



AUTOPSY AUDIT OF POISONING CASES WITH HISTOPATHOLOGICAL CHANGES IN VISCERAL ORGANS

Forensic Medicine

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ABSTRACT

Poisoning is a medical emergency irrespective of the amount and nature of poison ingested. This autopsy based study was carried out on poisoning cases reported to FMT Dept. LTMMC & GH Sion Mumbai in two year duration. The main objectives of the study were to analyze pattern, demographic variables and histopathological changes of poisoning cases. Out of 3812 postmortem, 154 were poisoning cases. Poisoning by insecticide was seen in maximum cases 42.9% and in maximum cases (70.1%) manner of poisoning was suicidal in nature. Most of the victim were married person 83.1% and from low socioeconomic strata 73.4%. On histopathology, in lungs intrapulmonary hemorrhage is seen in maximum cases (64 41.6%) followed by congestion 47 cases. In liver, fatty changes were seen in maximum number of cases (84 54.5%) followed by ballooning degeneration in 8 cases. In kidney, cloudy degeneration was seen in maximum number of cases (77 50%) followed by acute tubular necrosis in 68 cases. In brain, edema was seen in 87 cases (56.5%), out of which maximum numbers were observed in insecticide 49 cases (74.2%).

KEYWORDS

Death, Suicide, Poisoning, Autopsy, Histopathological changes, Viscera

Introduction

Poison is any substance which when enters the body produces ill-effect, disease or death. According to WHO, annually three million acute poisoning cases with 220,000 deaths occurs. Developing countries leads in mortality due to poisoning (99%) involving mostly agriculture workers. Though the exact incidence of this problem in India is uncertain, it is estimated that about 7 to 10 million cases of poisoning are reported every year, of which about 10,000 happen to die¹. In India, Poisoning is the most common method adopted for suicide². Agriculture being main source of income, easy and rampant availability of pesticides, poverty related socioeconomic problems, lack of adequate protective clothing, and limited treatment facilities are some of the factors contributing to the high morbidity and mortality. In spite of such a huge number of deaths due to poisoning, opinion regarding cause of death is reserved till chemical analysis report of viscera shows poison. This delay in opinion as to cause of death results in pendency in court proceeding, delay in death certificate, settlement of insurance claims of dependants etc. remain pending. Various external and internal post mortem findings are likely to be the key determinants to identify acute poisoning cases and to rule out other causes of death, hence it is of paramount importance that these factors be firmly and decisively established. Death may occur immediately after taking poison or may get delayed for days or weeks together, where the poisoning may not be the actual cause of death, although it may occur as a result of some remote intervening cause. In these cases the determination of exact cause of death sometimes may not reveal anything on gross. Histopathology is an important and most useful way to find out the conditions of internal visceral organs. Histopathological examination can reveal such pathology in major organs like lung, liver, kidney where poison is acted, absorbed and eliminated. In this study an attempt in made to correlate the signs, symptoms, histopathological findings to ascertain the cause of death in case of poisonings.

MATERIALS AND METHOD

This prospective & observational study was carried out in Depart. Of FMT, LTMMC & GH Sion, Mumbai. All deaths with history of suspected or confirmed poisoning & those persons declared dead on arrival in the causality with history of poisoning were included in the study. 154 cases analyzed during a 2 year period. Viscera for the chemical analysis were collected during postmortem examination.

OBSERVATION AND RESULT

Out of 154 poisoning cases 66.2% were males and 33.8% were female. Male to female ratio was 1.9:1. Maximum incidence was observed in age group 21-40 years comprising 85 (55.2%) cases followed by 41-60 years 44 (28.6%) cases (Table-1 & 2). Present study shows that married persons 128 (83.1%) were more in number than

unmarried 26 (16.9%) (Table-4). 113 (73.4%) cases were from low socioeconomic status and 39 (25.3%) cases were from middle socioeconomic status (Table -3).

In the present study 108 (70.1%) cases were of suicidal poisoning and 44 (28.6%) cases of accidental poisoning (Table-5). Insecticide was the most common type of poison used 66 (42.9%), followed by Rodenticide 18 (11.7%), Alcohol 17 (11.0%) (Table-6). On histopathological examination, brain edema was seen in 87 cases (56.5%) out of which 49 cases of insecticide poisoning. Brain congestion was seen in 67 cases (43.5%). In lungs, intrapulmonary hemorrhage was seen in maximum number 64 cases (41.6%) followed by congestion in 47 cases (30.5%). In liver fatty changes was seen in maximum number 84 cases (54.4%) followed by congestion in 39 cases. In kidney cloudy degeneration was seen in 77 cases (50%) followed by acute tubular necrosis in 68 cases (44.2%). (Table-7-11)

DISCUSSION

In our study males (66.2%) outnumbered females (33.8%) and maximum cases belonged to the age group 21-40 years. 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. This observations of male preponderance and age group coincides with the studies of Waghmare, Mohite (2014)³, Siddapur et al (2011)³.

