

Trends of Agriculture & Industrial Chemicals Poisoning Cases in Rural Hospital of Central India

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Abstract

In present times, due to an advancement of synthetic chemistry and the fast changing scenario have placed an ever increasing number of highly poisonous substances within the reach of common men. Thousands of man-made chemicals are currently in common use throughout the World, and one to two thousand new chemicals appear in the market each year. In industrialized countries, there are at least one million commercial products that are mixture of chemicals, and the formulations of up to one third of these may change every year [18]. With the advent of newer technologies in the field of agriculture and partly due to the effects of Green Revolution which took place in India in late 60's, there has been a rise in cases regarding poisoning due to agricultural & industrial chemicals. The increased use of fertilizers & agrochemicals chemicals have become one of the leading the cause of deaths in Modern India which is still an agrarian economy.

Keywords: Agricultural and Industrial Chemicals; Poisoning; Mortality; Developing Countries.

Introduction

India is one of the oldest civilization as Egyptian and Chinese civilizations. The secret of their survival is somewhat based in their agriculture [6]. India being an agrarian economy, around 70 % of the economy is based on one sort or another agricultural produce. As in late 60's there was Green revolution in India to increase the agricultural production. It involved a lot of fertilizers as well as a lot of insecticides. With due course of time it was found that, there has been a steep rise in poisoning cases due to use of Agricultural or industrial chemicals. Insecticide poisoning is commonly reported all-over India. Numbers of agrochemicals were identified by WHO

and they are banned in many countries. Indonesia banned 57 pesticides used for rice crops as they saved less crops and damage life of human beings [4].

The insecticides, pesticides and rodenticides registered for use in India under section 9 (3) of insecticide act 1968 are 143 in number. Crops are attacked by insects, pet, weeds, nematodes and rodents. To save crops insecticides and rodenticides are widely used. Drinking water from river Cauvery and Yamuna is reported to be contaminated by pesticides. Poverty, family dispute, marital conflicts, failure in love and depression are common reasons for suicide by poisoning.

The poison commonly encountered in India and other developing countries is pesticide. The reason behind this is agriculture based economics, poverty, and easy availability of highly toxic pesticides. Apart from these reasons, developed countries are producing toxic chemicals which are increasingly exported to developing countries where they are used extensively leading to health hazards.

Changing social values like unemployment, poverty, family disputes, marital conflicts, failure in love, and examination depression are common reasons for suicide by poisoning.

Among all pesticides, organophosphate is the largest bulk of poisoning in India. Since 1985 the problem of aluminium phosphide poisoning, a grain fu-

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migrant is reported as the commonest cause in Northern parts of India viz. Haryana, Punjab and Rajasthan [21].

When the patient is brought to hospital for treatment of poisoning relatives are not ready to tell the reason behind the consumption of poison. Doctor has to diagnose and treat patient by his own knowledge symptomatically. Number of patients is not brought to hospital due to fear of police interrogation. They are treated in house by household remedies, and unfortunately they die.

Organophosphorus, organochlorus compounds and zinc phosphide are commonly used poisons to commit suicide. Zinc phosphide due to its odourless and tasteless character is commonly used for homicide.

Aims and Objectives

Present study entitled for the "Trends of agricultural & industrial chemicals poisoning cases in rural hospital of Central India" with following aims and objectives:

1. To study agricultural & industrial chemicals poisoning cases admitted in our Hospital and poisoning cases brought for post-mortem in mortuary of our Hospital in Department of Forensic Medicine and Toxicology, situated in rural part of Central India during the period from August 2012 to October, 2014.
2. To study the type of poisons consumed and mode of poisoning.
3. To study incidence of poisoning in different age groups.
4. To study incidence of poisoning according to sex.

Material and Methods

After approval of local institutional ethical committee has been taken this study was done. Cases of poisoning were studied in 1038 cases of poisoning reported in our Hospital situated in rural area of Central India during the period from August 2012 to October 2014. 804 cases were admitted in hospital out of which 588 cases were admitted with history of consumption of poison and 216 cases were admitted with history of snake bite. Out of them 147 expired during treatment of which 135 were of poisoning and 12 with history of snake bite. History of incidence of poisoning was taken from patient or their relatives when-

ever possible. When patient was unconscious, history was taken from relatives. Analysis of gastric contents, blood, and urine was done in Toxicology laboratory of Forensic Medicine Department by T.L.C. (Thin Layer Chromatography) method.

Material and methods used were as follows:

- ❖ History and examination of living poisoning cases admitted in hospital.
- ❖ Post-mortem findings in cases of death due to poisoning.
- ❖ Analysis of gastric content, blood and urine in Toxicology laboratory in Department of Forensic Medicine & Toxicology and Regional Forensic Science Laboratory.

Post-mortem Cases

Total 381 post mortem cases of poisoning were studied for the period from August 2012 to October 2014, in the mortuary of Department of Forensic Medicine and Toxicology, in our Hospital.

Out of 381 cases 147 cases died in the hospital on which post-mortem were done. Total 234 cases were directly brought dead from spot or died while bringing to hospital.

