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Profile of Poisoning in Autopsy cases in Bangalore South: A Ten-Year Retrospective Study

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Abstract

Poisoning occurs when any substance interferes with normal body functions after it is swallowed, inhaled, injected, or absorbed. In this retrospective study, all cases of fatal poisonings brought for medicolegal autopsy during the period 1st January 2011 to 31st December 2020 were analysed at the Department of Forensic Medicine & Toxicology, RRMCH, Bengaluru. The data obtained was computed and descriptive analysis of baseline characteristics were inferred. In our study, 12.18% of the total cases in the study period were deaths due to poisoning of which the males formed 512 cases (73.14%) and females formed 188 cases (26.86%), the male to female ratio being 2.7 : 1. Most of the cases belonged to the 18-30 years age group. Majority of cases were suicidal in manner. Most common poison was noted to be organophosphorous compound. The majority of hospitalised cases involved consumption of organophosphorous compound forming 23 cases. Most of the hospitalised cases had a survival period of less than 12 hours. The study concluded that males were more commonly involved, and poisoning is seen most commonly among people from the age group of 18-30 years. The most common cause of death being suicidal poisoning by use of organophosphorous compound, and if hospitalised with a survival period of less than 12 hours.

Key words: Retrospective; Poisoning; Organophosphorous; Hospitalised; Manner of Death.

Introduction

A poison is a substance which if introduced into the living body, or brought into contact with any part thereof, will produce ill-health or death, by its constitutional or local effects or both.[(1)] The branch of medicine that deals with the study, diagnosis and treatment of poisons is known as toxicology.[(2)]

Poisoning is a significant global public health problem. According to WHO data, in 2012 an estimated 193,460 people died worldwide from unintentional poisoning. Of these deaths, 84% occurred in low- and middle-income countries. Nearly a million people die each year as a result of suicide, and chemicals account for a significant number of these deaths. For example, it is estimated that deliberate ingestion of pesticides causes 370,000 deaths each year. The number of these deaths can be reduced by limiting the availability of, and access to, highly toxic pesticides.[(3)]

Acute pesticide poisoning is one of the most

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common causes of intentional deaths worldwide. [4] Self-poisoning with pesticides accounts for 14–20% of global suicides, an estimated 110,000–168,000 deaths each year.[5]

The National crime records bureau (NCRB)'s Accidental Deaths and Suicides in India shows that in 2019, there have been 4,12,959 accidental deaths of which 5.1% were due to poisoning. It also shows that 1,39,123 cases of suicide occurred out of which 11,288 case (25.8%) were due to poisoning with a male predominance between the ages of 18-30 years.[6]

As agriculture is major profession in the rural part of India farmers stock the pesticides to eradicate the weeds and pests. Due to easy availability of the pesticides, they are commonly used by the individuals to end their life in stressful situations. [7] Organophosphorous (OP) compounds cause most common suicidal poisoning deaths in southern, central India.[8]

While in northern India, aluminium phosphide causes most suicidal poisoning deaths.[9]

In general, accidental poisoning is more common in young children, whereas suicidal poisoning is more common in young adults.[10]

The exact incidence in India is difficult to estimate as there is a lack of data at the central level. While mortality data are a poor indicator of the total burden on the healthcare system due to poisonings, it is further compounded by absent or wrongful recording of data. The pattern of poisoning varies from region to region depending on the availability of compounds, culture, customs, education, socio-economic status, etc. However, it is vital to glean this information as it directly influences the health need of that regional population and the healthcare manpower and infrastructure planning for dealing with such cases. Often the lacunae in the chain of poisonings are the failure to implement preventive measures. With this in mind, the present study was conducted with the aim to investigate the poisoning trends for the last 10 years in Bangalore South.

Materials and Methods

The study is a ten-year retrospective study conducted at the Department of Forensic Medicine, Rajarajeshwari Medical College during the time period of 1st January 2011 to 31st December 2020. In the study, all cases of fatal poisoning brought for medicolegal autopsy were included. A standard proforma specially designed was used to collect information regarding the age, socio-economic status, manner of poisoning, types of poison, hospitalisation, and survival period.

Standard autopsy protocols were followed and relevant viscera/samples were subjected for chemical analysis. Bodies in advanced stages of decomposition and cases where the chemical analysis report was negative were excluded. Descriptive analysis of baseline characteristics was analysed and then summarised.