In present study, married cases (83.1%) outnumbered phenomenally the unmarried cases (16.9%). Similar involvement of married persons was also observed by Siddapur et al (2011)³. It may be because of greater stress a married person exposed than single individuals in their day-to-day lives. The different causes of the stress culminating in poisoning ranged widely from marital and family discords to financial and job related problems to educational and other matters.

It is well established that financial problem is one of the prime culprit for suicide among poor followed by familial issues. We noted maximum cases 113 (73.4%) from low socioeconomic status, 39 (25.3%) cases were from middle socioeconomic status. Similar pattern of observations with respect to socioeconomic status was observed by Siddapur et al (2011)³, Khosya & Meena (2016)⁵.

Poison is supposed to cause painless death. We observed 108 (70.1%) cases were of suicide and 44 (28.6%) cases were of accident. These observations corresponds with the observations made by Siddapur et al (2011)³, Khosya & Meena (2016)⁵, Singh et al (1999)⁶.

In this study insecticide was the most common type of poison used 66 (42.9%) cases followed by rodenticide 18 (11.7%) and alcohol 17(11.0%). Due to vast agriculture based economy, low cost, easy availability, insecticides are widely used in farms and preferred

method of committing suicide due to painless death comparative to other methods. Similar observations also noted by Waghmare, Mohite (2014)⁸ and Gupta et al (2006)⁸.

Histopathological Changes in Visceral Organs of Insecticides Poisoning:

In brain, edema was seen in maximum number of cases in 49(74.2%) cases followed by congestion in 17 (25.8%) cases. These findings coincide with the study carried out by Waghmare, Mohite (2014)¹. In lungs, congestion was seen in 35 (53.0%) cases and intrapulmonary hemorrhages were seen in 30 (45.5%) cases and lobar pneumonia was seen in 1 case (1.5%). These findings corresponds with study done by Pandey et al (2015)⁹. In liver, fatty changes were seen in maximum number of 40 (60.6%) cases, congestion was seen in 17 (25.8%) case, ballooning degeneration in 6 (9.1%) cases. Studies done by Waghmare, Mohite (2014)¹, Balasubramanian, Gokulakrishnan (2016)² and Pandey et al (2015)⁹ also noted simila observation in liver. Kidneys show cloudy degeneration in 45 (68.2%) cases followed by acute tubular necrosis in 19 (28.8%) cases which is corroborated by the studies of Waghmare, Mohite (2014)¹.

Histopathological changes in Visceral Organs of Rodenticide poisoning:

In brain, congestion was seen in 13(72.2%) of cases followed by edema in 5 (27.8%) cases. In lungs, pulmonary edema was seen in 12 (66.7%) cases followed by congestion and intrapulmonary hemorrhages in 3 (16.7%) cases. In liver, fatty changes was seen in 7(38.9%) cases followed by sinusoidal dilatation 6 (33.3%) cases and centrilobular necrosis 5 (27.8%) cases. All cases, i. e. 18 (100%) cases of rodenticide poisoning show red pulp congestion in spleen. In kidneys, acute tubular necrosis was seen in 17 (94.4%) and cloudy degeneration was in 1 (5.6%) case. These findings are consistent with findings of Waghmare, Mohite (2014)¹, Jain et al (2005)¹⁰, Datir et al (2015)¹¹ and Omid Mehpour et al¹².

Histopathological Changes in Visceral Organs of Alcoholic intoxication:

In brain, cerebral edema was seen maximum number of 16 (94.1%) cases and congestion was seen in 1(5.9%) case. In lungs, pulmonary edema was seen in 10 (58.8%) cases, intrapulmonary hemorrhages were seen in 6 (35.3%) cases and congestion seen in 1 (5.9%) case. In liver, fatty changes were seen maximum number 13 (76.5%) cases followed by congestion were seen in 4 (23.5%) cases. In spleen congestion was seen in 16 (94.1%) cases and red pulp congestion was seen in 1 (5.9%) case. In kidneys, cloudy degeneration was seen in maximum number of 11 (64.7%) cases followed by acute tubular necrosis, 6 (35.5%) cases .These findings are consistent with other studies done by Waghmare, Mohite (2014)¹, Saha, Das (2015)¹³, Tuusov et al (2014)¹⁴ and Pandey et al (2015)⁹.

