# Socio-Demographic Profile of Fatal Poisoning in a Tertiary Care Teaching Hospital of Coimbatore District-A Retrospective Study

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## Abstract

**Background:** Poisoning poses a major public health problem mainly in developing countries. Because of the rapid industrialization and advancement in agricultural sector, fatality by poisoning also increases day by day. The aim of this study is to determine the socio-demographic profile of fatal poisoning in Coimbatore District. **Methods:** This retrospective study was carried out in Department of Forensic Medicine, Coimbatore Medical College, Coimbatore, Tamil Nadu with data obtained from fatal poisoning cases brought for postmortem examination from January 2016 to December 2016. Identification of specific poisons were done with chemical examiner's report. All collected data were analyzed in various possible aspects in the prepared proforma. **Results:** During the study period the total number of medico legal autopsies conducted were 3675 out of which fatal cases due to poisoning were 600(16.33%) cases. The study showed that the incidence of poisoning was more common among married men ie.303 cases (50.5%) out of 600 total number of poison cases. The incidence was more common in the age group 31 – 40 years in males (86 cases) which formed 14.3 % and in females it is 21-30 years (65 cases) which formed 10.8%.When we observed the religion wise distribution, Hindu males out numbered 369 out of 600 cases which formed 61.5%. **Conclusion:** Morbidity and mortality due to poisoning can be minimized by health education, early referral, establishment of toxicological units for detection of specific poisons and appropriate guidance for proper management of poisoning cases at hospitals and primary health care centers.

***Key words**: Socio-demographic profile; poison; autopsy*

## Introduction

Poisons were known to antiquity. References to the poisons were found in ancient records worldwide. In prehistoric periods, there were professional poisoners. Orfila, who in nineteenth century brought precise chemical methods in toxicology is considered as father of Modern Toxicology. The first treatise on Indian Medicine was the Agnivesa Charaka Samhita written in seventh century BC. The first textbook on poisons was written by Mathew Joseph Orfila in 1814.

Because of the rapid industrialization and advancement in agricultural sector, the incidence of poisoning is spreading like a wild fire. The chemical substances that are developed to save the agricultural products from rodents and pests act as a double edged sword to mankind. Though there are advancement in medical research and treatment, death due to poisoning still remains in the higher side and it keeps on increasing day by day.

Death due to poisoning is significant medically, legally and socially. Fatality by poisons may be suicidal, homicidal or accidental. Suicidal poisoning is more

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common. Accidental poisoning occurs in children less than 5 years of age. Homicide by poison is rare. WHO estimated that approximately 3 million poisoning cases occur worldwide of which 22, 00,000 deaths occur per year. More than 90% of the cases are being reported from developing countries like India and Srilanka.

The aim of this study is to determine the socio-demographic profile of fatal poisoning in and around the Coimbatore city.

## Materials and Methods

This retrospective study was carried out at the Department of Forensic Medicine and Toxicology, Coimbatore Medical College, Tamilnadu. Details were collected from the history of the case, treatment history and records, inquest papers, autopsy reports and chemical examiners report. Details of fatal poisoning cases brought for postmortem examinations from January 2016 to December 2016 were collected.

We used standard proforma to obtain data from the records to ensure consistency for the whole sample. Information collected includes age, sex, place of death, religion, marital status, medical treatment given, manner of death and chemical analyzer's report. The collected data was statistically analyzed.

## Results

This study revealed that a total of 3675 medico legal autopsies were conducted from 1st January 2016 to 31st December 2016 of which poisoning cases constituted 600 (16.3%) (Table 1)

Fatality in males outnumbered the females. Male female ratio being 2.03:1(Table 2) Out of total 600 cases, number of deaths in males is 401(66.8%), in females 198(33%) and in transgender 1(0.001%). Incidence of death by poisoning is more in the month of January 2016, 61 cases (10.2%) followed by 56 cases in February (9.3%) and in April 55 cases (9.16%)(Table 2)

