisoning Cases Autopsied

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1. Introduction:

Suicidal behaviour is any deliberate action that has potentially life-threatening consequences, such as taking a drug overdose, deliberately consuming poison, hanging, drowning, burn etc. (1). Suicide is among the top three causes of death among the youth worldwide. According to the WHO, every year, almost one million people die from suicide and 20 times more people attempt suicide; a global mortality rate of 16 per 100,000, or one death every 40 seconds and one attempt every 3 seconds, on average (2) According to recent data available with WHO (3) that 804000 suicide deaths occurred worldwide in 2012, representing an annual global age-standardized suicide rate of 11.4 per 100 000 population (15.0 for males and 8.0 for females) (3).

According to WHO report published in 2012 that India ranks 43rd in descending order of rates of suicide with a rate of 10.6/100,000 reported in 2009 (WHO suicide rates) (2). While in 2012 the age standardized suicide rates was 21.1 / 100,000 (3). The rates of suicide have greatly increased among youth, and youth are now the group at highest risk in one-third of the developed and developing countries. Common methods used in developed countries include firearms, car exhaust asphyxiation, and poisoning whereas in developing countries, pesticide poisoning, hanging, and self-immolation lead the list.

According to WHO -2014 (3) a request was sent to 1914 WHO Member States to report data on methods of suicide in the WHO mortality database between 2005 and 2011. Only 76 WHO Member States were responded. These countries account for about 28% of all global suicides, so the methods used in 72% of global suicides are unclear. In high-income countries, hanging accounts for 50% of the suicides, and firearms are the second most common

method, accounting for 18% of suicides. The relatively high proportion of suicides by firearms in high-income countries is primarily driven by high-income countries in the Americas where firearms account for 46% of all suicides; in other high-income countries firearms account for only 4.5% of all suicides. However, in Low- and middle-income countries (LMICs), particularly in countries with a high proportion of rural residents engaged in small-scale agriculture, pesticide self-poisoning is most common methods of suicide. A systematic review (8) of world data for 1990–2007 estimated that around 30% (plausible range 27–37%) of global suicides are due to pesticide self-poisoning, most of which occur in LMICs. Based on this estimate, pesticide ingestion is among the most common methods of suicide globally (3).

In India, during 2009 self consumption of a poison was most common method for suicide (33.6%), followed by hanging (31.5%), self immolation (9.2%), and drowning (6.1%) (4). This pattern is recapitulated in the NCRB 2010 report (5).

The state level data on the methods used in suicide are quite limited and at the level of Ranchi district is not available. In addition to this the poison associated morbidity and mortality varies from place to place and changes over a period, due to the use of new chemicals. Therefore, the knowledge of the general pattern of poisoning in a particular region would help in early diagnosis and management of poisoning, which in turn should result in a prevention of suicidal mortality due to poisons. By considering these above mentioned facts, the present study has been conducted.

2. Materials and Methods:

The materials for the present study were cases brought for medico legal autopsy from various police stations of Ranchi District (Jharkhand) at the Forensic Medicine Department of RIMS, Ranchi. During the study period (April 2013 to October 2014) total 3492 cases were autopsied, out of which 180 cases were suicidal poisoning in nature. The information regarding manner of poisoning based on the history, provided by

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the accompanying relatives or police. Further, information regarding the socio-demographic, mode of suicides, time of incidence, place of incidence, occupation, etc were gathered from the police papers like inquest report, dead body challan etc, and through detailed interviews of the relatives, neighbours, friends, and police officials accompanying the dead bodies. In case of hospital deaths, hospital papers were also examined. To calculate the seasonal variation the seasons were classified according to the Indian Meteorological Department (IMD) (6) which designated four climatological seasons in India are as: Winter, occurring from December to March, summer or pre-monsoon season from April to June, Monsoon or rainy season from July to September and post-monsoon or autumn season from October to November (6). Collected data were analyzed using SPSS version 16 and results are presented in the form of table and figures.

