

Original Research Paper

Gross and Histopathological Changes in Fatal Poisoning

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Abstract

Prospective two year study period, from 1st August, 2008 to 31st July, 2010, a total of 1,374 autopsies were performed at the centre, 70 cases were suspected cases or confirmed poisoning & those persons declared dead on arrival in the causality and suspected to be a case of poisoning. Incidence of deaths due to poisoning was 5.09 %. Insecticide was commonest poison (22 or 31.42%), followed by alcohol intoxication 16(22.85%). Maximum deaths were due to cerebral edema 18(30.50%) cases. Cyanosis was present in maximum number (24 or 34.28%) of cases.

On gross examination, Stomach mucosa was congested in maximum number or 36(51.42%) cases. Sub mucosal hemorrhages in stomach were commonly seen in (12 cases) insecticide poisonings. On histopathological examination, in liver, fatty changes were seen in maximum number of (13 or 59.09%) cases followed by ballooning degeneration in 3(13.63%) cases. In kidneys, cloudy degeneration was seen in maximum (12 or 54.54%) cases followed by acute tubular necrosis in 8(36.36%) cases.

Key Words: Poisoning, Autopsy, Histopathological changes, Intoxication, Cynosis

Introduction:

According to WHO, three million acute poisoning cases with 2, 20, 000 deaths occur annually. Of these 99% of fatal poisonings occur in developing countries, particularly among agriculture workers. [1] The exact incidence of this problem in India is uncertain, but it is estimated that about 7 to 10 million cases of poisoning are reported every year, of which about 10,000 happen to die.

Every year 5 to 6 persons per lakh population die due to poisoning. [2] At present Aluminium phosphide tops the list in northern part of India while insecticide heads the list in southern part of India. [3]

The pattern of poisoning varies from region to region depending on variety of factors such as availability of the poisons, socioeconomic status of the population, religious and cultural influences.

Acute poisoning is one of the most common causes for emergency hospital admissions. The patients of poisoning need careful thorough assessment, early diagnosis, monitoring and aggressive supportive management in the intensive care setting. [4]

In this study we attempt to correlate the signs and symptoms, gross findings and histopathological examination to ascertain the cause of death in case of poisonings.

Material and Methods:

This prospective study was carried out in Departments of Forensic Medicine, Pathology and Postmortem Center attached to T.N.M.C & B.Y.L. Nair hospital, Mumbai, Maharashtra. All deaths with history of suspected or confirmed poisoning & those persons declared dead on arrival in the causality and suspected to be a case of poisoning were sent for medico-legal postmortem.

Seventy such cases out of a total number of 1,374 autopsies during a 2 year period i.e. from 1st August 2008 to 31th July 2010 were selected for the present study except deaths due to natural causes and undetermined causes. Viscera for the chemical analysis were collected during postmortem examination.

These viscera sent to Forensic Science Laboratory, Kalina, Mumbai. Each poisoning case has been studied in detail using specific pro-forma. All data were documented and statistically analyzed. Histopathological examination slides were done by routine method and reporting was done under the guidance of senior pathologist.

After evaluation of brief history, causal factors, indoor paper finding, post mortem examination, chemical analysis report, histopathological examination report the final cause of death was ascertained.

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DOR: 12.04.2014 DOA: 17.08.2014

Results:

In this study it was observed that most of the victims (22 or 31.42%) were in the 21-30 of age group, followed by 13(18.57%) in the 51-60 age group. (Table1)

Regarding external signs and symptoms Cyanosis was present in maximum number (24 or 34.28%) of cases followed by frothing from mouth and nose which was seen in 19(27.14%) cases. Maximum number (22 or 31.42%) of cases were due to insecticides followed by alcohol intoxication 16(22.85%). Deaths due to rodenticides were 4(5.71%) and Carbolic acid, alcohol and Phenobarbitone, Chloroquine, sedative overdose and snake bite poisoning were seen as a one case of each. (Fig. 1)

Maximum deaths were due to cerebral edema 18(30.50%) cases including insecticide and alcohol poisoning. It was observed on gross examination that, in brain, congestion was seen in maximum number (39 or 55.71%) cases followed by cerebral edema in 25(35.71%) cases. In lungs, congestion was seen in maximum number (32 or 45.71%) cases followed by intrapulmonary hemorrhages in 15(21.42%) cases.

In liver, congestion was seen in maximum number (35 or 50%) cases followed by fatty changes in 16(22.85%) cases.

In stomach, kerosene like odour was present in 15(21.42%) cases, alcoholic odour in 9(12.85%), mucosa congestion of stomach was seen in maximum number (36 or 51.42%) of cases followed by Inflammation of wall in 17(24.28%) cases and mucosa was hemorrhagic in 12(17.14%) cases.