In males, incidence of death by poisoning is more 86 cases in the age group 31-40 (14.3%) followed by 80 cases in age group 21-30 (13.3%),78 cases in age group 41-50 (13%), 69 cases in age group 51-60 (11.5%) , 34 cases in age group 61-70 (5.7%) , 26 cases in age group more than 70 years (4.3%), 24 cases in the age group less than 11-20 (4%) and 4 cases in the age below 10 years(0.6%) (Table 3)

In females, incidence of death by poisoning is more 65 cases in the age group 21-30 (10.8%) followed by 38 cases in the age group 31-40 (6.3%), 22 cases in age groups 51-60 and 61-70 (3.7%), 21 cases in age group 11-20 (3.5%),20 cases in the age group 41-50 (3.3%), 10 cases in age group more than 70 years (1.7%) and nil cases in the age group less than 10 years (Table 3)

Incidence of death by poisoning is more in married men 303 cases (50.5%) than in married female 152 cases (25.3%) followed by 98 cases in unmarried male (16.3%) and 46 cases in unmarried female (7.6%) out of the total 600 cases (Table 4)

This study also revealed that the maximum number of deaths by poisoning occurred in Hindu males 369 cases (61.5%) followed by Hindu females 190 cases (31.6%), Christian males 20 cases (3.3%), Muslim males 12 cases (2%) and in Muslim females and Christian females each 4 cases (0.6%) (Table 5)

In the present study, most of the cases were suicidal 596 cases (99.3%) followed by 4 accidental deaths(0.7%) Accidental poisoning occurs in children less than 10 years of age. There were no homicidal poisoning reported during the study period (Table 6)

## Discussion

Whatever may be the manner of death, any unnatural death is a tragedy which wastes the precious human life and resources. In the present study male poisoning deaths are more than twice the female deaths with male to female ratio of 2:1. This is consistent with the results in the study conducted by A K Kapoor et al[1]. This is supported by a similar study conducted by A K Batra et al[2] which revealed male poisoning deaths more than twice the female deaths with male to female ratio of 1.0:0.49 which is maintained in more or less same in all age groups., B.R.Sharma et al[3] in which males outnumbered the females, the male: female ratio being 2:1, Dr Kartik Prajapati et al[4] which showed the male poisoning deaths 1.33 times more than the female deaths with a male to female ratio of 1.8:1, Alakesh Halder et al[5], Dr.S.S.Sandhu et al[6] in which males are