3. Results:

Total three thousand four hundred and ninety two cases were autopsied in the autopsy centre during the period of one year and 8 months (April 2013 to October 2014). Of these, 180 cases of self-poisoning, suicidal in nature. This was 5.2% of the total cases autopsied at centre.

The age and gender distribution of suicide poisoning was described in Table-1. Their ages ranged 12-80 years, with the majority of victims of males and females were in between 15 years to 30 years, which accounting for more than half of the total suicidal poisoning after that a gradual decline in suicidal poisoning was marked.

More males ($N = 99$) are committed suicidal poisoning than females ($N = 81$) in Ranchi between April 2013 and October 2014. However, the ratio of male and female suicide by poisoning was almost equal ($M: F = 1.22 : 1$).

Of the 180 suicidal poisoning deaths, 60% were married and 40% were unmarried (Table 2). It was observed from Figure-1, in which the cases were distributed on the basis of their religions, that the majority of victims

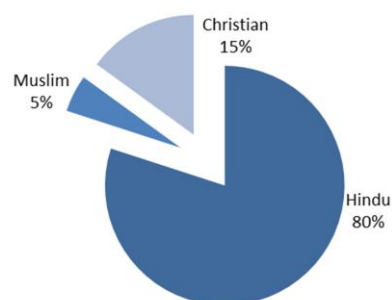


Fig. 1. It shows distribution of victims in relation to religion.

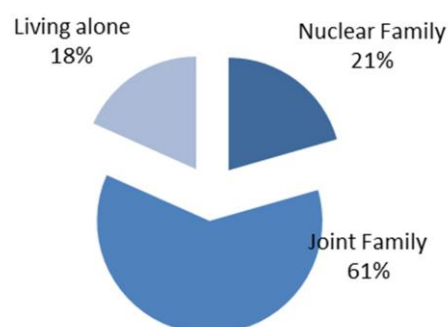


Fig. 2. It shows distribution of victims according to family structure.

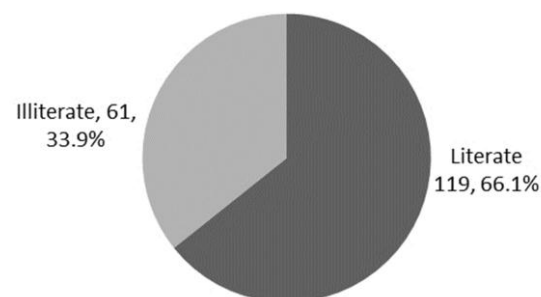


Fig. 3. It shows distribution of victims in relation to education.

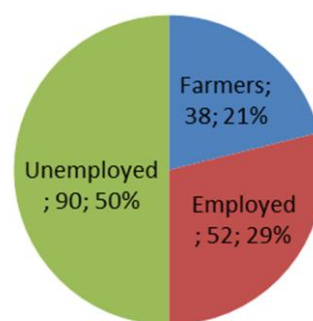


Fig. 4. It shows distribution of victims on basis of occupations.

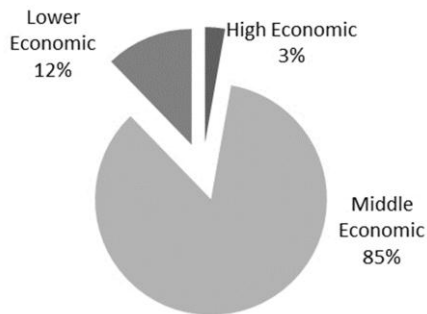


Fig. 5. It shows distribution of victims according to economic status.

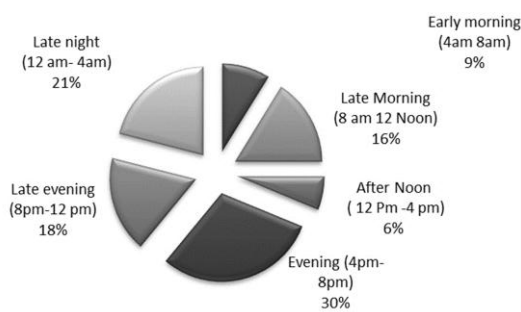


Fig. 6. It shows distribution of victims according to time of incidence.

