Original Paper

A Retrospective Study of Poisoning Cases in Thrissur District of Kerala for the Year 1995

Cyriac Job

ABSTRACT

Poisoning is a global problem, and incidence and trends vary from place to place. To know the regional incidence in Thrissur, Kerala, taking into account commonly used poisons, mortality, manner of poisoning, clinical, postmortem, and analytical findings, as well as the sex, age, etc., of the victims, a retrospective study was conducted for the year 1995, at Thrissur Government Medical College. The results show that males outnumber females (2.69: 1), the highest incidence is in the third decade of life, suicidal causes are the commonest, followed by accidental poisoning, and many of the victims died before reaching the hospital (1.29:1), while the mortality even after being admitted to the hospital remained unacceptably high in the first six hours (2.13:1).

Emanation of froth or fluid from the mouth/nostrils (which may or may not be blood-stained), characteristic smell, colour etc of stomach contents, congestion of stomach, congested, oedematous lungs, and generalized visceral congestion are the common postmortem findings in the cases studied.

A significant number of cases were due to carbamate or organophosphate pesticide ingestion. While aluminium phosphide has become the commonest pesticide in some Indian states, hardly any case was associated with this compound in the present study in Thrissur.

Key Words: Poisoning, Kerala

Introduction

As per World Health Organization (WHO) estimates published in 1990, around 3 million poisoning cases with 220,000 deaths occur in the world annually. About 99% of these deaths occur in developing countries. Poisons are difficult to define as they can be used as drugs, preservatives, etc., or even as food. Centuries ago, Paracelsus (1493–1541) the Swedish alchemist categorically said that all substances are poisonous, and that it is the dose and mode of administration that are more important than the actual nature. However, there are some substances that are outright toxic, including certain plants, chemicals, pharmaceuticals, etc. Toxicity may result from accidental or intentional exposure. Since the incidence and pattern of poisoning vary from place to place, it is desirable to perform regional studies periodically to recognize the extent and evolution of the problem.

The present study was undertaken to observe the incidence and certain specific characteristics in Thrissur district of Kerala state, including commonly used poisons, mortality, manner of poisoning, clinical, postmortem, and analytical findings, and also the sex, age, etc., of the victims.

Materials and Methods

This is a retrospective study of all death cases brought for postmortem examination during the period 1995 at Thrissur Government Medical College, which is a multispecialty teaching institute situated in Thrissur, a central district of Kerala in India. Chemical analysis of vis-

Associate Professor of Forensic Medicine, Calicut Govt. Medical College, Kozhikode, Kerala.
E-mail: cyriac_job@yahoo.co.in

cera samples is done at the Regional Chemical Examiner's Laboratory, in Cochin, a major city in an adjoining district. There is a huge backlog of cases at this laboratory on account of manpower shortage, and lack of sophisticated equipment. The earliest year pertaining to which chemical reports of samples submitted for analysis is expected to be received appears to be 1995, and hence that year was selected for the study. Chemical analysis reports of submitted cases that were received till May 2008 were included.

Custom-made proformas were used to collect relevant details in all cases where poisoning was suspected. Clinical and postmortem findings, and the chemical analysis reports were correlated with each other to get a cohesive picture. Various parameters were studied, including age, sex, cause and manner of death, common poisons, survival period, postmortem findings, and chemical analytical results. Statistical analysis of the collected data was done using the software "Epi Info."

Results

Out of the 1485 cases examined, suicidal poisoning accounted for 323 cases, while accidental poisoning comprised 21, and there were 7 homicides, and 2 cases of snake bites.

The incidence of poisoning was found to be maximum in the third decade of life (28.7%), followed by the fourth decade (23.7%) (**Table 1**). The mean age was 38.5 years +/- 14.2 years. The age range was from 1 year to 74 years.

In general, males outnumbered females, but in the second decade of life, females acoounted for more cases (**Table 1**).