Careful post-mortem examination was done in the mortuary of the Department of Forensic Medicine in our Hospital. Main features observed during post-mortem examination were for evidence of poisoning like:

- ❖ Cyanosis
- ❖ Frothing from mouth & nostrils and its nature
- ❖ Congestion of lungs, liver, spleen, kidneys and other organs
- ❖ Congestion of stomach mucosa and state and nature of stomach contents
- ❖ Conditions of pupils
- ❖ Conditions of heart
- ❖ Post-mortem lividity
- ❖ In case of snake bite fang marks and swelling around fang marks
- ❖ Smell if any
- ❖ Rigor mortis

Study of incidence, age, sex, occupation, education, and religion, and socioeconomic status, suicidal, homicidal or accidental, period of survival after consuming poison was done.

Samples of blood, urine and gastric contents of poisoning cases admitted in hospital and cases brought for post-mortem were analysed in Toxicology Laboratory in Department of Forensic Medicine, in our Hospital and sent to Regional Forensic Science Laboratory for chemical analysis.

Techniques used for preservation of samples for chemical analysis in Departmental Clinical Toxicology Laboratory

The common materials preserved for chemical analysis in cases of suspected poisoning, was stom-

ach wash, vomitus, blood and urine. The sample were collected in thoroughly cleaned glass bottles of 100ml capacity which were properly closed with rubber cock and labelled containing details as name, age, sex, poison suspected date and time of sample collected. Preservative used, treatment being given at the time of sample collection, name and signature with designation of treating physician, were properly noted.

Preservative used for material preservation

| Type of material | Type of preservative used |
|----------------------------|--|
| Stomach wash fluid/vomitus | Saturated solution of common salt. (Sodium chloride) |
| Blood | Mixture of sodium fluoride and potassium oxalate |
| Urine | Thymol |

A parted form required preservative each and every careful step was used to ensure that the samples

were send to Toxicology Laboratory without undue delay, for minimizing the time gap between sample collection, preservation and chemical analysis.

Agricultural and industrial chemical poisons and mortality

| Types | Cases | Mortality | Survival |
|---------------------------|------------|-----------|------------|
| Allethrin | 1 | 0 | 1 |
| Alum | 1 | 0 | 1 |
| Aluminium phosphide | 138 | 80 | 58 |
| Arsenic | 1 | 0 | 1 |
| Barium carbonate | 5 | 0 | 5 |
| Carbon monoxide | 2 | 0 | 2 |
| Chlorine gas | 1 | 0 | 1 |
| Copper sulphate | 26 | 2 | 24 |
| Corrosives | 19 | 4 | 15 |
| Lead | 2 | 1 | 1 |
| Liquid Ammonia | 1 | 1 | 0 |
| Mercury chloride | 4 | 1 | 3 |
| Methyl alcohol | 12 | 4 | 8 |
| Methyl iso-cyanide | 1 | 0 | 1 |
| Nitrobenzene | 2 | 0 | 2 |
| Organophosphorus compound | 19 | 1 | 18 |
| Phenol | 7 | 1 | 6 |
| Potassium carbonate | 1 | 0 | 1 |
| Sulphur | 1 | 0 | 1 |
| Zinc phosphide | 2 | 0 | 2 |
| Total | 246 | 95 | 151 |

Discussion

Poisoning was more in rural area than urban area. Common poisons in rural area were Insecticides than industrial poisoning.

Poisoning was more common in people having low socio-economic status, poisoning was rare in people having higher socio-economic status.

Poisoning was common in uneducated and poor people. Poisoning was rare among educated people.

Period of survival was 0-6 hours in most of the cases. Poisoning was suicidal in most of the cases followed by accidental while homicidal poisoning was rare.

Insecticides poisoning were more commonly reported and amongst them organophosphorus poisoning was more fatal. Majority of cases were from rural areas.

Allethrin poisoning was reported in 1 case which were from urban area and due to consumption of a packet of "*kachhuwa chhaap agarbatti*" by young males.

It was observed that, though the number of agricultural & industrial chemical poisoning was high, the mortality was very low as compared to other type of chemical poisons. Out of 102 cases reported to the hospital, only 9 died & 93 survived.

Summary & Conclusion

Prevention of Accidental poisoning

Preventive measures can be tried to control accidental insecticide poisoning as given below:

1. Pesticide will used only if it needs after all other simple means of pest controls like neem tree extract, dusting of ash, etc. are useless.
2. Before opening the bottle read label carefully, study all warning and follow directions given strictly.
3. Using protective clothing (gowns), masks, gloves, shoes while handling pesticides to prevent inhalation and skin absorption of poison.
4. Discard pesticides or its container or equipment used, by deeply burying under the earth.
5. Keep away remaining pesticides away from the reach of children and pets.
6. Clean spraying equipment by rinsing it with at least three changes of water.
7. Wash hands and other exposed area of the body

immediately after spraying pesticides and before eating and eatables.

8. Spraying in fields should not be done for more than two hours a day and not more than six days per week. The edible commodities particularly fruits and vegetables should not be made available to consumers by the producers at least within one week after spraying as they are loaded with substantial quantities of pesticides.
9. Persons suffering from lung, liver and kidney diseases should not be engaged in spraying pesticides.
10. No smoking, drinking or eating should be allowed during spraying.
11. Spraying should be done towards the current of wind.
12. Proper storage of pesticides to avoid contamination and leakage of these chemical to edible commodities.
13. Government should take necessary steps to prevent poisoning by educating people by various modes of propaganda and practical demonstration to use the pesticides.
14. Exporting firms and manufacturing countries should provide detailed information on the labels of these chemicals.
15. International organisations like WHO, FAO (Food and Agriculture Organization) should form a uniform code of practice towards strict control on imports and exports as well as distribution and use of hazardous pesticides and chemicals.

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