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Medicolegal Study on Death from Poisoning.

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Abstract: *Rapid development in science and technology and rapid growth in agriculture and industrial sector has led to increase in the incidence of poisoning, taking away a lot of precious human life. The chemical substances developed to protect the agriculture products from rodents and pests, to save the human beings from starvation, are themselves becoming a threat for the human life. Trends of poisoning had been constantly changing throughout the world with advent of new agents. This study aims to evaluate Incidence and pattern of poisoning in the district of Murshidabad.The study included all the cases of suspected poisoning brought for autopsy during the period september 2012 to august 2017. A total of 1400 cases of suspected poisoning death were analyzed. Male victims (62.50%) outnumbered females (37.50%) and maximum numbers of cases (63.714%) were in the age group 21-40 years. Economic status was found to be lower in 66.64% cases and maximum cases (73.93%) are villagers. Organophosphorus compounds were the most common agent responsible for poisoning with 27.14% cases followed by organochlorine compounds with 25.64% cases.*

Keywords: *Poisoning, Suicide, Insecticide, Death, Organophosphorus*

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I. Introduction

Death is a harsh reality of life. The people of advanced world use a lot of substance in every aspect of life including household, industry, agriculture, hospital, etc.[1] The choice of poisoning agents depends on availability, cost, harmful effects of poison and regional consideration.[2] Proper education of common people, cultivators about storage, handling, uses of pesticide and insecticide is expected to reduce incidence of poisoning.[3] In modern world, chemical substances play a vital role in every aspect of life starting from as a preservative to treatment and prevention of many diseases.[3, 4] Off different mode of suicide, poisoning is common and it has been known since antiquity.[5] Suicidal and accidental poisoning is a significant contributor to morbidity and mortality throughout the world. As per WHO, about 3 million cases of poisoning with 2,20,000 death occur annually worldwide, of which 90% of the cases occur in developing countries particularly among agricultural workers.[6] The mortality rate of poisoning in developed countries is very less but in developing country like India it is quite high (15-30%). [7, 8]

Poison is a substance (solid, liquid or gaseous), which if introduced to the living body or brought into contact with any part thereof, will produce ill health or death, by its constitutional or local effect or both. [9]

II. Materials And Methods

The retrospective cross sectional study consisted of 1400 medico-legal autopsy performed in the Department of Forensic Medicine in a peripherally placed district level tertiary care hospital during the period of September 2012 to august, 2017. Details of suspected poisoning cases were collected from inquest reports, hospital records, autopsy reports and chemical examiner's analysis report of viscera and body fluids. The various epidemiological data i.e. age, sex, religion, habitat, marital status, education, occupation, economic status, mental status, date and circumstances of ingestion of poison, place of treatment and most common agent responsible for fatal poisoning are studied.

These are the cases having specific history and autopsy findings suggestive of poisoning. The skeletal remains, decomposed bodies and cases where the signs of poisoning were not present were excluded from this study. The investigation of the scene of incident was excluded from the purview of this study. In few cases adequate information could not be obtained and such cases were put under "Undetermined/ Unknown group"

The study was conducted to find out:

1.Pattern of poisoning in the district.
2.Treatment related parts in suspected poisoning cases.
3. The risk factors of death due to poisoning.
4. Modality to prevent loss of precious human life due to poisoning.

III. Results & Discussion

A total 7579 autopsies were performed during the study period, of which 1400 cases were death due to suspected poisoning.So,the incidence of poisoning is 18.47% of total unnatural death /yr. Male victim outnumbered the female victim, the number being 875 (62.50%) in male and 525 (37.50%) in female. The male-female ratio is 1.66:1 in our study. (Table 1)

The present study shows that most of the victims were in the age group 21-40 years, with 892 (63.714%) cases, the lowest number of cases reported in the age group of >60 yrs are 115 (8.214%). In present study Lower class tops the list with 933(66.64%) cases followed by middle class with 350(25%) cases and rest 117 (8.36%) case belongs to upper class.(Table 2).

Maximum numbers of cases are educated up to high school(upto class X) level. Total 395(28.21%) cases are reported from this group. The lowest cases are reported from illiterate group i.e education less than class IV, with 161(11.5%) cases, of which 73(5.21%) were male and 88(6.29%) were female. (Table 3**)** Regarding the occupation, maximum number of victim were students with 393(28.07%) cases followed by domestic worker with 333(23.79%) cases and of which majority 306(21.86%) are house wife from female community. (Table 3**)**

Our study shows that appearence of symptoms in cases of poisoning was mostly between 6 PM-12 Midnight, a total of 671(47.93%) cases died during this hour, of which 408(29.14%) were male and 263(18.79%) females.(Table 4).

Most of the victims 802(57.29%) were treated in PHC,BPHC,SD Hospital then referred to Medical College Hospital while 598(42.71%) cases did not received any treatment. Majority of victims 802(57.29%) died in the hospital, whereas 598(42.71%) cases were brought dead to the hospital. (Table 5).

Villagers were found in 1035(73.93%) cases. (Table 6).

