

A Cross Sectional Study on Socio-demographic Profile of Deceased Due to Suspected Poisoning Coming for Autopsy in FMT Department IGIMS, Patna, Bihar

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Department IGIMS, Patna, Bihar.

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ABSTRACT

The definition of poison has changed to its present form which is any substance which when administered, inhaled, or ingested is capable of acting deleteriously on the human body. Poisoning is represented by these four elements: Cause, subject, effect and consequence. Previously the cases of poisoning were mostly accidental but presently poisons are the commonest mode of committing suicide. Acute pesticide poisoning is one of the most common causes of intentional deaths worldwide.

Objective: To assess pattern of suspected poisoning cases.

Methods: This cross-sectional study was done on medico legal autopsies with cause of death as suspected poisoning conducted at the Department of Forensic Medicine and Toxicology (FMT), Indira Gandhi Institute of Medical Sciences (IGIMS), Patna over a period of six years (01 January, 2016 to 31 December, 2021) to study the pattern of suspected poisoning cases.

Inclusion criteria: All cases of suspected poisoning deaths coming for medico legal post-mortem examination.

Exclusion criteria: Decomposed bodies; Unidentified bodies.

Results: During study period 146 cases of suspected poisoning were examined. Maximum number of cases 29 cases were observed in 2019. The most common age involved was 21-40 years with n=72. Males (72.6%) were affected more than females. People from urban areas were affected with n=98. Married persons (n=106) were affected more. People from middle socio-economic status were affected more with n=91. Cases were more frequently seen in summer (April-June) season with n=50. Oral route was the route of exposure in 133 cases. 80.14% of the cases were suicidal in nature.

original author and source are credited.

Conclusions: Public education programs about suicide are an important component of suicide prevention programs which should aim at changing the prevailing attitudes. Significant number of deaths can be prevented by providing local first-aid kits, better training of physicians, faster transportation to hospitals, and ensuring that adequate supplies of antidotes and essential hospital equipment are readily available. Data from poison information centers can help in planning methods to prevent further suicides.

Keywords: Poison; Suicide; Poison information centre; Suspected poisoning; Autopsy

INTRODUCTION

The word poison comes from the Latin word 'potion' which means to drink for health. The definition of poison has changed to its present form which is any substance which when administered, inhaled, or ingested is capable of acting deleteriously on the human body [1]. "All substances are poisons. There is none, which is not a poison. The right dose differentiates a poison and a remedy". That is to say, a "non-toxic" substance can be toxic at a high enough dose and a very toxic substance can be safe if the dose is low enough. "The dose makes the poison" is a convenient rule [2]. Toxicology is defined as the study of the effects of chemical agents on biological materials. Modern toxicology is a multidisciplinary science and forensic toxicology is required to determine any exogenous chemical agent present in biological specimens made available in connection with medico-legal investigations [3].

Poisoning is made up of four components: Poison, poisoned organism, cell harm and symptoms and indicators of death. Poisoning is represented by these four elements: Cause, subject, effect and consequence. The organism is poisoned after being exposed to the poisonous substance. When a toxic level of the chemical is accumulated in the cells of the target tissue or organ, the cells normal structure or function is disrupted. Symptoms and toxic signs appear next, with death possible if the toxicity is severe enough [4]. According to NCRB (National Crime Records Bureau) statistics of 2020, the 4th leading causes of accidental deaths is 'poisoning' (6.1%).

Poisoning caused 22,221 (6.1%) deaths during 2020 [5]. Poisoning is a significant global public health problem. WHO (World Health Organization) estimates that, in 2016, unintentional poisoning caused 1,06,683 deaths and the loss of 6.3 million years of healthy life (disability-adjusted life years). It is estimated that about 20% of global suicides are due to pesticide self-poisoning, mostly in rural agricultural areas in low- and middle-income countries. Previously the cases of poisoning were mostly accidental but presently poisons are the commonest mode of committing suicide. In India, there is no check on their sale, and anybody can purchase it over the counter. Due to this, there is an increase in the number of poisoning cases across the country in past few years [6]. Acute pesticide poisoning is one of the most common causes of intentional deaths worldwide [7].

The pattern of poisoning varies from country to country, place to place and changes over a period of time due to various reasons. Poison consumption accounts for substantial numbers of deaths throughout the world, in the form of suicide, accident or homicide. Variety of factors, like availability and access of poison, socio-economic status of the individual, cultural and religious influences etc., influence the pattern of poisoning [8]. An understanding of acute poisoning patterns of a particular region will assist in arriving towards a preliminary diagnosis of poisoning cases and also in devising their effective treatment plans.

Along with identifying the population at risk for suicidal poisoning, such information will also provide guidance in designing interventions like psychological counselling and educating those at risk [9]. The data pertinent to poisoning

cases in Bihar area is deficient. So, the present study was executed to perceive pattern of suspected poisoning cases by collecting relevant data regarding parameters like socio-demographics, manner of poison intake, type of poisonings etc., from a tertiary care centre of Bihar (Indira Gandhi Institute of Medical Sciences).

