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Original Article

Trends of Fatal Poisoning in Vadodara (Mid-Gujarat)

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ABSTRACT

Poisoning is one of the most common methods to commit suicide in India. Most of the population in India resides in rural areas, where pesticides are commonly used in farming, and that is why it is the most common poisoning in India. Vadodara is the 'chemical city' of Gujarat, because chemical factories are more here, and consequently the incidences of accidental and intentional poisoning are also higher at this centre. A detailed knowledge about the nature and magnitude of the poisoning cases in this particular area is significant for early diagnosis and prompt treatment. To know the trends of fatal poisoning in mid-Gujarat, we conducted a retrospective study in the Department of Forensic Medicine, S.S.G. Hospital and Medical College, Vadodara. A total of 289 cases of fatal poisoning were brought to us for post-mortem examination during the span of 1 year (from January to December 2008), and therefore all data related to age, sex and seasonal variation with manner of poisoning were studied with detailed autopsy examination. The results of chemical analysis of routine viscera were subsequently analysed after receiving forensic science laboratory reports. Our study revealed that the majority of victims were Hindus, males 21-30 years of age who died due to self-ingestion of insecticide poison in the initial months of the year.

Keywords: Poisoning, Suicide, Insecticide.

INTRODUCTION

Death due to acute poisoning is one of the most common causes of unnatural deaths in India. With progress in the industrial and agricultural field and advances in medical sciences, a vast number of insecticides have become available, which on exposure may produce severe toxicity. Insecticides are substances that are designed or chosen for their selective toxicity to certain organisms. Although their toxicity is selective, they are often also toxic to other species usually to a lesser degree. Human poisoning from accidental exposure to insecticides has occurred since they were first used, and in some cases many people have been poisoned[1]. Knowingly or unknowingly, millions of people are exposed to danger by hazardous occupational practices and unsafe storage of toxic chemical products in their day-to-day life[2, 3]. Lack of specialised toxicological services in developing countries like India has further contributed to the higher rate of morbidity and mortality. According to WHO (1999), more than three million poisoning cases have been reported, out of which 2,51,881 deaths occur worldwide annually, of which, 99% of fatal poisoning occur in developing countries, predominantly among farmers due to various kinds of poisoning, including poisonous toxins from natural products[4, 5]. In developing countries like India, incidences of suicidal and homicidal poisoning are increasing day by day due to the easy availability of poisonous substances. Most of the studies[6, 7, 8, 9, 10] conducted in different parts of India have shown that the majority of the victims of fatal poisoning are Hindu, males of a younger age group who committed suicide by ingestion of insecticide (organophosphorus) poison.

Vadodara is a tertiary health centre in mid-Gujarat, and due to a large number of chemical factories it is also known as the 'chemical city', and consequently the incidences of accidental and intentional poisoning are also higher at this centre. The patterns of poisoning in the region of Vadodara have not been studied before this study. The increasing incidences of fatal poisoning with prevalence

of certain groups of poison in this particular geographical area has prompted us to undertake this study to know weather trends of fatal poisoning are the same as observed by others or something different in this particular area of India.

MATERIALS AND METHODS

This retrospective study was conducted at the Departments of Forensic Medicine, Vadodara, which is a tertiary health-care centre in mid-Gujarat, and most of the cases are referred here from rural areas. Every year about 1700-1800 different types of medico–legal autopsies are conducted in the mortuary of our department. A total of 1712 autopsies were conducted during the period of 1 year from January to December 2008, and out of them 289 cases (16.88%) of death due to poisoning were selected for this study. In all cases detailed and complete autopsy examination of the corpses was performed and routine viscera of autopsy (stomach and loop of the small intestine with their contents, pieces of liver, spleen and kidneys and sample of blood) were preserved in a saturated solution of common salt for chemical analysis. Information regarding age, gender, time of incidence and manner of poison were duly recorded in proforma. Information from relatives and accompanying police records with autopsy details were used to conclude the manner of poisoning whether suicidal, accidental or homicidal. The exact types of poisons responsible for death were confirmed by forensic science laboratory (FSL) reports. The results were analysed after receiving the chemical analyser reports, and details of the parameters used in the study were filled up in proforma and final conclusions were drawn after comparing and discussing with similar types of work carried out by foreign and Indian authors.

RESULTS

Out of total 1712 autopsies, 289 cases (16.88%) of death due to poisoning were selected for this study. The incidence of poisoning deaths was more in 3rd (37.37%) and 4th decades (21.8%) of life as compared with both extremes of life. In this study, male poisoning deaths (66.68%) were twice those of female deaths (33.32%) with a male-to-female ratio of 2:1. The incidence of poisoning was more in Hindus (89.96%) than in Muslims (5.54%), Sikhs and Christians (0.68%). While in the rest of 3.14% cases, religion could not be ascertained due to un-identification of the deceased till date of this study. Seasonal trends of fatal poisoning show that the maximum numbers of poisoning deaths were reported in January (12.5%), followed by May (11.4%); however, statistically no specific seasonal trend was observed in the whole year. Incidences of suicidal cases were highest (90.66 %) in this study, followed by accidental deaths (7.96%). No homicidal case of fatal poisoning was observed in this study. Natural deaths were concluded in 1.39% cases in which death was allegedly due to poisoning. This inference is based on history given by relatives and the

Table 1: Age- and Gender-Wise Distribution of Fatal Poisoning

Age Group (years)	Number of Males (Percentage)	Number of Females (Percentage)	Total
Less than 10	05 (1.73%)	01 (0.35%)	06 (2.07%)
11-20	18 (6.23%)	24 (8.30%)	42 (14.53%)
21-30	73 (25.23%)	35 (12.11%)	108 (37.37%)
31-40	42 (14.53%)	21 (7.27%)	63 (21.8%)
41-50	32 (11.07%)	10 (3.5%)	42 (14.53%)
51-60	12 (4.15%)	04 (1.4%)	16 (5.53%)
61-70	08 (2.77%)	00 (0.0%)	08 (2.77%)
71-80	03 (1.03%)	01 (0.35%)	04 (1.4%)
Total	**193 (66.68%)**	**96 (33.32%)**	**289 (100%)**