Discussion:

In the present study, males outnumbered the females and the peak incidence of deaths due to poisoning was in the age group of 21-30 years with 22(31.42%) cases. This particular age group is the most active phase of life for men who are involved mentally, physically and socially and exposed to maximum hazards. They are exposed to day to day stresses of life than females and the peak coincides with the studies of N.K. Aggarwal et al and Kiran et al. [4, 5] It does not coincide with the study of B.D. Gupta et al. [6]

It was observed that, cyanosis was present in maximum number (24 or 34.28%) of cases followed by frothing from mouth and nose as seen in 19(27.14%) cases due to abundant accumulation of secretion in the respiratory passages. Odour from mouth and nose was present in 17(24.28%) cases consistent with other studies. [7]

In our study maximum number (22 or 31.42%) of cases were due to insecticides followed by alcohol intoxication 16(22.85%).

Owing to easy availability, low cost and high toxicity, comparatively painless death than other violent methods, insecticides have always been extremely popular in India for committing suicide. [5, 9] Maximum deaths were due to cerebral edema in 18 (30.50%) cases of insecticide and alcohol poisoning cases. This coincides with study of Gupta S.K. et al. [10]

In this study, stomach changes were commensurate with the effects of causative agent. Most of the agents cause congestion and inflammation of the stomach mucosa that is why the congestion and inflammation of mucosa was seen maximum.

Hemorrhages were commonly seen in (12 cases) insecticide poisonings. Combination of corrosion, perforation and softening of wall was seen in cases (3) of acid poisoning.

Although there were 22 cases of insecticide poisoning, kerosene like odour was present in only 15 cases. Alcoholic odour was present in 9 out of 16 cases of alcohol poisoning. In 43 (61.42%) cases there was no specific odour similar to other studies. [8]

Gross Changes in Visceral Organs of Insecticides Poisoning:

In present study brain congestion was seen in maximum number 11(50%) of cases followed by edema in 9 (40.90%). In lungs congestion and intrapulmonary haemorrhages were seen in equal number 6 (27.27%), in heart and liver; congestion was seen in maximum number (17 or 77.27%) and (13 or 59.09%) of cases respectively.

This coincides with findings quoted in textbook of Reddy [8] and also with study of Sutay et al. [9] In stomach and kidney, congestion was seen in maximum number (13or 59.09%) and (42 or 60%) cases respectively.

Histopathological Changes in Visceral Organs of Insecticides Poisoning:

In brain, edema was seen in maximum number (13 or 59.09%) of cases. In lungs, congestion and intrapulmonary haemorrhages were seen in equal number (6 or 27.27%) of cases. In heart, congestion was commonly seen in 17(77.27%) cases.

In liver, fatty changes were seen in maximum number of (13 or 59.09%) cases followed by ballooning degeneration in 3(13.63%) cases. These were similar with study of Sutay et al. [9] In stomach congestion was seen in maximum number (14 or 63.63%) cases followed by hemorrhagic mucosa in 6(27.27%) cases. In kidneys, cloudy degeneration was

seen in maximum (12 or 54.54%) cases followed by acute tubular necrosis in 8(36.36%) cases similar to other studies. [7, 9]

Gross Changes in Visceral Organs of Alcohol Intoxication:

In brain, cerebral edema was seen maximum number 10(62.5%) of cases. In lungs, congestion and intrapulmonary haemorrhages were seen equal number 5(31.45%) of cases.

In heart, congestion was seen maximum number (13 or 81.25%) cases. In liver, congestion was seen maximum number in 7(43.45%) cases followed by fatty changes in 6(37.5%) cases. [9] In stomach congestion was seen in maximum number (10 or 62.5%) cases followed by inflammation of mucosa in 4(25%) cases. In kidneys, congestion was seen in maximum number (9 or 56.25%) cases followed by necrosis in 4(25%) cases.

It coincides with findings quoted in textbook of Reddy [8] as alcohol causes dilatation and congestion of blood vessels.

Histopathological Changes in Visceral Organs:

In brain, cerebral edema was seen maximum number (10 or 62.5%) of cases. In lungs, pulmonary edema and intrapulmonary haemorrhages were seen equal number in 5(31.45%) of cases. In heart, congestion was seen maximum number (13 or 81.25%) cases.

In liver, fatty changes were seen maximum number (7 or 43.25%) cases followed by congestion in 6(37.5%) cases. These findings are consistent with other studies. [9]

In stomach congestion was seen in maximum number (12 or 75%) cases followed by hemorrhagic mucosa and congestion in 2(12.5%) cases. In kidneys, cloudy degeneration was seen in maximum number (6 or 37.5%) cases followed by acute tubular necrosis in 5(31.25%) cases. [8]

Gross Changes in Visceral Organs of Rodenticide Poisoning:

In brain, congestion was seen maximum number 3(75%) of cases and edema was seen in 1(25%) case.

In lungs, congestion was seen in 2(50%) cases and intrapulmonary haemorrhages and pulmonary edema was one case each. In heart, congestion was seen all cases(4 or 100%). In liver, congestion was seen maximum number in 2(50%) cases followed by enlargement.