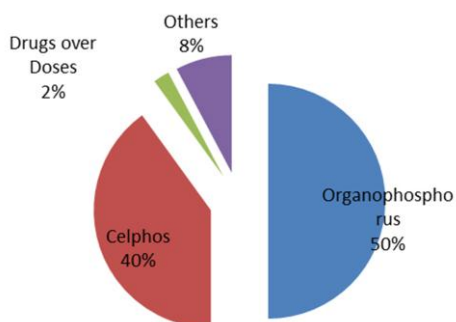


Fig. 7. It shows distribution of victims on basis of type of poisons.

were Hindus (80%), followed by Christians (15%) and Muslims (5%).

The majority victims of suicidal poisoning were from joint family (61%) followed by Nuclear Family (21%) and Living alone victims (18%) (Figure 2). The education-wise break-up of suicide victims is presented in Figure 3. The maximum numbers of suicide victims (66%) were literate and illiterate accounted for 34% (Figure 3). In terms of occupational status, the majority (50%) were unemployed, followed by 29% were employed, and 21% were farmers (Figure 4). The majority of the victims were from middle economic class (85%) followed

by lower economic class (12.0%) and high economic class (3.0%) (Figure 5).

The seasonal variations in number of cases are depicted in Table-3. Most of the suicidal poisoning occurred during summer season (37.2%) followed by Monsoon (July-Sept) (32.2%), Winter (Dec-March) season (26.7%) and the least frequency reported in the post-monsoon or autumn (Oct-Nov.) (3.9%) (Table 3). Figure 6 depicted that the time of consumption of poison, the maximum victims (30%) were consumed poison at evening (between 4 PM to 8 PM), followed by late night (between 12 AM to 4 AM) with 21%. The least number (6%) of victims were consumed poison afternoon hours (between 12 pm - 4 pm) (Figure 6).

Of the 180 cases, the majority (48.3%) were chose parental home for suicidal poisoning, from them 68 (37.8%) were males and 19 (10.6%) were females. This is followed by In-law's home 54 (30%) of which 03 (1.7%) were males and 51 (28.3%) were females. Next to these are Rental Home (16.7%), and other (5%). Amongst, the In-law's home majority (94%) victims were females while at parent home and rental home majority were males with 78% and 70% respectively (Table 4).

The distribution of victims on the basis of type of ingestion of poisons is presented in Figure 7. Agrochemicals were the preferred agents with organophosphates alone responsible for maximum (50%) suicidal mortalities (n=90) and followed by aluminium phosphide (40%) and others (8%). The other group included the poisons like organochlorine insecticides, plants and pyrethoides. Only 2% victims those uses drugs to commit suicide (Figure 7).

4. Discussion:

The World Health Organization (WHO) estimates that of the nearly 900,000 people who die from suicide globally every year, 170,000 are from India (7).

The second most frequently reported method for suicide was self-poisoning (often ingestions of organophosphate pesticides), which accounted for 16% to 49% of all suicides (8-22).

Table 1: Distribution of victims of suicidal poisoning in relation to age and Gender

Age Group (in years)	Gender				Total	
	Male		Female		Frequency	%
	Frequency	%	Frequency	%		
< 14	03	1.7	06	3.3	9	5.0
15-29	55	30.6	44	24.4	99	55.0
30-44	20	11.1	16	8.9	36	20.0
45-59	16	8.9	11	6.1	27	15.0
>60	05	2.8	04	2.2	09	5.0
	99	55.0	81	45.0	180	100

Table 2: Distribution of victims of suicidal poisoning in relation to Nuptial and Gender