Table 2: Religion- and Marital Status-Wise Distribution of Fatal Poisoning

Religion	Hindu	Muslim	Christian	Sikh	Unknown	Total
Number (%)	260(89.96%)	16(5.54%)	02(0.68%)	02(0.68%)	09(3.14%)	289(100%)

investigating police officer. In all cases, routine viscera were sent to the FSL, and after analysing the chemical analysis reports we found that insecticides constitute the largest group in 50.86% cases, followed by aluminium phosphide in 17.3% cases, acids in 1.04% cases, phenyl in 0.68% cases, while kerosene and zinc phosphide were detected in 0.35% cases. Overdosing of drugs, e.g., Emidaclopride, Acephan, Clonazepam and Amoxycillin, each were concluded as cause of death in 0.35% cases. No poison was detected in 27.33% cases even after receiving the reports of chemical analysis.

Table 3: Monthly Trends of Fatal Poisoning

Month of Poisoning	Number of Cases	Percentage
January	36	(12.5%)
February	19	(6.6%)
March	26	(9.0%)
April	25	(8.6%)
May	33	(11.4%)
June	18	(6.2%)
July	23	(7.9%)
August	20	(6.9%)
September	22	(7.6%)
October	31	(10.7%)
November	13	(4.6%)
December	23	(7.9%)
Total	**289**	**(100%)**

able 4: Distribution of Cases According to Manner of Death

Manner of Death	Number of Cases	Percentage
Suicidal	262	(90.66%)
Accidental	23	(7.96%)
Homicidal	00	(0.00%)
Natural	04	(1.39%)
Total	**289**	**100**

Table 5: Distribution of Cases According to Agent of Poisoning

Poison Type	Number of Cases	Percentage
Insecticides	147	(50.86%)
Aluminium phosphide	50	(17.3%)
Acids	03	(1.04%)
Phenol	02	(0.68%)
Zinc phosphide	01	(0.35%)
Kerosene	01	(0.35%)
Emidaclopride	03	(1.04%)
Acephan	01	(0.35%)
Clonazepam	01	(0.35%)
Amoxycillin	01	(0.35%)
Unknown	79	(27.33%)
Total	**289**	(100%)

DISCUSSION

In this study, we tried to find out the association of episodes of fatal poisoning with various factors like age, gender, religion, their seasonal trends and type of poison and manner of death. These factors have been dealt by other researchers in varying permutations and combinations. In this study, incidences of poisoning were higher in the third decade of life, and the majority of the victims were Hindu male, which is similar to most of the studies conducted by various authors[1, 2, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16]. The higher incidence of poisoning in individuals of the adult age group of 20-40 years can be explained by the fact that the persons of this age group suffer more as compared with those of other age groups from stress of modern life style, financial losses, failure in love, family problems, etc. Change over from the concept of joint family to nuclear family has forced modern couples to face the problems of day-to-day living, both at home and outside, on their own, without the much-needed advice from elders, and when these problems and tensions become unbearable, ending one's life seems to be the only solution for them. Although all studies were conducted in different parts of India, the Hindu-male predominance was a common and constant feature in all, which suggests that Hindu males are more exposed to socioeconomic burden and crisis and hence are more vulnerable to high-grade stress both physical and psychological in nature. No significant seasonal trend was observed in this study, while Guntheti *et al.*[14] found that the majority of the victims consumed poison in the summer followed by winter. Most of the poisoning cases were reported in the months of July-September in the study by Sandhu *et al*.[10] and in August by Garg *et al.*[7]. In the majority of the cases reported to us in this study, the manner of death was suicidal in nature, which is consistent with observations made by other authors[6, 7, 8, 14, 15]. After receiving and analysing the chemical analysis reports, we found that insecticides constitute the highest number of fatal poisoning in 50.86% cases, followed by aluminium phosphide poisoning in 17.3% cases, acids in 1.04% cases, phenol in 0.68% cases, while kerosene and zinc phosphide each were detected in 0.35% cases. Overdosing of drugs, e.g., Emidaclopride, Acephan, Clonazepam and Amoxycillin, each were concluded as cause of death in

0.35% cases while poison was unknown in 27.33% cases even after receiving the reports of chemical analysis. Insecticides (organophosphorus) poisoning was the leading cause of death in most of the studies[6, 8, 9, 10, 14, 15], except in the study by Garg *et al*.[7] who found aluminium phosphide as a leading cause of death in their study. The data presented in literature indicate that organophosphate insecticide is the predominant problem worldwide, being responsible for many cases of suicidal and accidental poisoning.

CONCLUSION

Our study concluded that majority of the victims were Hindu, male of 21-30 years of age who died due to self-ingestion of insecticide poison in the initial months of the year. The most common poisoning includes organophosphorus, halogenated insecticides and aluminium phosphide. Suicidal poisoning among young adults is a common public health hazard and stigma in our society and difficult to control in the present scenario, while accidental poisoning is preventable. Incidences of death due to poisoning can be reduced by establishing a Poison Information Centre (PIC), which should be networked with other PICs in India and also with developed countries, which can help in early identification of the poisoning and also in managing cases by sharing information. Awareness to the public regarding information on poison prevention has to be penetrated. Such similar studies later on at the other centres and at the same centre needs to be conducted to provide a better understanding of the epidemiology of poisoning in middle Gujarat and how deaths by poisoning may further be reduced.

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