most affected than females in deaths by poisoning i.e 75.5%, B.D.Gupta et al[7] in his study reported that males were prone to death by poisoning (62.1%) compared to females (37.9%) , Rajani V.Bhagora et al[8] , in this study, poisoning death cases were higher as (57.58%) in males than in female deaths (42.42%),in their study, Dr.S.K.Chaudhary et al[9] reported that the death due to poisoning in male population was 1.36 times more in comparison to female population with male to female ratio of 1:0.73, B.Suresh Kumar Shetty et al[10] in their study observed that males outnumbered females constituting 69.2% (n=90) and 30.8% (n=40) of cases respectively with a male-female ratio of 2.3:1. In our study the most affected age group of fatal poisoning is 31-40 in males and 21 -30 years in females which is supported by a similar studies done by A K Batra et al[2] Dr.S.S.Sandhu et al[6], B.D.Gupta et al[7], Rajani V.Bhagora et al[8], V.Koulapur et al[11] whom in their studies have reported that the fatal poisoning is more in third and fourth decade whereas it is less common in extremes of ages. This study revealed the maximum number of fatal poisoning occurred in married men. This finding is supported by the similar studies conducted by A K Batra et al[2], Dr.Kartik Prajapati et al[4], Dr.S.S.Sandhu et al[6] who reported that married persons (both sexes combined) outnumber the unmarried persons and constitute for over 62%, 62% and 57.6% deaths respectively. Dr.Virendar Singh et al[12] also observed that more married men (61.28%) were victims than unmarried men in his study. In our study, the incidence of death by poisoning is more in January 61 cases (10.2%) followed by higher incidence in February 56 cases (9.3%) and April 55 cases (9.16%). This is supported by a similar study by Kondrostami et al[13] which reported that spring and autumn were the most troubling seasons regarding suicidal deaths. In the study conducted by A.K.Kapoor[1] maximum incidence of suspected poisoning admissions were recorded in the summer season comprising of 120 cases (39.9%) followed by monsoon season (32.6%), while for poisoning deaths, a total of 86 cases were recorded in the rainy season (41.9%), followed by summer (36.6%). Both in suspected poisoning cases and suspected poisoning deaths, a minimum incidence was noted in the winter months. In April 2003, a maximum of 34 cases of suspected poisoning were admitted whereas in August 03, a maximum of 28 poisoning deaths were recorded. In a study by A K Batra et al[2], these peaks were noted in mid-monsoon months of August and September, probably due to socio-economic reasons like monsoon-dependent cultivation practice, agriculture-based economy, crop failures, exorbitant rates of interest and indebtedness to private usuries, financial crisis, hunger, denied minimum wages and increased work and labor pressure in rainy season which lead to constant anxiety coupled with an easy availability of insecticidal poisons, as it is purchased and kept at forms and houses for use when the agricultural activities are at its peak. In the study done by Dr.S.Chaudhary et al[9] maximum number of poisoning deaths were observed in month of May (13%) followed by month of March (11%) but statistically no seasonal trend is observed in the total number of events. Most of the poisoning deaths in the study conducted by B.Suresh Kumar Shetty et al[10] were reported during the rainy and summer seasons. In a study conducted in Singapore (14), which has two monsoon seasons, the peaks for Indian suicides were noted in April, September and November. In the present study, poison deaths were highest in Hindus, 560 cases out of 600 (93%) followed by 24 cases in Christians (4%) and 16 cases in Muslims (2.6%). This is supported by similar studies (4,7,9) where the maximum number of deaths by poisoning were seen in Hindus when compared to other religions. Incidence of fatal poisoning was more in Hindu people (92.40%) as compared to Muslim (07.60%) in a study conducted by Dr.Kartik Prajapati et al[4] ,B.D.Gupta et al[7] concluded that most of the victims were Hindus, which can be explained by the fact that major population of India is Hindu. Dr.S.Chaudhary et al[9] in his study reported that the incidence of fatal poisoning was more in Hindus (89.90%) as compared to Muslims (10.10%). In our study, the percentage of cases on manner of death is revealed as suicidal deaths 99.3% (596 cases), accidental in 0.7% (4 cases) and no homicidal cases. B.Suresh Kumar Shetty et al[10] in their study stated that intentional self-poisoning constituted 79.2% (n=103) of these deaths, followed by accidental consumption of poison (19.2%). No case of homicidal poisoning death was reported during the study period. In two cases the manner of death remained undetermined. This report from our study is further supported by the study conducted by Tanuj Kanchan et al[15] in which manner of death was reported as suicidal in 92.9% cases ($n$ = 13) and accidental in one case (7.1%).

**Conflict of Interest**: None

**Source of Support**: Self

**Ethical Clearance**: Ethical clearance and funding were not necessary as it was a retrospective study which included only collection of data.