Marital Status	Male		Female	
	Frequency	%	Frequency	%
Married	108	60.0	57	31.7
Unmarried	72	40.0	42	23.3
Total	180	100	99	55.0

Table 3: Distribution of Victims of Suicidal Poisoning according to Season of Incidence

	Frequency	%
Winter (December - March)	48	26.7
Summer (April - June)	67	37.2
Monsoon (July - September)	58	32.2
Post-monsoon or autumn (October - November)	07	3.9
Total	180	100

Table 4: Distribution of Victims according to Place of Incidence

Place of Incidence	Male		Female	
	Frequency	%	Frequency	%
Parent home	87	48.3	68	37.8
Rental home	30	16.7	21	11.7
Work place	00	00.0	00	0.0
In Law's home	54	30.0	03	1.7
other	09	5.0	07	3.9
Total	180	100	99	55.0

Self-poisoning is one of the oldest methods for committing suicide. Suicide is often an impulsive act resulting from the failure to adjust with their surroundings and cope with the stress they are exposed to. In addition to this, situations go worse when nobody is available for emotional support and

understanding the feeling, one may resort to suicide as a solution to ones problem and stress.

Poisoning related suicidal mortalities are quite high as compared to those in other parts of India and abroad. Suicidal poisoning forms a bulk of the total poisoning

Table 5: Distribution of Victims according to time of Incidence

Time of Incidence	Number	Percentage
Early morning (4am-8am)	16	8.9
Late Morning (8 am-12 Noon)	29	16.1
After Noon (12 Pm-4 pm)	11	6.1
Evening (4pm-8pm)	54	30
Late evening (8pm-12 pm)	32	17.8
Late night (12 am-4am)	38	21.1
Total	180	100

mortalities (23). It could be due to a general belief that poisoning kills with a minimal suffering.

In the present study, self-poisonings constituted 5.2% of the total autopsied cases. The incidence is lower than that reported in other studies conducted in other part of country (24, 25). Kumar *et al* (23) and B Suresh Kumar *et al* 2012 (26) have reported a higher proportion of fatal poisoning in Manipal, Mangalore and its neighbouring region. Higher incidence of poisonings is often related to the rural background and agriculture based setup in India. The lower proportion of poisoning fatalities in the present study can possibly be attributed to the fact that the study area constituted of a relatively more of urban than rural population with a high literacy rate in the urban population.

In our study, 55% of the total cases were males and 45% were females (Table 1). Similar observation was reported by various authors studies conducted in different parts of India, male predominance was a common and constant feature in all (27-36). Whereas the findings of study conducted in India by Vinay Shetty & Gurudutta, S. Pawar in 2008 (36) and Sanjeev Kumar *et al* (37) in 2012 were very close convergence of the present findings respectively 51.5% and 58% were males. This could probably be explained by the more frequent involvement of males in dealing with social and family life and more prone to stress and thus more frequently affected. Only a single article was found during literature search where reported that

the female preponderance has been reported in Imphal (38).

The present study showed that majority (55%) of victims of males and females were in between 15 years to 29 years, which accounting for more than half of the total suicidal poisoning followed by 20% cases in the age group 30- 39 years. The observations of global studies also showed the victims are frequently affected in the most active periods.

Similar observation was made by authors of studies done in other parts of the country (29, 31-35, 37, 39, 40, 41) and abroad (42-45). According to Islam *et al* (42) 48.4 % 13-24 years; Kambiz *et al* (43), Meel *et al* (44) 51.5% of age 11-30 years, Abdullat *et al* (45) 49.35 from age group 20 -29 years, the victims are frequently affected in the most active periods of their lives i.e. young age. The majority of victims were belonging to this age group it could be because of the person were more active and there were many reasons for suffering from stress of the modern life style, failure or less percentage in the exams, scolding from parents or teachers, failure in love, family problems etc. The victims in their extremes of ages were far less affected due to limited exposure for suffering from stress like adults young aged peoples. Only significant deviation was observed in Korea (46) where maximum numbers of the victims were in the above 70 years of age group.