MATERIALS AND METHODS

This cross-sectional study was done in the Department of Forensic Medicine and Toxicology, Indira Gandhi Institute of Medical Sciences (IGIMS), Patna. Ethical clearance for the study was obtained from Institutional Ethical Committee vide Letter No- 437/IEC/IGIMS/2022 dated 01/04/2022. All the autopsy with cause of death as suspected poisoning conducted in mortuary of Department of Forensic Medicine Indira Gandhi Institute of Medical Sciences Patna, over a period of six years (01 January, 2016 to 31 December, 2021) were included in the study based on the inclusion and exclusion criteria.

Inclusion criteria

An autopsy on all cases of suspected poisoning deaths conducted at the mortuary, IGIMS, Patna.

Exclusion criteria

The autopsy on unidentified bodies; the autopsy on decomposed bodies.

The deceased's detailed information was gathered from the post-mortem record of the department, concerned police officials as well as the inquest report. All the available data was uploaded on an MS-Excel spreadsheet and analyzed using SPSS version 20 for descriptive statistics.

RESULTS

A total of n=146 autopsy of suspected poisoning were done at IGIMS, Patna, between 01 January, 2016 to 31 December, 2021. Maximum number of cases 29 (19.9%) were performed in 2019 while least number of cases 20 (13.7%) were performed in 2020 details given in Table 1.

Table 1. Distribution of suspected poisoning cases according to year.

Year	Number of cases of suspected poisoning (%)
2016	26 (17.8)
2017	23 (15.7)
2018	27 (18.5)
2019	29 (19.9)
2020	20 (13.7)
2021	21 (14.4)
Total	146 (100)

The most common age involved with suspected poisoning was 21-40 years with n=72 (49.3%) cases while the least common age involved with suspected poisoning was >60 years with n=05 (03.4%) details given in Table 2.

Table 2. Distribution of suspected poisoning cases according to age group.

Age group	2016	2017	2018	2019	2020	2021	Total
0-20	8	3	8	6	2	2	29

21-40	12	13	10	11	12	14	72
41-60	5	6	8	10	6	5	40
>60	1	1	1	2	0	0	5
Total	26	23	27	29	20	21	146

Table 3 shows that males were affected more with n=106 (72.6%) in comparison to females.

Table 3. Distribution of suspected poisoning cases according to sex of the deceased.

Sex	2016	2017	2018	2019	2020	2021	Total
Male	18	16	17	22	17	16	106
Female	8	7	10	7	3	5	40

Cases of suspected poisoning were more frequent in people from urban areas with n=98 (67.1%) as compared to rural areas details given in Table 4.

Table 4. Distribution of suspected poisoning cases according to residential status.

Residential status	2016	2017	2018	2019	2020	2021	Total
Rural	7	9	8	9	7	8	48
Urban	19	14	19	20	13	13	98

Table 5 shows that married were affected more with n=106 (72.6%) in comparison to divorced which forms the least number of cases with n=06 (4.11%).

Table 5. Distribution of suspected poisoning cases according to marital status.

Marital status	2016	2017	2018	2019	2020	2021	Total
Unmarried	9	7	9	5	2	2	34
Married	15	14	17	23	17	19	106
Divorced	2	1	1	1	1	0	6

Cases of suspected poisoning were more frequent in people from middle socio-economic status with n=91 (62.32%) as compared to middle socio-economic status which comprises least number of cases with n=24 (16.44%) details given in Table 6.

Table 6. Distribution of suspected poisoning cases according to socio-economic status.

Socio economic status	2016	2017	2018	2019	2020	2021	Total
Lower	3	4	4	6	3	4	24

Middle	17	14	19	18	13	10	91
Upper	6	5	4	5	4	7	31

Cases of suspected poisoning were more frequent in summer (April-June) season with n=50 (34.25%) as compared to Autumn (October-November) season which comprises least number of cases with n=25 (17.13%) details given in Table 7.

Table 7. Distribution of suspected poisoning cases according to seasonal variation.

Seasonal variation	2016	2017	2018	2019	2020	2021	Total
Winter (Dec-Mar)	8	6	3	11	6	4	38
Summer (Apr-Jun)	10	11	8	8	5	8	50
Rainy (Jul-Sep)	5	4	8	7	4	5	33
Autumn (Oct-Nov)	3	2	8	3	5	4	25

Cases of suspected poisoning were most frequent through oral route with n=133 (91.1%) as compared to respiratory route which comprises least number of cases with n=04 (02.74%), while in 01 case the route of exposure was not clear details given in Table 8.

Table 8. Distribution of suspected poisoning cases according to route of exposure.

