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A Comprehensive Study of Deaths from Corrosive Poisoning

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Paracelsus, the father of toxicology, once wrote:"Everything is poison, there is poison in everything. Only the dose makes a thing not a poison." A corrosive is a substance which has surface-destructive effect on contact. Corrosive poisoning results from ingestion, topical exposure or inhalation of compounds, that causes tissue injury by chemical reaction. An average home contains a dozen different cleaning products. These products are used in many industries. These are responsible for a large number of accidental and intentional poisoning. This study "A Comprehensive Study Of Deaths from Corrosive Poisoning" is taken up Over 47 corrosive poisoning fatalities autopsied at the Department of Medicine and Department of Forensic Medicine, Osmania General Hospital, Hyderabad to make an attempt to ascertain the frequency of poisoning fatalities and to suggest suitable remedial measures to reduce the morbidity and mortality due to corrosive poisoning. Incidence in males (66.91%) is more than in females (33.09%).The most frequently involved victims belong to the age groups 21 to 30 years, than 11 to 20 years and 31 to 40 years. In majority of the cases, the poisoning was suicidal (93.62%) and then they were accidental (6.38%).

Key Words- *corrosive poison, manner of death, type of poison.*

Introduction

Poisoning is the one of the commonest method for suicide in developing countries like India(1). A **corrosive substance** on contavt damages another surface or substance. A corrosive agent is a substance that causes both functional and histological damage on contact with body surfaces. Although there are many ways to categorize corrosive agents, they are most typically classified as acids and alkalis. They may come in solid or liquid forms with different viscosities and concentrations of solution.In the past there were many incidences of accidental poisoning but later their number went down after adopting mandatory warning labels on the containers, increased education and product regulation (especially of acids)have decreased morbidity and mortality from caustic exposures in both adults and children. But in underdeveloped countries exposure to caustics remains a significant problem [2,3,4,5].

The term corrosive poisons are alkaline or acidic agents.It is a common belief that alkalis bite the oesophagus and licks the stomach due to dilution by its acidic contents and acids spare the oesophagus and damage the stomach. Corrosive poisoning results from ingestion, topical exposure or inhalation of compounds, that causes tissue injury by chemical reaction. These products are used in many industries and house as a cleaning products. Which may leads accidental and intentional poisoning. These compounds are available easily and popular for suicidal and homicidal purpose. Most people use these compounds for suicidal purpose. Death rate is also high in these cases. The out-come depends also on the dose taken, availability of hospital care. Some studies show that about 80% of corrosive poisoning occurs in children < 5 yrs. Adult exposure has

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more mortality & morbidity due to significant volume of exposure & possible combined ingestion caustic substances are chemical when ingested causes injury to the gastrointestinal mucosa. Which are also known as corrosive poisons i.e., strong acids. They coagulate the tissue proteins, extract the tissue fluids. if the person survives then there is ulcer formation, sloughing of the necrosed tissue and scar formation with contractures.

Mineral acids and alkalis have direct local action, but may have indirect action, when ingested and absorbed in the system like circulatory and respiratory systems. Organic corrosive chemicals causes direct local as well as remote action as they are absorbed and reach to the different systems. At present, there are no official or even suggested standards limiting the toxicity of corrosive usage. In our study, we made an effort to go into the social and economic factors, sex, race and occupational factors to throw some light and to suggest certain parameters for early detection and treatment. We also studied various incidences referring to fatal dose, fatal period and the most important clinical sign and chemical examination.

Aims and Objectives of the Study

The incidence of poison deaths from corrosive substances constitutes a miniscule percentage of deaths out of total deaths from various poisons. Even though corrosive substances are available easily as an out-of-the shelf article compared to other poisonous substances particularly as household and toilet cleaners of limited usage, they can cause a chemical significant violet death. As such their use is limited to suicidal poisoning and at no occasion they are used as homicidal poisons but for rare incidents of acid throwing. Therefore corrosive substances are used as an ingested poison for committing suicide where classical findings of corrosion of tissues are observed during autopsy.

