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## Original Research Article

### **Profile of Deaths due to Poisoning, Autopsied in Chennai – A Cross Sectional Study**

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#### Article Info

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#### Key words

Poisoning, Autopsy,  
Hydrochloric acid,  
Suicide.

#### Abstract

**Introduction:** Poisoning is an important health problem in every country of the world and it is a known fact that the incidence of poisoning in India is the highest and is estimated that more than 50,000 people die every year from poisoning. Poisoning affects all age groups generally due to easy accessibility of poisons and lack of awareness. **Objectives:** To find out epidemiological factors, pattern and other significant features of poisoning. **Methods:** The present study was conducted in the Department of Forensic Medicine & Toxicology attached to Medical College for a period of 2 years. Detailed and complete Post – Mortem Examination of the dead bodies were done including Chemical Analysis of Viscera. A proforma was prepared to fill up details of the parameters used in this study, data was compiled and analysed statistically. **Results:** Out of 5438 cases autopsied in the year 2020 & 2021 only 114 cases were confined to poisoning which constitutes 2.09% on a whole. Males (68.42%) outnumbered females. The most predominant age group of poisoning is between 31-40 Years. Maximum cases were brought dead to the hospital (80.70%). Maximum cases of consumption of poisoning were confined with Hydrochloric Acid Poisoning (28.07%). Maximum cases of poisoning related deaths were suicidal in nature (85.96%). **Conclusion:** In order to minimize the deaths due to poisoning, awareness need to be created among the public about the seriousness of poisoning. Government can take initiation to set up a poison information centre in all the tertiary care hospitals which can provide information about the type of toxic compound, antidote.

#### 1. Introduction

Paracelsus (1493 – 1545) defined poison as all substances are poison; there is none which is not a poison. The right dose differentiates a poison and a remedy.<sup>1</sup> Till today poisoning remains one of

the commonest causes of unnatural death. With the development of science and technology poisonous substances are used in house holding works, paintings, grain preservatives, agriculture

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and industries etc. Even though the advanced medical treatment and awareness, the poisoning cases are increasing day by day. Annually it has been estimated that the health hazards are directly or indirectly due to poisons is for more than 1 million illnesses worldwide, and this could be just the tip of the iceberg as most of the cases of poisoning actually go unreported and untreated especially in the developing and underdeveloped countries.<sup>2</sup>

WHO estimated that approximately 3 million pesticide poisoning cases occurs worldwide and cause more than 22,000 deaths per year.<sup>3</sup> This happened probably because of easy availability of these substances, less price and peaceful death on behalf of some social causes, emotional causes, less education and far away from tertiary hospital.

Poisoning being invariably medico legal in nature among fatal cases, post mortem examination is done to establish the exact cause of death. Manner of death in these cases is predominantly suicidal because of the general belief that it terminates life with minimal sufferings. Even accidental or homicidal cases are also reported and alleged which was more prevalent in the past as there were no well-established means of detecting poison from viscera etc and it was believed that if dead body was black, blue or spotted in places or smelled bad, the cause of death was a poison. Poisons are subtle and silent weapons, which can be easily used without violence and often without arousing suspicion.

At present due to vast development in all fields of life like industries, medicine and agriculture a significant number of new compounds have appeared as new poisonous substances, which lead to more number of poisoning cases.<sup>4,5</sup>

Even though the advanced medical treatment and awareness, the deaths due to poisoning are increasing day by day. As various chemicals are in use in modern era, they are very handy for misuse or accidental calamity. With the advent of modern techniques of chemical analysis, this method of committing homicide has lost its grounds.<sup>2</sup>

## 2. Aims and Objectives:

- To find out epidemiological factors, pattern and other significant features of poisoning.
- To know the predominant age, sex, and occupation involved in consumption of poison.
- To know the most common type of poison & the common manner of death encountered.

## 3. Materials and Methods:

The present study was conducted in the Department of Forensic Medicine & Toxicology attached to Medical College & Hospital for a period of 2 years from 01-01-2020 to 31-12-2021. During this period a total of 5438 Post Mortem cases were conducted, out of these 114 cases contributed to poisoning. Detailed and complete Post – Mortem Examination of the dead bodies were done including Chemical Analysis of Viscera, which was done at Forensic Science Laboratory. A proforma was prepared to fill up details of the parameters used in this study, data was compiled and analysed statistically.