With regards to the religion of the victims, the result of present study showed that the majority of victims were Hindus (80%), followed by Christians (15%) and Muslim (5%). The Hindus were commonly affected ones followed by others. In India, the majority of the population follows Hinduism and a similar religion based distribution is observed in different regions of India. In addition to this as it was observed that Hindu and Christian are predominantly engaged in agriculture related occupations. The fact that the farming is very prone to be financial losses in this part of India which resulting increased financial burden to farming community. There may be situation when the farmers may not able to cope up it and force them for suicide. The findings are

similar to studies done elsewhere in India (33) As per Islam, the Muslim religion, strictly forbids suicide that may be the reason for low incidence amongst Muslims (47, 48).

The majority victims of suicidal poisoning were from joint family (61%) followed by Nuclear Family (21%) and Living alone victims (18%). Similar observation was made in the study of Bansal *et al* (49) that 53% were from joint family; whereas the study of Ramdurg *et al* (50) showed that 59 % belonged to joint family. Adityanjee DR (51) and Mohanty S *et al* (19) had reported 85 % victims from joint family. Maximum cases were from joint family as compared to nuclear family (52). While the finding reported by Navinkumar M. Varma, and S.D. Kalele (35) that the majority victims were from nuclear family (64.33%) as compared to joint family (33.57%). It could be due to social and family structure while in our study the majority victims were from joint family. Subhadip Bharati *et al* (53) reported that 53.8% belonged to nuclear family and 46.2% to joint family.

The education-wise break-up of suicide victims is presented in Figure 3. The maximum numbers of suicide victims (66%) were literate and illiterate accounted for 34% (Figure 3). Incidence of poisoning was more amongst literate than illiterate which is consistent with other's findings (52, 54-55).

In the study conducted by Subhadip Bharati *et al* (53) majority of patients were middle school and primary school educated (32.7% and 23.7% respectively). 17.3% patients were illiterate, 26.3% had education secondary and above. Nagendra MR (56) found 27.4% of study subjects were illiterate, 52.2% below or up to matriculation and their findings were in agreement with the findings of other studies. Bansal (49) observed that majority of the cases had high school education which was consistent with the findings of two Indian studies.

Literacy statuses reveal that at the time of poisoning, most of the victims were either literate 361 (71.91%) or educated up to high school level and 141 (28.08%) illiterate (57). Above mentioned all studies suggest that incidence of poisoning was more in illiterate

and people with less education, this may be due to lack of knowledge and inability to succeed in life etc. These data also showed that even less educated people have knowledge of poisons and their effects (30, 32, 34, 35, 40).

In terms of occupational status, the majority (50%) were unemployed, followed by 29% were employed, and 21% were farmers (Fig-4).

The findings reported by Subhadip Bharati (53) that the majority of the study subjects were students (43.6%) and housewives (28.8%) and only 16.1 % were engaged in agriculture. In the study of Bansal *et al* housewives constituted the largest occupational group (25%) followed by students (15%) and 9% were farmers (49).

The present study shows that the majority of the victims were from middle economic class (85%) followed by lower economic class (12.0%) and High economic class (3.0%) (Figure-5). The similar observation was reported by the study carried by Sanjeev K *et al* (37) in which middle class victims were common followed by lower class.

Whereas, the findings of present author are differing to the study carried out by other authors like Subhadip Bharati *et al* (53), Nagendra MR *et al* (56) and Naveen N. *Et al* (58) that majority of the patients were belonged to lower socio-economic status groups. Most of the other studies in different countries have also reported that lower social class is an important risk factor for suicide and attempted suicide (59, 60). This study correlates with most studies (61-63).