Now-a-days they have changed their application as a tool for vitriolage, particularly in young generation to settle scores in frustrated love affairs. Hence the incidence of homicides from topical corrosion has not been an uncommon feature. Apart from this, because of its dubious consistency particularly with oils, rare occasions of accidental poisoning are also seen. Accidental chemical injury also does occur in industrial accidents.

Truly speaking, corrosives are the only substances which has changed its mode of administration with the progress of civilization particularly urbanisation and industrialisation and in near future corrosives and corrosive sublimates may become main liners in the overall incidence of unnatural mortality from poisons.

This study "A Comprehensive Study Of Deaths from Corrosive Poisoning" is taken up to make an attempt to ascertain the frequency of poisoning fatalities and to suggest suitable remedial measures to reduce the morbidity and mortality due to corrosive poisoning.

Objectives

The objectives of the present study are to determine:

1. The frequency of fatal cases of acute corrosive poisoning in relation to age and sex.

2. The frequency of fatal cases of corrosive poisoning with regard to their marital status.

3. The frequency of fatal cases of corrosive poisoning according to their socio-economic status.

4. The various corrosive substances responsible for death in the order of their frequency.

5. The survival period of the person in cases of particular corrosive poisoning.

6. The causes of death.

7. The manner of death.

8. Suggestions to prevent the incidence and to reduce mortality and morbidity in the present scenario.

Materials and Methods

A study of 701 cases of various poisoning, of which 47 corrosive poisoning fatalities autopsied at the Department of Medicine and Department of Forensic Medicine, Osmania General Hospital, Hyderabad has been made.

The records maintained at the Department of Medicine and the Department of Forensic Medicine, Osmania General Hospital, includes copies of the following:

1. Hospital case sheet extracts.

2. Police requisition and inquest reports.

3. Reports of clarification of the circumstances surrounding the death.

4. The post-mortem reports.

5. Forensic Science laboratory reports of the chemical analysis of viscera of the deceased.

Information was also extracted from the relatives, attenders and eyewitnesses (in some cases), regarding the mode of poisoning and the type of poison used.

The presence or absence of a poison in the viscera sent for analysis, to the Forensic Science Laboratory was taken as the criteria to consider a case as a "Poison Fatality". This was because in some cases, if the chemical analysis report was received as negative, it was not considered for the study as the precise cause of death was not identified and at best a calculated guess would have been made.

An attempt has been made to ascertain the manner of death, taking into consideration the history given in the inquest report, the age of the deceased, the nature of the poison responsible for death and any other available information. The history given by the police should only be taken as a hint. The autopsy findings should always prevail upon the history furnished in case of any inconsistencies between the two.

Observations and Discussion

In this study, 47 cases of corrosive poisoning fatalities were studied in detail.

AGE: Analysing the age group of the 47 cases of corrosive poison fatalities, it was noted that 14.89 % deaths were between the ages of 11 to 20 years. 29.79 % were between the ages of 21 to 30 years. 25.53 % were between 31 to 40 years. 17.02 % were between 41 to 50 years. 8.51 % was between 51 to 60 years. 4.25% were between 61 to 70 years.

The predominance of this age group is due to the fact that the age group 21 to 50 years is the most active period of life. People have a tendency to take more risks in pursuit of success, and frustration and depression are more common in personal as well as in professional life.

SEX: Sex distribution in this study shows male preponderance. There were 469 males and 232 females in a total number of 701 cases of poisoning. Out of 47 Corrosive poisonings,28 male and 19 female fatalities were noted.

The male preponderance is due to the fact that all over the world males are seen as sole breadwinners and when they fail in doing something, whether professionally or personally; there is a sense of shame, which drives people to suicide. Also as men take more risks and tend to lead a more care-free life. The females lead a less active life and also stay indoors with an overall less amount of exposure to the various poisonous substances.

MARITAL STATUS: On studying the marital status of the persons in this study, it is observed that 37 people were married including 22 males and 15females. And 10 persons were unmarried including 4males and 6 females.