**Inclusion Criteria:** All cases of poisoning autopsied at Government Medical College & Hospital, for the year 2020 & 2021 from 01-01-2020 to 31-12-2021.

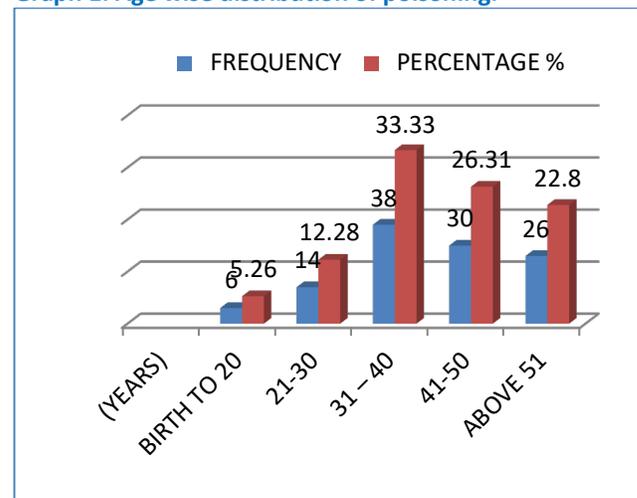
**Exclusion Criteria:** All snake bite cases, scorpion sting, bees sting cases and where the diagnosis of poisoning was doubtful (Unconscious patient without proper history and signs of poisoning).

## 4. Observations:

**Sex wise distribution of poisoning:** Maximum cases of Poisoning were seen in males which constitutes to 68.42% of the cases where as females were 31.57%.

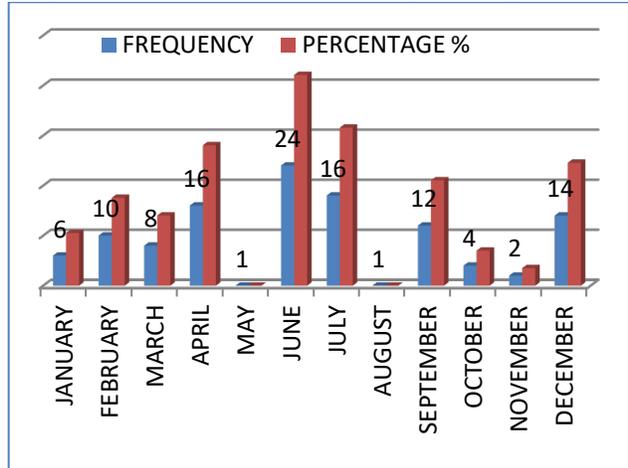
**Age wise distribution of poisoning:** Maximum cases of poisoning were seen in the age group of 31-40 Years (33.33%) followed by 41-50 Years (26.31%) and above 51 Years (22.80%). The most predominant age group of poisoning was between 31-40 Years (33.33%) (Graph 1).

Graph 1: Age wise distribution of poisoning.



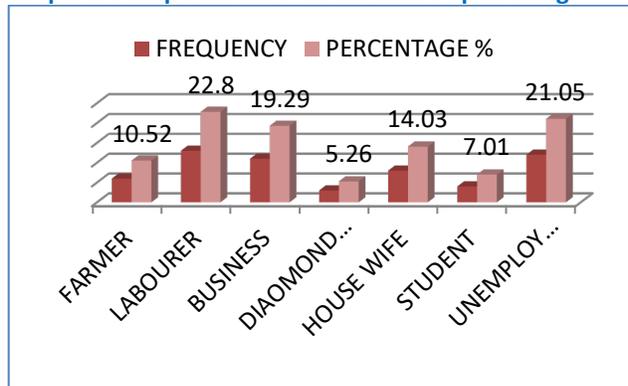
**Month wise distribution of poisoning:** Maximum number of poisoning cases were seen in the month of June (21.05%) followed by July (15.78%) and April (14.03%). Predominant month of poisoning is June (21.05%) (Graph 2).

**Graph 2: Month wise distribution of poisoning.**



**Occupation wise distribution of poisoning:** Cases of poisoning based on occupation was relatively high in labourers (22.80%) followed by business individuals (19.29%) and unemployed individuals (21.05%). Maximum cases of poisoning were noticed in laborers (22.80%) (Graph 3).