Results

In the study period between 2011 to 2020, the total number of cases subjected to autopsy were 5749. Of these, 721 cases were those of suspected poisoning. Furthermore, it was found that 700 (12.18%) cases were confirmed cases of poisonings with positive chemical analysis reports from the regional Forensic Science Laboratory, these cases formed the sample for this study. **(Table no: 1)**

Table 1: Year-wise Incidence of Poisoning Cases

Year	Total Autopsies	Total Confirmed Poisoning Cases	Percentage
2011	484	36	7.4
2012	539	52	9.6
2013	513	72	14.0
2014	573	84	14.6
2015	605	135	22.3

Year	Total Autopsies	Total Confirmed Poisoning Cases	Percentage
2016	627	66	10.5
2017	628	73	11.6
2018	607	59	9.7
2019	659	72	10.9
2020	514	51	10
Total	5749	700	12.18

Out of the 700 cases studied, the two most common age groups were found to be 18-30 years and 30-40 years forming with 371 cases and 213 cases respectively. The least common age group was found to be children forming 8 cases in total. It was also noted that men far outnumber women by a ratio of 2.7 : 1. However, it was noticed that in cases above the age of 50 years there were more female cases (n=19) than male cases(n=14). (Table no: 2)

Table 2: Age and Sex wise distribution of cases

Sl. No.	Age group	Male (n=512)	Female (n=188)	Total
1	<18	5	3	8
2	18-30	276	95	371
3	30-40	154	59	213
4	40-50	58	17	75
5	>50	14	19	33

Table 3: Alleged Manner of Death from History

	Male	Female	Total
Suicide	457	146	603 (86.14%)
Accident	46	37	83 (11.85%)
Homicide	4	1	5 (0.71%)
Unknown	5	4	9 (1.28%)

The most common manner out of the 700 cases was suicidal with 603 cases, the second being accidental poisoning with 83 cases, and homicidal with 5 cases. **(Table no: 3)**

Table 4: Type of Poison/Venom

Type of Poison	Number of Cases
Organophosphorous	359
Organochlorine	181
Aluminium Phosphide	69
Paraquat	28
Carbon Monoxide	19
Cyanide	4
Corrosive	8
Vasmol	14
Paracetamol	4
Benzodiazepine	2
Snake bite	9
Other chemicals/Undetermined	3
Total	700

The most commonly observed poison in cases at autopsy was noted to be Organophosphorous compound with 359 cases, the least common being benzodiazepines with only 2 cases. Only one case in the study had an undetermined result. **(Table no: 4)**

Table 5: Poisons in Hospitalised Cases

Poison	Cases (n=49)
Organophosphorous	23
Organochlorine	10
Snake bite	6
Vasmol	5
Corrosive	3
Paracetamol	1
Amitriptyline	1

Table 6: Survival Period in Poisoning Cases

Survival Period	Cases (n=49)
<12 hours	19
12-24 hours	14
24-48 hours	11
>48 hours	5

Among the 49 cases (0.07%) that were hospitalised before being subjected to autopsy, the most common poison encountered again was organophosphorous compounds and organochlorine compounds with 23 cases and 10 cases, respectively. **(Table no: 5)** The most frequent survival period noted was <12 hours, and 12-24 hours with 19 cases and 14 cases respectively. Survival periods tapering in a downward progression from beyond 24 hours. **(Table no: 6)**

Discussion

Poisoning is the most common among people from the age group of 21-30 years and then progressively declines as the age groups progress according to a study done by Celine et al.[11]

Gender-wise distribution had males outnumbering females, 512 cases (73.14%) to 188 cases (26.85%). In another study it was noted that there was a male to female ratio of 3:1.[12]

Similar male predominance of cases was noted in the study done by Kiran N et al where it was seen that out of 148 cases, males formed 93 cases and females formed 55 cases.[13] However, in another study it was noted that there were more females (52.3%) than males (47.7%). [14]

Most common manner of death was found to be suicidal in 86.14% of cases, accidental in 83, and unknown in 9 cases (1.28%). In all the manners, males were more predominantly involved than females. The unknown cases had no suicide notes, history of self-harm, no history of mental illness or self-harm, as per the families.