On toxicological analysis Organophosphorus compounds were the most common agents with 380(27.14%) cases, followed by organochlorine 359(25.64%) cases & snake venom(final reports from FSL not received) 291(20.79%) cases,corrosive substance were detected only in 44(3.14%) case. (Table 7).

Maximum number of victims 904 (64.57%) died within 24 hrs of hospital admission.only 29 (2.07%) cases survived beyond after 3 days (Table 8).

Most of the victims i.e 840 (60%) were unconscious at the time of admission .Only 240 victims (17.14%) were fully conscious at the time of admission. (Table 9).

Out of total 1400 victims in 930 cases (66.43%) substance present in stomach were identified at autopsy & in 470 cases (33.57%) substance was not detected.(Table 10).

In 1259 cases (89.93%) H/O suicide was present of which 791 (56.5%) were male & 468 victims (33.43%) were female.(Table 11).

During treatment purpose in 1065 cases(76.07%) gastric lavage were given and in 1238 cases (88.43%) antidote were administered. (Table 12).

Incidence of poisoning were maximum during july to September 628(44.86%) cases. followed by april to june with 408(29.14%), January to march with 189(13.50%) and October to December with 175 (12.50%) cases. (Graph 1)

In the present study, incidence of poisoning found to be 1400 cases (53.89%). Male victim (62.50%) outnumbered female (37.50%) as males lead a more stressful life than female due to family responsibilities. Maximum numbers of cases (63.714%) were in the age group 21-40 years due to the fact that at this period they are by nature more emotional, aggressive, intolerant and irrational.Majority of victims belong to the student community (28.07%), as this group is less exposed to life with worries of study, future unemployment and love affairs.Maximum numbers (28.21%) of victims were educated up to high school(class X) level. Economic status was found to be lower in 66.64% cases, because poverty is a motive behind suicide and because of deficiency of funds they cannot afford the standard of treatment after exposure.Maximum cases (73.93%) are from villagers,due to bulk of present study population live in rural areas and agricultural activities are more prevalent.Appearance of symptoms of poisoning were found mostly in 6PM-12 Midnight (47.93%), due to emotional outburst resulting from tiredness, disappointments, and frustration reaching peak level at the end of days busy schedule. The place of treatment was Medical College Hospital as most of the victims of poisoning referred and treated in medical college hospital for lack of facilities in the local hospitals. 57.29% cases died in hospital& 64.57% cases died within 24 hours of hospital admission.In most of the cases(66.43%) substance present in stomach were identified at autopsy & mostly were having a history of suicide(89.93%) possibly because mental disharmony,poverty,unfulfilled ambition etc. may provoke suicide.Highest cases (44.86%) took place in july to September ,as this is the period of active agricultural activities when pesticide and insecticide are extensively used. 89.93% cases were of suicidal in nature. Organophosphorous compounds were the most common agent responsible for poisoning with 27.14% cases followed by organochlorine compounds with 25.64% cases.60% victims were unconscious at the time of admission.In 76.07% cases & 88.43% cases gastric lavage & antidote were administered respectively during treatment as most of the victims were treated in

hospitals or health centres.The present study findings are similar with most of the studies done in this field like study of Dr. Khairul Hussain, Assam in 2001, GMCH Chandigarh study, G.G. Hospital Jamnagar etc.[10] The study is in difference with the PGIMS, Rohtak study where the most common poison found to be used is the organochlorine insecticides where as in the present study the organophosphates are the most common poison used.[1]

IV. Tables

Table-1 Age & sex wise distribution

Age	Sex		Total(%)	Sex Ratio
	Male(%)	Female(%)		
0-20	108(7.71%)	55(3.92%)	163(11.643%)	1.96
21-40	567(40.5%)	325(23.21%)	892(63.714%)	1.74
41-60	130(9.28%)	100(7.14%)	230(16.429%)	1.30
>60	70(5%)	45(3.21%)	115(8.214%)	1.55
Total	875(62.5%)	525(37.5%)	1400(100%)	1.66

Table 2 Economical status of victims

Economic status	Male		Female		Total	
	No	%	No	%	No	%
Lower (income <25,000/yr)	598	42.71%	335	23.93%	933	66.64%
Middle (income 25,000-60,000/yr)	200	14.29%	150	10.71%	350	25%
Upper (>60,000/yr)	077	5.5%	040	2.86%	117	8.36%
Total	875	62.5%	525	37.5%	1400	100%

Table 3 Education & occupation status of victims

Parameter		Male		Female		Total	
		NO.	%	NO.	%	NO.	%
Educational Status	Illiterate(<class IV)	73	5.21%	88	6.29%	161	11.5%
	Primary(class IV-VIII)	175	12.50%	131	9.36%	306	21.86%
	High School(upto class X)	206	14.71%	189	13.5%	395	28.21%
	Higher Secondary(upto class XII)	245	17.5%	84	6%	329	23.5%
	Graduate	181	12.93%	28	2%	209	14.93%
Occupational Status	Student	233	16.64%	160	11.43%	393	28.07%
	Business	132	9.43%	0	0	132	9.43%
	Service	101	7.21%	29	2.07%	130	9.28%
	Cultivator	230	16.43%	1	0.07%	231	16.5%
	Domestic worker	27	1.93%	306	21.86%	333	23.79%
	Labor	152	10.86%	29	2.07%	181	12.93%