**Graph 3: Occupation wise distribution of poisoning.**



**Religion wise distribution of poisoning:** Cases of poisoning were more in Hindus (57.89%) followed by Christians (28.07%) and Muslims (14.03%).

**Table 1: Distribution of poisoning cases according to educational status.**

Educational status	Frequency	Percentage %
Illiterate	34	29.82
Graduate	22	19.29
Post graduate	26	22.80
Upto school	14	12.28
College drop outs	18	15.78
Total	114	100

Most of the individuals who consumed poison and died were Illiterates (29.82%) followed by Post Graduate’s (22.80%) and College Dropouts (15.78%) (Table 1).

**Distribution of poisoning cases according to marital status:** Maximum number of poisoning cases was seen in married males (57.14%) followed by unmarried males (86.36%).

**Distribution of poisoning cases according to socio economic status:** Maximum number of poisoning cases was seen in Middle socio-economic status (56.14%) followed by lower socio-economic status (35.08%) and Upper socio-economic status (8.77%).

**Distribution of cases based on treated and died, brought dead to the hospital:** Maximum cases were brought dead to the hospital (80.70%).

**Table 2: Distribution of poison detected by chemical analysis.**

Chemical analysis (FSL)	Frequency	Percentage %
Organophosphorus	10	8.77
Crane poison	04	3.50
Carbamate	04	3.50
Pyrethroid	04	3.50
Paraquat	04	3.50
Zinc phosphide	14	12.28
<b>Hydrochloric acid</b>	<b>32</b>	<b>28.07</b>
Nitric acid	02	1.75
Sulphuric acid	08	7.01
Cyanide	06	5.26
Benzodiazipine	06	5.26
Thinner	02	1.75
Alcohol	04	3.50
Super Vasmol – 33	04	3.50
Medicinal tablets	04	3.50
Unknown compounds / Not detected	06	5.26
Total	114	100

Maximum cases of consumption of poison were confined with hydrochloric acid poisoning (28.07%) followed by zinc phosphide (12.28%) and organophosphorus poisoning (8.77%) (table 2).

**Manner of death:** Maximum cases of poisoning deaths were suicidal in nature (85.96%) followed by accidental (7.01%) and manner of death not known contributed to (5.26%).

**5. Discussion:**

Total 5438 autopsies were carried out during the study period and out of them 114 cases of deaths due to poisoning were observed which constitutes 2.09% of deaths on a whole. Maximum cases of Poisoning were seen in males which constitutes to 68.42% of the cases where as females were 31.57%. (Males outnumbered females), which is in concurrence with the study conducted by PC Vaghela et al, Rajesh et al, S Chaudhry et al & Sasikumar et al.<sup>6,7,8,9</sup> Though all the studies were conducted in different parts of India, male predominance was a common and constant feature. Maximum cases of poisoning were seen in the age group of 31-40 Years (33.33%) followed by 41-50 Years (26.31%) and above 51 Years (22.80%). Almost similar statistics were observed in studies conducted by Navin Varma et al,

AK Kapoor, Dalal et al, Sanjay Gupta et al, Sharma BR et al, Rajesh et al.<sup>3,10,11,12,13</sup> It could be explained by the facts that the persons of this young age group are suffering from stress of the modern life style, family problems, financial problems and failure in the exams.

Maximum number of poisoning cases were seen in the month of June (21.05%) followed by July (15.78%) and April (14.03%) which was not consistent with the studies done by Navin Varma et al, PC Vaghela et al, Dhatarwal S.K et al where maximum number of poisoning cases were observed in the monsoon months of August, September and October.<sup>3,6,14</sup> Cases of poisoning based on occupation was relatively high in labourers (22.80%) followed by business individuals (19.29%) and unemployed individuals (21.05%). This is in contrast to the studies conducted by Rajani V. Bhagora et al, and Anand Patil et al. Farmers consuming poison was high in the study conducted by Bhuyyar Chandrasekhar et al followed by housewives.<sup>15,16,17</sup> In our study labourers consuming poison were high, this is because Chennai being a cosmopolitan city, many labourers from other parts of the country reach here for various job opportunities.