Histopathological Changes in Visceral Organs of Corrosive poisoning:

In brain and heart congestions were seen in all 10 (100%) cases, pulmonary edema in 6 (60.0%) cases and intrapulmonary hemorrhages in 4 (40.0%) cases. In spleen congestion was seen 8 (80.0%) cases and red pulp congestion was seen 2 (20.0%) cases. In live fatty changes were seen in 4 (40.0%) cases, centrilobular necrosis in 3 (30.0%) cases, ballooning degeneration was seen 2 (20.0%) cases and sinusoidal dilatation was seen in 1 (10.0%) case. Acute tubular necrosis 7(70.0%) and cloudy degeneration 3(30.0%) cases were noted on histopathological examination of kidneys. Similar findings were also noted by Sushim waghmare, S.C. Mohite (2014)¹, Dr. S B Datir et al (2015)¹¹, Yuko Emoto et al (2016)¹⁵ and Rajanikanta Swais et al (2016)¹⁶.

CONCLUSIONS AND SUMMARY

Incidence of poisoning cases is 4.88 %. Ratio of male to female victims is 1.9:1. Majority of victims were married in the age group of 21-40 years and from low socioeconomic strata. Majority of victims committed suicide. In this study Insecticide was the most common type of poisoning followed by rodenticide poisoning. In histopathological examination, cerebral edema was the common internal autopsy finding in poisoning cases. In lungs intrapulmonary hemorrhages more common than congestion and pulmonary edema. In liver fatty changes were common followed by congestion. In kidney, cloudy degeneration was common, followed by acute tubular necrosis. We conclude that histopathology examination can support to estimate cause of death in death due to poisoning while chemical analysis report

of viscera is awaited and cut short the legal proceeding which used to remain pending for evidence of poison in laboratory.

Table-1 Age

Age Group	Number	Percentage
<=20 Years	17	11.0%
21-40 Years	85	55.2%
41-60 Years	44	28.6%
>60 Years	8	5.2%
Total	154	100.0%

Table-2 Sex

Sex	Number	Percentage
Female	52	33.8%
Male	102	66.2%
Total	154	100.0%

Table-3 Socioeconomics Status

Socioeconomic Status	Number	Percentage
Low SES	113	73.4%
Middle SES	39	25.3%
Upper SES	2	1.3%
Total	154	100.0%

Table-4 Marital Status

Marital Status	Number	Percentage
Married	128	83.1%
Unmarried	26	16.9%
Total	154	100.0%

Table-5 Manner of Death

Manner of Death	Number	Percentage
Suicide	108	70.1%
Accidental	44	28.6%
Unknown	2	1.3%
Total	154	100.0%

Table-6 Type of Poison

Type of Poison	Number	Percentage
Insecticide	66	42.9%
Rodenticide	18	11.7%
Alcohol	17	11.0%
Unknown	17	11.0%
CA report awaited	12	7.8%
Corrosive	10	6.5%
Mixed	5	3.2%
Kerosene	3	1.9%
Sedative/ Hypnotic	3.0	1.9%
Snake bite	2.0	1.3%
Other	1	0.6%
Total	154	100.0%

Table-7 Histopathological Changes in Brain

Type of Poison	Brain							
	Congestion		Edema		Hemorrhagic		Total	
	No's	%	No's	%	No's	%	No's	%
Alcohol	1	5.9%	16	94.1%	0	0.0%	17	100.0%
CA Report Awaited	8	66.7%	4	33.3%	0	0.0%	12	100.0%
Corrosive	10	100.0%	0	0.0%	0	0.0%	10	100.0%
Insecticide	45	68.2%	21	31.8%	0	0.0%	66	100.0%
Kerosene	3	100.0%	0	0.0%	0	0.0%	3	100.0%
Mixed	5	100.0%	0	0.0%	0	0.0%	5	100.0%
Other	0	0.0%	0	0.0%	1	100.0%	1	100.0%
Rodenticide	15	83.3%	3	16.7%	0	0.0%	18	100.0%

Sedative/Hypnotic	1	33.3%	2	66.7%	0	0.0%	3	100.0%
Snakebite	2	100.0%	0	0.0%	0	0.0%	2	100.0%
Unknown	12	70.6%	5	29.4%	0	0.0%	17	100.0%
Total	102	66.2%	51	33.1%	1	0.6%	154	100.0%