This data suggests that the rate of poisoning fatalities is more among the married population compared to the unmarried population. This may be due to the fact that the married people have more responsibilities, duties and financial burden due to the dependants and consequently get more frustrated and are liable to take their own lives. Also, as a majority of adults are married, the rate of poisoning also reflects this trend. Unmarried people on the other hand are more carefree and "happy go lucky" which explains the lower number of fatal cases.

PERIOD OF SURVIVAL: Incorrosive poisoning, it is observed that 26 (55.32%) victims succumbed within 24 hours of consumption of the poison. Thirteen persons (27.66%) died in between 24-48 hours after consumption of the poison and 4 persons (8.51%) survived in between 48-72 hrs. Three persons (6.38%) survived 72-100 hours and a single person (2.13%) survived more than 100 hrs. but later died of complications. Obviously, all these persons received some sort of treatment at a hospital. This indicates the degree of toxicity of these compounds as well as the large quantity of the substance consumed. In some cases, the treatment could not have reached its logical conclusion of saving the patient's life due to financial problems of the family and sometimes due to careless and recklessness of the patients' attendants in understanding the gravity of the situation and taking proper precautions and care of the patient and his needs.

MANNER OF POISONING: In this study, the manner of death was found to be suicidal in a large number of cases (93.62%), followed by accidental (6.38%). There were no homicidal and unknown manners of poisoning. The high percentage of suicides by corrosive poisoning is due to known toxicity of these agents and also their easy availability and low cost. They are usually found in most Indian homes for floor and toilet cleaning.

Suicide is a subject of great sociological and psychiatric importance with many unexamined and unresolved problems. In our country, the study of this particular subject is rendered difficult by the lack of statistics about the number of attempts and successful suicides. It is always interesting to consider the reasons. Corrosive compound are routinely used in many Indian homes and can be easily mistaken for something else and consumed with disastrous consequences.

TYPES OF CORROSIVE POISONING: In this study deaths due to sulphuric acid were 43 (91.49 %) out of which 25 male, 18 female, Carbolic acid - 2 deaths (4.25 %), 1 male, 1 female, Nitric acid 1 death-male (2.13%), and Hydrochloric acid 1 death- male (2.13%).

Conclusion

The incidence of cases of corrosive poisoning is on the increase. Corrosive Poisoning cases that came to Mortuary of Osmania General Hospital are from Sulphuric acid, Nitric acid, Hydrochloric acid and Carbolic acid. They are easily available and most effective, kills the person in a very short period. Therefore, the study of poisoning by corrosives is thought necessary and an attempt is made here.

All the findings are critically discussed and the following are noted:

1. The incidence of corrosive poisons was found on the increase.

2. Incidence in males (66.91%) is more than in females (33.09%).

3. The most frequently involved victims belong to the age groups 21 to 30 years, than 11 to 20 years and 31 to 40 years.

4. In majority of the cases, the poisoning was suicidal (93.62%) and then they were accidental (6.38%)

5. Signs and symptoms:

a. Vomiting,

b. sluggish reaction of pupil to light,

c. loss ofconsciousness,

d. Respiratory disturbances and death.

6. Fatal dose - could not be ascertained

7. Treatment:

a. demulcents,

b. I.V. fluids,

c. Inj. Pantocid,

d. Anti-biotics,

e. Oxygen inhalation,

f. Injections of atropine and adrenaline and

g. ventilation support.

8. Post-mortem appearance: signs asphyxia, corroded areas of skin mucous membranes were brownish black, teeth chalky white stomach mucosa converted into soft sponge black massinflammation of upper respiratory tract, corrosion of oesophagus , perforation of stomach and chemical peritonitis were observed in sulphuric acid poisoning. In case ofnitric acid poisoning yellowish corroded areas of skin, teeth and mucous membranes were observed.Distinct odour of phenol in mouth, nostrils and gastric contents, brownish corroded areas, gastric mucosa soft, cerebral and pulmonary oedema were found in carbolic acid poisoning.

9. Chemical analysis: revealed presence of corrosive substances.

Conflict of Interest – Nil

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