Table 1 Age and Sex Distribution of the Study Sample

	Male		Female		Total	
Age Group	**Number**	**Percentage**	**Number**	**Percentage**	**Number**	**Percentage**
01–10 yrs	05	01.8	01	01	006	01.6
11–20 yrs	06	02.2	15	14.7	021	05.59
21–30 yrs	72	26.3	36	35.3	108	28.72
31–40 yrs	67	24.5	22	21.6	089	23.67
41–50 yrs	60	21.9	13	12.7	073	19.41
51–60 yrs	46	16.8	08	07.8	054	14.36
61–70 yrs	17	06.2	07	06.9	024	06.38
71–80 yrs	01	00.4	00	00	001	00.27
Total	274	100	102	100	376	100

Table 2 Causes of Death in the Study Sample

Sl.No	Cause	Number	Percentage
1	Chemical Poisoning	319	84.8
2	Alcohol Intoxication	018	04.8
3	Plant Poisoning	008	02.1
4	Found dead (Unknown cause)	008	02.1
5	Drowning	006	01.6
6	Drug Overdose	006	01.6
7	Diseases	005	01.3
8	Hanging	003	00.8
9	Snake bite	002	00.5
10	Burns	001	00.3
	Total	376	100

The manner of death in 348 cases (92.55%) was suicide, while 21 cases (5.58%) were due to accidental exposure, and 7 cases (1.86%) were homicidal in nature.

The actual nature of the poison in the vast majority of cases (84.84%) was some form of chemical, while a few were due to plant poisons (yellow oleander in 7, and oduvan in 1 case) (**Table 2**). Of the homicidal cases, five were children who were poisoned by their mother.

One hundred and seventy one cases (45.48%) were found dead at the scene, while 41 (10.9 %) died on the way to the hospital. Of the 164 cases (43.61%) admitted to hospital, in 77 cases (46.95 %), death occurred within 6 hours of admission, and 4 persons died after a period of more than one week (**Table 3**).

Table 3 Survival Periods in the Study Sample

Sl.No	Survival Period	Number	Percentage
1	Found dead	171	45.5
2	Brought Dead	41	10.9
3	One hour	17	04.5
4	1 to 6 hrs	60	16
5	6 to 12 hrs	21	05.6
6	12 to 24 hrs	03	00.8
7	One day	26	06.9
8	Two days	13	03.5
9	Three days	8	02.1
10	Four days	7	01.9
11	Five days	2	00.5
12	Six days	1	00.3
13	Seven days	2	00.5
14	Eight days	1	00.3
15	Eleven Days	1	00.3
16	Nineteen Days	1	00.3
17	Twenty-three days	1	00.3
	Total	376	100

Predominant external autopsy findings in the fatal cases included plain froth from the mouth in 128 cases (34.04 %), blood-stained froth in 55 cases (14.62%), non-frothy fluid in 18 cases (04.78%), and blood-stained fluid in 37 cases (09.84%). Main internal findings comprised gastric mucosal congestion in 287 cases (76.33 %), and corrosion in 21 cases (05.59 %). Stomach contents revealed non-specific odours in 183 cases (48.67%), smell of alcohol in 24 (06.38%), and kerosene-like in 23 (06.11%). Congestion with oedema was the commonest pulmonary finding (339 cases, i.e., 90.16%).

In all cases, relevant viscera and body fluids for chemical examination were dispatched on the same day, or within a few days. But the results were received usually after prolonged delays, sometimes after more than 10 years! (**Table 4**). Some form of poison was detected only in 250 cases (66.49%), while it was negative in 115 cases (30.58%), and results were not received even at the time of going to press in 11 cases (02.92%). The commonest poisons detected included carbamates (46.8%), organophosphates (34.4%), alcohol (06%), and chlorinated hydrocarbons (04%)(**Table 5**). Miscellaneous poisons included formic acid (03.2%), cyanide (01.6%), and barbiturates (01.2%).