In stomach, hemorrhagic mucosa was seen in 50% cases. Congestion and inflammation of mucosa was seen in one case of each. [8] In kidneys, congestion was seen in

maximum number (3 or 75 %) of cases followed by enlargement in one case. [9]

Histopathological Changes in Visceral Organs:

In brain, congestion was seen maximum number (3 or 75%) of cases followed by edema in 1(25%) case. In lungs, pulmonary edema was seen in 2(50%) cases followed by congestion and intrapulmonary haemorrhages in one case each. In heart, congestion was seen in all cases(4 or 100%).

In liver, fatty changes were seen in (2 or 50%) cases followed by centrilobular necrosis and sinusoidal dilatation one case each.

In stomach congestion and sub mucosal hemorrhages were seen in equal number (2 or 50%) cases. In kidneys, acute tubular necrosis was seen in three cases and cloudy degeneration in one case and with findings quoted in textbook of Reddy. [8]

Gross Changes in Visceral Organs of Sulphuric Acid Poisoning:

All the visceral organs were congested. In stomach, combination of corrosion, perforation and softening of wall was also seen. [8] These are due to corrosion and distraction the tissues coming in contact with the acid and coagulative necrosis by precipitating proteins.

Histopathological Changes in Visceral Organs:

Brain and heart congestion and necrotic changes in stomach were seen in both the cases(100%). Pulmonary edema and intrapulmonary haemorrhages, fatty changes and sinusoidal dilatation of the liver, acute tubular and cloudy degeneration of the kidneys were seen in 1(50%) case of each.

Gross changes in visceral organs of carbolic acid poisoning

Congestion was commonly seen in brain, heart, lungs, liver. In stomach, leathery appearance was seen. [8] In kidneys, enlargement was seen. The stomach mucosal folds are swollen, thickened and covered by opaque, coagulated, grey or brown mucous membrane looks leathery due to corrugative action of carbolic acid.

Histopathological Changes in Visceral Organs:

In brain and heart congestion was seen. In lungs, pulmonary edema was seen. In liver, ballooning degeneration was seen. In stomach sub mucosal hemorrhages was seen. In kidneys, tubular necrosis was seen.

Conclusion:

The present study helps to interpret the effect on body of poisons used. In this study,

there is an increasing frequency of insecticide poisoning in urban population including younger age group and male sex.

Cerebral edema was most common immediate cause in death due to poisoning. Congestion was common gross visceral organ finding and cerebral edema was common histopathological findings.

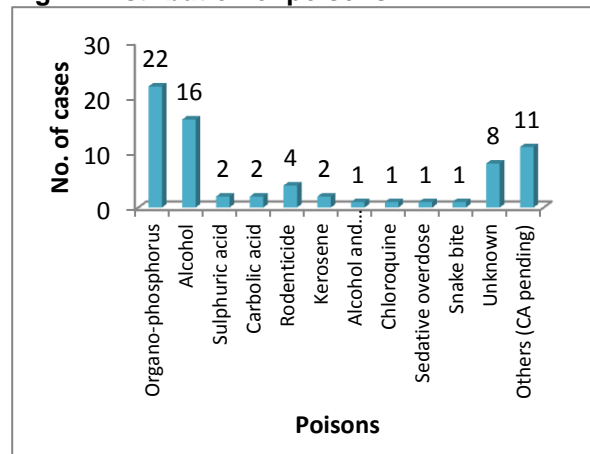
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Table 1: Age and Sex Wise Distribution

Age grps(Yrs)	Sex		
	Male (%)	Female (%)	Total (%)
0-10	0(0)	2(2.85)	2(2.85)
11-20	2(2.85)	4(5.71)	6(8.87)
21-30	17(24.28)	5(7.14)	22(31.42)
31-40	10(14.28)	4(5.71)	14(20)
41-50	6(8.87)	3(4.28)	9(12.85)
51-60	10(14.28)	3(4.28)	13(18.57)
61-70	3(4.28)	0(0)	3(4.28)
71-80	0(0)	0(0)	0(0)
>81	1(1.42)	0(0)	1(1.42)
Total	49(70)	21(30)	70(100)

Fig. 1: Distribution of poisons



**Table 2
Relation between Poisons and Histopathological Changes in Stomach**

Name of poisons	Congestion	Gastritis	Necrotic changes	Sub mucosal hemorrhages	Total
Pesticides	14(63.63%)	2(9.09%)	0	6(27.27%)	22
Alcohol	12(75%)	2(12.5%)	0	2(12.5%)	16
Sulphuric acid	0	0	2(100%)	0	2
Carboic acid	0	0	0	1(100%)	1
Rodenticide	2(50%)	0	0	2(50%)	4
Kerosene	2(100%)	0	0	0	2
Alcohol and Phenobarbitone	0	0	0	1(100%)	1
Chloroquine	1(100%)	0	0	0	1
Sedative overdose	1(100%)	0	0	0	1
Snake bite	0	0	0	1(100%)	1
Unknown	6(75%)	0	0	2(25%)	8
Others(CA report awaited)	8(72.72%)	0	0	3(27.27%)	11
Total	46(65.71%)	4(5.71%)	2(2.85%)	18(25.71%)	70