**Table 1 – Number of Postmortems conducted in 2016**

| S. No | Month | RTA | TTA | Poison | Natural cause | Hanging | Murder | Burns | Fall from height | Drow-ning | Electro cution | Other | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Jan | 110 | 14 | 61 | 26 | 29 | 5 | 25 | 15 | 1 | - | 15 | 301 |
| 2 | Feb | 99 | 11 | 56 | 25 | 37 | 11 | 27 | 9 | 7 | 2 | 17 | 301 |
| 3 | Mar | 112 | 11 | 46 | 37 | 30 | 10 | 15 | 12 | 7 | 2 | 7 | 289 |
| 4 | Apr | 122 | 12 | 55 | 44 | 32 | 12 | 22 | 10 | 8 | 9 | 12 | 338 |
| 5 | May | 115 | 7 | 39 | 40 | 44 | 8 | 30 | 12 | 7 | 5 | 23 | 330 |
| 6 | Jun | 104 | 14 | 47 | 30 | 35 | 7 | 20 | 5 | 5 | 3 | 11 | 281 |
| 7 | Jul | 96 | 12 | 48 | 36 | 32 | 9 | 26 | 8 | 6 | 3 | 19 | 295 |
| 8 | Aug | 114 | 2 | 52 | 34 | 32 | 12 | 22 | 16 | 5 | 2 | 16 | 307 |
| 9 | Sep | 131 | 12 | 50 | 37 | 42 | 16 | 31 | 4 | 4 | 1 | 24 | 352 |
| 10 | Oct | 105 | 7 | 51 | 33 | 35 | 10 | 15 | 11 | 1 | 5 | 12 | 285 |
| 11 | Nov | 114 | 10 | 50 | 16 | 41 | 4 | 19 | 5 | 5 | 4 | 13 | 281 |
| 12 | Dec | 119 | 8 | 45 | 30 | 29 | 4 | 38 | 13 | 7 | 1 | 21 | 315 |
| 13 | Total | 1341 | 120 | 600 | 388 | 418 | 108 | 290 | 120 | 63 | 37 | 190 | 3675 |

**Table 2 - Sex and month wise distribution of cases**

| S.No | Month | Sex | | | Total |
|---|---|---|---|---|---|
| | | Male | Female | Transgender | |
| 1 | January | 45 | 16 | - | 61 |
| 2 | February | 36 | 19 | 01 | 56 |
| 3 | March | 25 | 21 | - | 46 |
| 4 | April | 34 | 21 | - | 55 |
| 5 | May | 29 | 10 | - | 39 |
| 6 | June | 31 | 16 | - | 47 |
| 7 | July | 39 | 09 | - | 48 |
| 8 | August | 40 | 12 | - | 52 |
| 9 | September | 29 | 21 | - | 50 |
| 10 | October | 32 | 19 | - | 51 |
| 11 | November | 32 | 18 | - | 50 |
| 12 | December | 29 | 16 | - | 45 |
| | Total | 401 | 198 | 01 | 600 |

## Table 3 - Age wise distribution of cases

| S.No | Month | Age | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | < 10 | | | 11-20 | | | 21-30 | | | 31-40 | | | 41-50 | | | 51-60 | | | 61-70 | | | >70 | | |
| | | M | F | T | M | F | T | M | F | T | M | F | T | M | F | T | M | F | T | M | F | T | M | F | T |
| 1 | Jan | - | - | - | 3 | 2 | - | 7 | 4 | - | 7 | 3 | - | 7 | 3 | - | 14 | 1 | - | 4 | 2 | - | 3 | 1 | - |
| 2 | Feb | - | - | - | - | 4 | - | 9 | 2 | 1 | 8 | 6 | - | 8 | - | - | 4 | 2 | - | 5 | 5 | - | 2 | - | - |
| 3 | Mar | 1 | - | - | 1 | - | - | 8 | 11 | - | 5 | 7 | - | 4 | - | - | 5 | 2 | - | 1 | 1 | - | - | - | - |
| 4 | Apr | - | - | - | 6 | 2 | - | 7 | 10 | - | 13 | 1 | - | 2 | 5 | - | 3 | 2 | - | 1 | 1 | - | 2 | - | - |
| 5 | May | - | - | - | - | 3 | - | 3 | 4 | - | 8 | 1 | - | 9 | 1 | - | 5 | - | - | 1 | 1 | - | 3 | - | - |
| 6 | Jun | - | - | - | 4 | 3 | - | 7 | 4 | - | 3 | 4 | - | 7 | 1 | - | 3 | 3 | - | 2 | 1 | - | 5 | - | - |
| 7 | Jul | - | - | - | 1 | 1 | - | 7 | 3 | - | 5 | 1 | - | 9 | 1 | - | 10 | - | - | 5 | 1 | - | 2 | 2 | - |
| 8 | Aug | 2 | - | - | 3 | 1 | - | 9 | 5 | - | 11 | 2 | - | 6 | 2 | - | 4 | 2 | - | 3 | - | - | 2 | - | - |
| 9 | Sep | - | - | - | 2 | 1 | - | 4 | 6 | - | 8 | 3 | - | 4 | 3 | - | 7 | 5 | - | 3 | 2 | - | 1 | 1 | - |
| 10 | Oct | - | - | - | 1 | 2 | - | 6 | 6 | - | 6 | 2 | - | 7 | 1 | - | 6 | 3 | - | 5 | 3 | - | 1 | 2 | - |
| 11 | Nov | 1 | - | - | 2 | - | - | 7 | 6 | - | 6 | 3 | - | 7 | 3 | - | 2 | 1 | - | 2 | 3 | - | 5 | 2 | - |
| 12 | Dec | - | - | - | 1 | 2 | - | 6 | 4 | - | 6 | 5 | - | 8 | - | - | 6 | 1 | - | 2 | 2 | - | - | 2 | - |
| | Total | 4 | - | - | 24 | 21 | - | 80 | 65 | 1 | 86 | 38 | - | 78 | 20 | - | 69 | 22 | - | 34 | 22 | - | 26 | 10 | - |