Table 4 Time of Receipt of Chemical Analysis Report in the Study Sample

Sl.No.	Period (yrs)	Number	Percentage
1	1	10	02.7
2	2	01	00.3
3	3	02	00.5
4	4	07	01.7
5	5	01	00.3
6	7	14	03.7
7	8	01	00.3
8	9	10	02.7
9	10	100	26.6
10	11	140	37.2
11	12	57	15.2
12	13	22	05.9
13	Not yet received	11	02.9
	Total	376	100

Discussion

Death due to poisoning is known since times immemorial, but trends in poisoning change constantly. In the early part of the previous century in India, it was arsenic poisoning which was quite common, while snakebites also accounted for a substantial proportion of reported cases. Subsequently, the trend shifted to opium and barbiturates.[1] When organophosphate pesticides were introduced in the agricultural and domestic sectors, they became the commonest agents of poisoning.[2,3] Today, the trend is towards aluminium phosphide, especially in North India.[4-7] However, organophosphate pesticide poisoning is still the commonest kind in Central and South India.[5-15] In the present

Table 5 Nature of Poisons/Drugs in the Study Sample

Sl.No.	Type of Poison	Number	Percentage	
			Of Positive Cases (250)	Of Total (376)
1	Carbamate	117	46.8	31.11
2	Organophosphate	086	34.4	22.87
3	Ethyl alcohol	015	06.00	03.98
4	Chlorinated hydrocarbon	010	04.00	02.65
5	Formic acid	008	03.2	02.12
6	Hydrocyanic acid	004	01.6	01.1
7	Barbiturate	003	01.2	00.8
8	Yellow oleander	003	01.2	00.8
9	Snake venom	002	00.8	00.5
10	Kerosene	001	00.4	00.26
11	Zinc phosphide	001	00.4	00.26
12	Nil	115	—	30.58
13	Not received	011	—	02.92
	Total	376	100	100

study, carbamates were the most commonly used pesticides, followed by organophosphates.

Several previous studies have indicated that the incidence of poisoning is highest in the 3rd decade of life,[2-4,9-12] which is reflected in this study also.

Males outnumbered females (2.69:1) in this study, which is true in the case of several previous studies also.[2-4,7-12,17]

Poisoning may result from accidental or intentional exposure. These depend on the availability of poisons, and the knowledge factor among the individuals concerned.[18] In the present study, suicides predominated, while a few were due to accidental exposure, and even fewer due to homicidal intent (50:03:01). Several previous studies report similar observations.[4,9-11,19]

Once a patient has been poisoned, the attending physician may try to identify the poison based on the history, smell, signs and symptoms, etc. Many organophosphate insecticides are identifiable from their characteristic kerosene-like smell, as the solvent used is often some petroleum derivative such as aromax.[20] Since it is mandatory to perform postmortem examination in all poisoning cases, various autopsy findings such as colour of skin and postmortem staining, congestion of organs, colour and smell of various organs, body cavities and stomach contents can help in identifying the poison to some extent. Characteristic odours (garlicky or kerosene like), bluish extremities, constricted pupils, oral froth, congested organs, and pulmonary and cerebral oedema are common autopsy features usually seen in poisoning cases.[5] Characteristic colours such as that of carbamates and certain other chemicals, froth or fluid (with or without blood staining) at the mouth and nostrils, and congestion and oedema of lungs are the commonest findings seen in this study.

In all autopsied cases, where poisoning is suspected, certain viscera and body fluids are generally recommended to be subjected to chemical analysis.[21] Unfortunately, in most places in India, because of shortage of manpower and proper equipment, reports often get delayed, sometimes for years. Since, in the absence of a final opinion, the investigating authority cannot close a particular case, this leads to problems in investigation.[22] This was reflected in the present study also. The incidence of negative result on analysis appears to correlate with delay in

chemical examination.[23] To compound the problem, the use of non-confirmatory techniques such as thin layer chromatography to definitely opine as to the nature of poison leads to false positives or negatives.[24]

In several previous studies it was observed that kerosene is the commonest poison encountered in paediatric poisoning,[25] and in the present study also, the only accidental death in a child was due to kerosene. Carbofuran is the most common carbamate pesticide found in this study, which is most commonly sold under the brand name "Furadan".

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