Cases of poisoning were more in Hindus (57.89%) followed by Christians (28.07%) and Muslims (14.03%). This is similar to the studies conducted by B.D.Gupta et al and Bhuyyar Chandrasekhar et al.<sup>6,17</sup> This increase in Hindus consuming poisons could be confined to majority of population with Hindus in India. Most of the individuals who consumed poison and died were Illiterates (29.82%) followed by Post Graduates (22.80%) and College Dropouts (15.78%). This is in contrast to many studies, including the study conducted by Bhuyyar Chandrashekar et al were literates outnumbered illiterates in consumption of poisoning.<sup>17</sup> In our study illiterates were more because most of them were labourers and daily wages. Economic stress could be the reason for them to commit suicide.

Maximum number of poisoning cases was seen in married males (57.14%) followed by unmarried males (86.36%). This is almost similar to the studies conducted by Bhuyyar Chandrashekar et al and B.D.Gupta et al were married people where high in committing suicide by poisoning.<sup>6,17</sup> This is related to financial stress and emotional stress related to bonding. In the study conducted by B.D.Gupta et al, married females were found to be

high in number in consuming poison and die whereas in our study married males were high in consuming poison and die. This could be explained as most of the men are the persons who go to work to run the family and could have consumed poison because of financial stress.<sup>6</sup>

Maximum number of poisoning cases was seen in middle socio economic status (56.14%) followed by lower socio economic status group (35.08%) and upper socio economic status (8.77%) which is in contrast to the studies conducted by B.D.Gupta et al and Anand Patil et al, people with lower socio economic status were high in consuming poison and die out of it.<sup>6,16</sup> This could be clearly explained that the expectations of individuals in middle Socio Economic Status could not be satisfied and subsequently due to social, emotional and financial stress they commit suicide.

Maximum cases were brought dead to the hospital (80.70%). This is similar to almost all the studies.<sup>18-21</sup> This indicates people are so determined and prefixed and have enough knowledge about consumption of more toxic products so that they will not survive. Maximum cases of consumption of poison were confined with hydrochloric acid poisoning (28.07%) followed by zinc phosphide (12.28%) and organophosphorus poisoning (8.77%). This is in contrast to the studies conducted by B.D.Gupta et al and Bhuyyar Chandrashekar et al where most of the cases of poisoning were confined to consumption of organophosphorus poison.<sup>6,17</sup>

In our study hydrochloric acid consumption was high as it is an easily available as a domestic product to clean the bathrooms and Chennai being a cosmopolitan city, sale of agricultural products are less. Most of who consumed organophosphorus poison could have got the insecticide from the outer rural areas which are in close proximity to Chennai and would have consumed it. Maximum cases of poisoning deaths were suicidal in nature (85.96%) followed by accidental (7.01%) and manner of death not known contributed to (5.26%) which is similar to the studies conducted by B. D. Gupta et al, Rajesh et al & many other studies as various chemicals are in use in modern era, they are very handy for misuse or accidental calamity as well.<sup>6,13,22-24</sup> Most of the people prefer them for the purpose of suicide, as poisons leads to peaceful death.<sup>25</sup>

## 6. Conclusion:

In India, prevention of poisoning deaths poses a difficult task, as the cause of poisoning is

multifaceted. Chances of suicide is more prevalent of various reasons like poverty, unemployment, socio economic problems, divorce, dowry, love affairs, illegitimate pregnancy, extra marital affairs and conflicts relating to the issues of marriage, play an important role, particularly in the suicide of women in India.

In order to minimize the deaths due to poisoning, awareness need to be created among the public about the seriousness of poisoning, implementing the measure to uplift the socio – economic status and to solve unemployment and last but not the least, the law has to be strengthened towards the sale and distribution of pesticides & other harmful chemicals. Establishing poison control centre in every treating hospital may decrease the deaths due to poisoning.

#### 7. Recommendations:

Government can take initiation to set up a poison information centre in all the tertiary care hospitals which can provide information about the type of toxic compound, antidote, toxicity assessment and treatment recommendations over phone / e-mail round the clock for all kinds of poisons.

**Ethical Clearance:** IEC approval is taken from the Institutional Ethical committee.

**Contributor ship of Author:** All authors equally contributed.

**Conflict of interest:** None to declare.

**Source of funding:** None to declare.

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