This is in agreement with the study done in North Karnataka, where it was seen that among 229 cases, suicidal was the manner in 78% cases, accidental was the manner in 21% of cases. [15]

It is also in agreement with the study done in RIMS, Ranchi wherein it was observed that 180 cases were due to suicidal self-harm, in which men showed a predominance. [16]

Further similarity was noted in the 5-year study done in Gulburga by Gunnar, Prakash, and KSN Reddy, where it was seen that out of 900 (97.5%) cases were suicidal in manner and 23 (2.5%) were accidental in manner, and the suicidal cases were more than the accidental cases in both the sexes. [17]

Among the various compounds, it was noted that organophosphorous composed more than half the cases of poisoning with 359 cases (51.28%), followed by organochlorine 181 cases (25.85%) and aluminium phosphide 69 cases (9.8%). The least common poison in use was Benzodiazepines with 2 cases.

In a study conducted at AIIMS, New Delhi, it was noted that out of a total of 726 poisoning cases insecticides formed a major component (12.80%) of the poisoning cases, further it was observed that carbamate (47) formed the maximum group followed by organophosphorous (43) and organochlorine compounds. [10] A study done in North Karnataka it was noted that out of 229 cases of fatal poisoning, The commonest poison encountered was the Organophosphorous compounds in 128 cases (73.14%) and benzodiazepine forming 16 cases (9.14%). [15]

Gupta et al observed that organophosphorous poisoning constitutes a majority of total cases in North Bangalore, accounting for about 49%.

In a study done by Kiran N et al, at St. Martha's Hospital, Bangalore it was observed that out of 148 cases, the common insecticides used for poisoning were organophosphorous compounds with 89 cases (60.14%). 17 cases were reported for corrosive substance poisoning followed by rodenticides and petroleum products. Eight cases of barbiturate poisoning were reported.[13]

Many studies have shown that deliberate self-poisoning has a far higher mortality than accidental poisoning.[18]

The use of a poisonous compound is determined by several factors including its easy availability in the market, price, and popularity among the masses and appropriate laws concerning the poisonous agent.[19]

Other compounds comprised of one case of each of beta-blocker overdose, hydrogen sulphide, and amitriptyline overdose. Vasmol (Super Vasmol-33 Keshkala hair dye) poisoning comprised 14 cases of the total number, which is an emerging poison in the tropical states. A retrospective study conducted over

3.5 years (January 2006-July 2009) of 13 consecutive patients with Super-Vasmol poisoning admitted to a tertiary care, referral hospital in South India showed that 8 cases (61.53%) were discharged with complete recovery.[20]

It appears that Organophosphorus poisoning constitutes a majority of cases because of easy availability, low cost, unregulated sale, and its presence in majority of households in this region. Pesticide poisoning being a major public health problem in the developing world.[21]

It was also observed in our study that 49 cases out of 700, were hospitalised. Poisonings that were hospitalised were noted to be organophosphorous most commonly. This could be attributed to the location of the centre being situated near agricultural lands. The least common were noted to be other chemicals like amitriptyline and paracetamol, both of which were suicidal in manner and were brought for treatment upon being found unconscious at their respective homes. The survival periods of these cases had most deaths occurring within the first 12 hours, with only 5 cases surviving beyond 48 hours. This is similar to a study done in Melmaruvathur in which it was observed that out of 106 cases, 49% (n=52) of cases, had a survival period of less than 24 hours.[22]

Conclusions

The present study was conducted in Rajarajeswari Medical college over a period of 10 years, and it was found that the male to female ratio was 2.7 : 1, with the maximum cases seen in the age group of 18-30 years. Organophosphorous compound is the most commonly used poison, along with organochlorine compounds. Suicidal manner was most common with 86.14%, followed by accidental 11.85%. Most of the hospitalised cases showed a survival period of less than 24 hours.

The need for prompt and accurate diagnosis of poisoning in patients is a growing demand. Poison detection centres, poison information centres, and poison control centres are still not a reality to most regions of India. This contributes to a lack of immediate diagnosis and relevant management, which in turn causes an inability to provide quality treatment.

To tackle this, certifications in toxicology and basic emergency skills could prove to be valuable, however, curbing the easy access to toxic substances is where prevention begins.

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