Route of exposure	2016	2017	2018	2019	2020	2021	Total
Oral	23	20	26	25	19	20	133
Respiratory	2	1	0	1	0	0	4
Injectable	1	2	1	2	1	1	8
Not clear	0	0	0	1	0	0	1

Cases of suspected poisoning were most frequent suicidal in nature with n=117 (80.14%) as compared to homicidal which comprises least number of cases with n=08 (05.48%), details given in Table 9.

Table 9. Distribution of suspected poisoning cases according to nature of poisoning.

Nature of poisoning	2016	2017	2018	2019	2020	2021	Total
Accidental	2	4	5	5	2	3	21
Suicidal	22	17	21	23	17	17	117
Homicidal	2	2	1	1	1	1	8

DISCUSSION

A mean of 24.33 autopsies of suspected poisoning cases are being conducted at IGIMS, Patna per year. Of the 146 cases, 72 (49.3%) belonged to the 21-40 years age group, which was similar to the findings from a previous study by Reddy, et al. and Nadeem, et al. ^[10,11]. This finding could be because this age group is the productive age group which

is socio-economic productive. In this study n=106 (72.6%) were males and n=40 (27.4%) were female cases. The male to female ratio was 2.65:1.

A similar pattern of male preponderance was found from other studies which may be probably due to the high dependence of family on male as breadwinners [12-14]. The distribution of domicile pattern of the victims showed that 98 were from urban areas (67.1%) and 48 were from rural areas (32.9%). This can be attributed to problems of urbanization that includes stress, intense competition, adaptability issues, unemployment, stress, financial mishaps etc. Similar findings were seen in study whereas contrasting findings were observed in the study by Gargi, et al. and by Sharma, et al. [7,15,16]. A larger percentage (72.6%) of cases were married (Table 1), which resembles the findings from three similar studies showing 72%, 67% and 78% of married cases [12,17,18]. This finding may be attributed to the fact that married people in India are at increased risk of suicide due to financial stress and increasing marital discord.

The maximum number of poisoning (n=91 cases) were found in middle socioeconomic status. These findings were similar to those reported by Navin, et al. [14,19]. A greater percentage (34.25%) of poisoning cases were seen in the summer season. A similar study from south India showed highest number of cases in May (27%) [20]. Similar finding has been observed in study done in the past [11]. This increase in number of suicide cases in the months of summer may be attributed to the fact that serotonin levels are relatively high in summer. An increased serotonin level thus increases the impulsivity and aggressive behavior of the person, altering his decision making process and thereby facilitating him to commit suicide [21].

In our study, maximum cases of suspected poisoning were through oral route with (91.1%). Similar findings have been reported by several studies done in the past [11,15,22]. This could be because of the fact of easy availability of drugs that are consumed orally and used most commonly for the purpose of poisoning. The present study shows that 80.14% of cases i.e., 117 were suicidal in nature. Poisoning is one of easiest methods of committing suicide. Easy availability, vast spectrum of poisons, cost-effectiveness and surety of death make poisoning an appealing means of committing suicide. Several studies done in the past have noted similar findings [7,23].

CONCLUSION

Public education programs about suicide are an important component of suicide prevention programs. Educational activities should aim at changing the prevailing attitudes. Significant number of deaths can be prevented by providing local first-aid kits, better training of physicians, faster transportation to hospitals, and ensuring that adequate supplies of antidotes and essential hospital equipment are readily available. Poison information centres are uniquely centralized repositories of data about human exposures to chemicals, including information about the agents involved, the circumstances giving rise to exposure and the health effects of exposure.

Data from poison information centres can help in planning methods to prevent further suicides. Limitation of the present study was it being a single centre study; hence, the findings are not representative of a general profile of poisoning from the whole region. Also, the number of cases included during this period might vary from actual number from this region, due to underreporting. There was also possibility of misdiagnosis, since the only source of information was provided by the patient or the patient's family member. Hence, a multicentric study for a longer duration is recommended to achieve a comprehensive pattern of acute poisonings occurring in Bihar.

DECLARATION

Ethics approval and consent to participate

Ethical clearance for the study was obtained from Institutional Ethical Committee vide Letter No-437/IEC/IGIMS/2022 dated 01/04/2022. Since it's a record based study, hence, consent to participate was not required.

CONSENT FOR PUBLICATION

Not applicable.

AVAILABILITY OF DATA AND MATERIAL

All data generated or analysed during this study are included in this published article.

COMPETING INTERESTS

None.

FUNDING

None.

AUTHORS CONTRIBUTIONS

- Mukesh Prasad formulated the idea for this original work and compiled all the data required for this paper.
- Sanjeev Kumar, Nawal Kumar Singh and Aman Kumar helped in retrieving all the data needed for compilation of results. The whole Introduction and Literature Review could not have been made possible without these authors.
- Nikhil Goel helped in statistical analysis as well as compilation of results. He also is solely responsible for corresponding with the journal as corresponding author.

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