An analysis was made to know the association between frequency of self poisoning with seasonal variations, it was found that most of the suicidal poisoning occurred during summer season (37.2%) followed by Monsoon (July-Sept) (32.2%), Winter (Dec-March) season (26.7%) and the least frequency reported in the post-monsoon or autumn (Oct- Nov.) (3.9%). The present findings were consistence with the findings of B K Guntheti *et al* (64), Singh Karamjit *et al* (65) and Shreemanta Kumar dash (66) that the maximum poisoning incidence was in summer showing the maximum numbers of victims.

Seasonal asymmetry in suicide is a long observed phenomenon and possible association between the monthly and seasonal distribution of completed and attempted suicides have long been studied. Seasonal variations in suicide rates have been reported for many countries, with a spring peak for men and spring and autumn peaks for women (67, 68).

Preti and Miotto (69) found evidence for seasonality only in violent suicides, whereas nonviolent suicides showed no seasonal trends. Climatic conditions in this hillitarian region of Eastern India differ from other parts of India and world. Predominant seasons are summers and monsoon, and during most part of the year, climatic conditions are hot and humid. Maximum suicides were reported during first half of the year with male mortalities occurring predominantly during second, and females during first quarter of the year. In Eastern part of India, highest number of cases were reported in rainy season (19), while in Faisalabad, Pakistan a seasonal surge was observed in spring (70).

Figure-6 depicted that the time of consumption of poison, the maximum victims (30%) were consumed poison at evening (between 4 PM to 8 PM), followed by late night (between 12 AM to 4 AM) with 21%. The least number (6%) of victims were consumed poison afternoon hours (between 12 pm - 4 pm) (Figure 6).

Most of the victims consumed poison during daytime, similar to studies done in Eastern part of the country (71, 72).

In a study in Italy, maximum suicidal mortalities were reported during late morning hours (73). In our study, a diurnal variation in the distribution of suicide was observed for both genders. During day hours, afternoon was preferred by females and evening time by males. This relative preference of time can be attributed to the fact that a person under stress is more prone to depression and ideas of self-destruction when alone and not engaged in other works. Females chose morning hours more frequently, whereas males had a relative preference for late night hours. Choice of

such a time is probably to escape attention of others.

The findings related to choice of place of incidence, the majority (48.3%) were chose parental home, from them 68 (37.8%) were males and 19 (10.6%) were females. This is followed by In-law's home 30% of which 1.7% was males and 28.3% were females. Amongst, the In-law's home majority (94%) victims were females while at parent home and rental home majority were males with 78% and 70% respectively (Table 4). A study conducted by Navinkumar M. Varma, S.D.Kalele in 2011(35) the population of Bhavnagar and reported that in majority cases (55.94%) place of poisoning was home, followed by farm (22.37%) and outside (19.59%).

The distribution of victims on the basis of ingestion of poisons is presented in Fig-7. Agrochemicals were the preferred agents with organophosphates alone responsible for maximum (50%) suicidal mortalities and followed by aluminium phosphide (40%) and others (8%). The other group included the poisons like organochlorine insecticides, plants and pyrethroids. Only 2% victims those uses drugs to commit suicide (Figure 7). Organophosphates were found to be responsible for maximum mortalities in males and females followed by zinc phosphide (rodenticide) and carbamates. Basic pattern and trend of poisoning shows a regional variation. The use of certain poisons to commit suicide depends on the availability and accessibility of the agent to an individual. For example, the Organophosphates continue to be the most commonly used agrochemicals in southern and western part of the country (27, 23, 74). In Northern India however, pesticide aluminium phosphide, a grain preservative is most commonly used (33, 75-77).

5. Conclusion:

Conclusion: Self-poisoning is one of the oldest methods for committing suicide. Suicide is often an impulsive act resulting from the failure to adjust with their surroundings and cope with the stress they are exposed to. More than 50% of victims from both male and female were in between

15 years to 30 years. The maximum victims were consumed poison at evening (between 4 PM to 8 PM) during summer season. The Agrochemicals were the preferred agents with organophosphates alone responsible for about 50% of suicidal mortalities followed by aluminium phosphide.

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