Table-8 Histopathological Changes in Kidney

Type of Poison	Kidney							
	Acute tubular necrosis		Cloudy Degeneration		Congestion		Total	
	No's	%	No's	%	No's	%	No's	%
Alcohol	6	35.3%	11	64.7%	0	0.0%	17	100.0%
CA Report Awaited	4	33.3%	8	66.7%	0	0.0%	12	100.0%
Corrosive	7	70.0%	3	30.0%	0	0.0%	10	100.0%
Insecticide	19	28.8%	45	68.2%	2	3.0%	66	100.0%
Kerosene	3	100.0%	0	0.0%	0	0.0%	3	100.0%
Mixed	0	0.0%	4	80.0%	1	20.0%	5	100.0%
Other	1	100.0%	0	0.0%	0	0.0%	1	100.0%
Rodenticide	17	94.4%	1	5.6%	0	0.0%	18	100.0%
Sedative/Hypnotic	3	100.0%	0	0.0%	0	0.0%	3	100.0%
Snakebite	1	50.0%	1	50.0%	0	0.0%	2	100.0%
Unknown	7	41.2%	4	23.5%	6	35.3%	17	100.0%
Total	68	44.2%	77	50.0%	9	5.8%	154	100.0%

Table-9 Histopathological Changes in Lungs

Type of Poison	Lungs											
	Bronchopneumonia		Congestion		Intrapulmonary hemo		Lobar pneumonia		Pulmonary Edema		Total	
	No's	%	No's	%	No's	%	No's	%	No's	%	No's	%
Alcohol	0	0.0%	1	5.9%	6	35.3%	0	0.0%	10	58.8%	17	100.0%
CA Report Awaited	0	0.0%	4	33.3%	8	66.7%	0	0.0%	0	0.0%	12	100.0%
Corrosive	0	0.0%	0	0.0%	4	40.0%	0	0.0%	6	60.0%	10	100.0%
Insecticide	0	0.0%	35	53.0%	30	45.5%	1	1.5%	0	0.0%	66	100.0%
Kerosene	0	0.0%	0	0.0%	0	0.0%	0	0.0%	3	100.0%	3	100.0%
Mixed	0	0.0%	0	0.0%	2	40.0%	0	0.0%	3	60.0%	5	100.0%
Other	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1	100.0%	1	100.0%
Rodenticide	0	0.0%	3	16.7%	3	16.7%	0	0.0%	12	66.7%	18	100.0%
Sedative/Hypnotic	0	0.0%	1	33.3%	2	66.7%	0	0.0%	0	0.0%	3	100.0%
Snakebite	0	0.0%	0	0.0%	2	100.0%	0	0.0%	0	0.0%	2	100.0%
Unknown	2	11.8%	3	17.6%	7	41.2%	2	11.8%	3	17.6%	17	100.0%
Total	2	1.3%	47	30.5%	64	41.6%	3	1.9%	38	24.7%	154	100.0%

Table-10 Histopathological Changes in Liver

Type of Poison	Liver															
	Ballooning degeneration		Centrilobular necrosis		Cholestasis		Cirrhosis		Congestion		Fatty change		Sinusoidal Dilatation		Total	
	No's	%	No's	%	No's	%	No's	%	No's	%	No's	%	No's	%	No's	%
Alcohol	0	0.0%	0	0.0%	0	0.0%	0	0.0%	4	23.5%	13	76.5%	0	0.0%	17	100.0%

CA Report Awaited	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	5	41.7%	6	50.0%	1	8.3%	12	100.0%
Corrosive	2	20.0%	3	30.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	4	40.0%	1	10.0%	10	100.0%
Insecticide	6	9.1%	0	0.0%	2	3.0%	3	4.0%	0	0.0%	17	25.8%	40	60.6%	1	1.5%	66	100.0%
Kerosene	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1	33.3%	2	66.7%	0	0.0%	3	100.0%
Mixed	0	0.0%	0	0.0%	0	0.0%	2	40.0%	0	0.0%	0	0.0%	3	60.0%	0	0.0%	5	100.0%
Other	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1	100.0%	0	0.0%	1	100.0%
Rodenticide	0	0.0%	5	27.8%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	7	38.9%	6	33.3%	18	100.0%
Sedative/Hypnotic	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	3	100.0%	0	0.0%	0	0.0%	3	100.0%
Snakebite	0	0.0%	0	0.0%	0	0.0%	0	0.0%	2	100.0%	0	0.0%	0	0.0%	0	0.0%	2	100.0%
Unknown	0	0.0%	2	11.8%	0	0.0%	0	0.0%	7	41.2%	8	47.1%	0	0.0%	0	0.0%	17	100.0%
Total	8	5.2%	10	6.5%	2	1.3%	2	1.3%	39	25.3%	84	54.5%	9	5.8%	154	100.0%		

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