Table 4 Appearance of symptoms

Symptom apperence time	Male		Female		Total	
	No	%	No	%	No	%
6am-12noon	131	9.36%	88	6.29%	219	15.65%
12noon-6pm	160	11.43%	58	4.14%	218	15.57%
6pm-12am	408	29.14%	263	18.79%	671	47.93%
12am-6am	44	3.14%	43	3.07%	87	6.21%
Unknown	132	9.43%	73	5.21%	205	14.64%
Total	875	62.5%	525	37.5%	1400	100%

Table 5 Place of Death

Place of death	Male		Female		Total	
	No	%	No	%	No	%
Brought dead to hospital	350	25%	248	17.71%	598	42.71%
Death in Hospital	525	37.5%	277	19.79%	802	57.29%
Total	875	62.5%	525	37.5%	1400	100

Table 6 Habitat of victim

Parameters		Male		Female		Total	
		No	%	No	%	No	%
Habitat	Rural	627	44.79%	408	29.14%	1035	73.93%
	Urban	248	17.71%	117	8.36%	365	26.07%

Table 7 Agents detected by chemical analysis of body fluids & visera

Agents	No of cases	%
Organophosphorus	380	27.14%
Organochlorine	359	25.64%
Snake venom(Final Reports not received from FSL)	291	20.79%
Carbamate	208	14.86%
Alcohol	118	8.43%
Corrosive	044	3.14%
Total	1400	100%

Table 8 duration of hospital stay

Duration	No of cases	%
<24hrs	904	64.57%
24 hrs-3 days	467	33.36%
>3 days	029	2.07%
Total	1400	100%

Table 9 Condition at the time admission

Condition	No of cases	%
Unconscious	840	60%
Partly conscious	320	22.86%
Fully conscious	240	17.14%
Total	1400	100%

Table 10 substance present in stomach at autopsy

Substance	No of cases	%
Identified	930	66.43%
Not identified	470	33.57%
Total	1400	100%

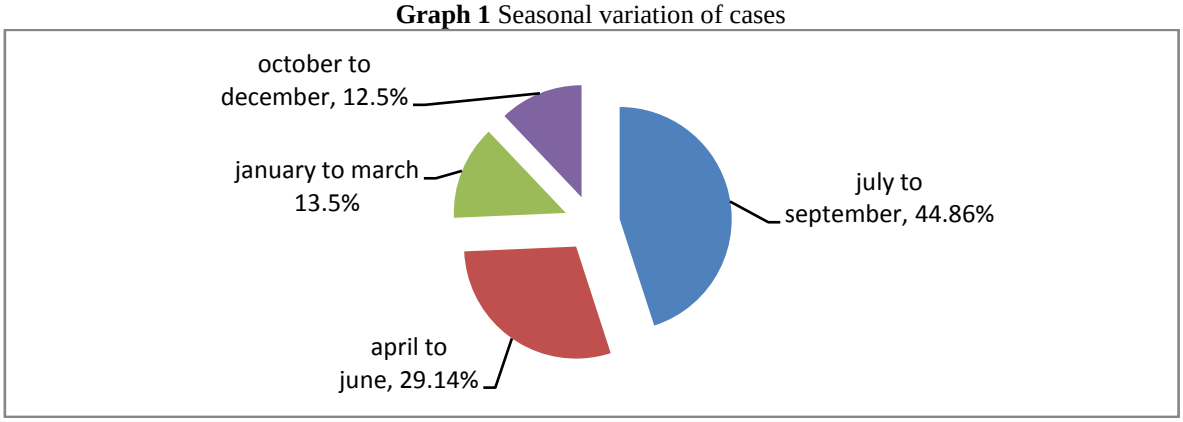
Table 11 Nature of death

Nature	Male		Female		Total	
	No	%	No	%	No	%
H/O Suicide	791	56.5%	468	33.43%	1259	89.93%
H/O Accident	58	4.14%	37	2.64%	95	6.78%
Suspected Homicide	26	1.86%	20	1.43%	46	3.29%
Total	875	62.5%	525	37.5%	1400	100%

Table 12 methods of treatment after admission

Methods		No of cases	%
Gastric lavage	Given	1065	76.07%
	not indicated	335	23.93%
Antidote administration	Given	1238	88.43%
	Not indicated	162	11.57%

Graph 1 Seasonal variation of cases



V. Conclusion

Importance is given on

1)To reduce incidence by (a)improvement in socioeconomic condition through reforms in the field of education, health, employment (b) scientific support to cultivators (c)incorporation of laws in relation to toxic substance to erase the loopholes for their production, distribution, sale, storage and application & (d) public awareness

2)Early detection by poison information centre

3)Toxicology set up built up strategy.

The problem of poisoning has been and is going to exist with human society. Hence further studies are necessary in the containment of this growing menace.

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