## Table 4 – Marital Status

| S.No | Month | Marital status | | | | |
|---|---|---|---|---|---|---|
| | | Married | | Unmarried | | |
| | | Male | Female | Male | Female | Transgender |
| 1 | January | 36 | 15 | 09 | 01 | - |
| 2 | February | 29 | 15 | 07 | 04 | 01 |
| 3 | March | 18 | 16 | 07 | 05 | - |
| 4 | April | 23 | 19 | 11 | 02 | - |
| 5 | May | 26 | 04 | 03 | 06 | - |
| 6 | June | 21 | 11 | 10 | 05 | - |
| 7 | July | 31 | 08 | 08 | 01 | - |
| 8 | August | 26 | 10 | 14 | 02 | - |
| 9 | September | 23 | 17 | 06 | 04 | - |
| 10 | October | 25 | 14 | 07 | 05 | - |
| 11 | November | 22 | 13 | 10 | 05 | - |
| 12 | December | 23 | 10 | 06 | 06 | - |
| | Total | 303 | 152 | 98 | 46 | 01 |

## Table 5 - Religion wise distribution

| S.No | Month | Religion | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Male | | | | Female | | | | Transgender |
| | | Hindu | Muslim | Christian | Others | Hindu | Muslim | Christian | Others | Hindu |
| 1 | Jan | 40 | 02 | 03 | - | 15 | - | 01 | - | - |
| 2 | Feb | 35 | - | 01 | - | 17 | 01 | 01 | - | 01 |
| 3 | Mar | 24 | - | 01 | - | 21 | - | - | - | - |
| 4 | Apr | 29 | 03 | 02 | - | 20 | 01 | - | - | - |
| 5 | May | 28 | 01 | - | - | 10 | - | - | - | - |
| 6 | Jun | 27 | 02 | 02 | - | 16 | - | - | - | - |
| 7 | Jul | 35 | 02 | 02 | - | 09 | - | - | - | - |
| 8 | Aug | 37 | - | 03 | - | 12 | - | - | - | - |
| 9 | Sep | 28 | - | 01 | - | 21 | - | - | - | - |
| 10 | Oct | 30 | - | 02 | - | 17 | 01 | 01 | - | - |
| 11 | Nov | 30 | 01 | 01 | - | 17 | 01 | - | - | - |
| 12 | Dec | 26 | 01 | 02 | - | 15 | - | 01 | - | - |
| | Total | 369 | 12 | 20 | - | 190 | 04 | 04 | - | 01 |

**Table 6 - Poisoning cases to manner of death**

| S.No | Manner of death | Number of cases | Percentage |
|---|---|---|---|
| 1 | Suicidal | 596 | 99.3% |
| 2 | Accidental | 4 | 0.7% |
| 3 | Homicidal | 0 | 0 |
| | Total | 600 | 100% |

## References


1. A K Kapoor, U S Sinha, A K Singh, R Mehrotra, An epidemiological study of aluminium phosphide poisoning at Allahabad. Int J Forensic Med Toxicol 2006; 4(1).
2. AK Batra, AN Keoliya, GU Jadhav, Poisoning : An Unnatural Cause of Morbidity and Mortality in Rural India. JAPI, Vol 51, October 2003.
3. B.R.Sharma, Nidhin Relhan, Neha Gupta and Harshabad Singh. Trends of Fatal Poisoning in Northern India: A Ten-Year Autopsy Analysis. Journal of Pharmacology and Toxicology 2 (4): 350-358, 2007, ISSN 1816-496X, 2007 Academic Journals.
4. Dr Kartik Prajapati, Dr Saumil P Merchant, Dr Pratik R Patel. Trends of Suicidal Poisoning in Ahmedabad (Retrospective Study). NHL Journal of Medical Sciences, Volume 1, Page 18-22.
5. Alakesh Halder. An Epidemiological study of Pesticide Poisoning Cases in West Bengal, JMSCR Volume 05, Page 22842-22845, Issue 06 June 2017..
6. Dr.S.S.Sandhu, Dr.A.Garg, Dr.RK Gorea, Poisoning Trend in Faridkot region: A Retrospective Study- Journal of Punjab Academy of Forensic Medicine & Toxicology., 2010; 10(1): 20-23. (ISSN: 0972 – 5687).
7. B.D.Gupta, P.C.Vaghela, Profile of fatal poisoning in and around Jamnagar- JIAFM, 2005: 27 (3). Page 145-148. ISSN 0971-0973.
8. Rajani V.Bhagora, D.J.Parmar, C.A.Desani – Profile Study of Fatal Poisoning Cases Brought for Postmortem Examination at Mortuary of Sir Takhtsinhji General Hospital, Bhavnagar (Gujarat) Int J Res Med.2015; 4(3);59-63 eISSN:2320-2742 p ISSN:2320-2734.
9. Dr.Sanjeev Kumar Chaudhary, Dr.S.G.Momin, Dr.Dipak H. Vora, Dr.Pikesh Modi, Dr.Viral Chauhan, Dr.Dipak Chotaliya. An Epidemiological Study of Fatal Aluminium Phosphide Poisoning at Rajkot- IOSR Journal of Pharmacy, e-ISSN: 2250-3013, p-ISSN: 2319-4219, www.iosrphr.org-Vol.3,Issue 1, Jan-Feb 2013, PP. 17-23.
10. B.Suresh Kumar Shetty, Tanuj Kanchan, Ritesh G.Menezes, Mahabalesh Shetty, M.Arun, Preetham Raj V.Salian et al. Poisoning fatalities in Mangalore, South India: A three year snapshot- International Journal of A J Institute of Medical Sciences, Vol.1, No.2, November 2012, Pages 104-111.
11. V.Koulapur V, S.Pujar S, S.Honnungar R, S.Jirli P, Patil S. Epidemiological Profile of Pesticide Poisoning Cases in Bijapur, Karnataka in Southwest India: a Retrospective Study. International Journal of Medical Toxicology and Forensic Medicine.2015; 5 (4):180-4.
12. Dr.Virendar Pal Singh, Dr.B.R.Sharma, Dr.Dasari Harish, Dr.Krishnan Vij. A Ten year study of Poisoning cases in Tertiary Care Hospital, IIJFMT 2004,1(4).118.
13. Roya Kordrostami, Maryam Akhgari, Maryam Ameri, Masoud Ghadipasha, Kamran Aghakhani. Forensic toxicology analysis of self-poisoning suicidal deaths in Tehran, Iran; trends between 2011-2015, DARU Journal of Pharmaceutical Sciences (2017) 25:15 DOI 10.1186/s-40199-017-0181-1.
14. Kok L P, Tsoi W S. Season, climate and suicide in Singapore. Medicine, Science and the Law 1993; Volume: 33 issue:3, page(s):247-252.
15. Tanuj Kanchan, Shankar M. Bakkannavar and Preetham R. Acharya. Paraquat Poisoning: Analysis of an Uncommon Cause of Fatal Poisoning from Manipal, South India- Toxicol Int. 2015 Jan-Apr; 22(1): 30–34. doi: 10.4103/0971-6580.172253.