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Epidemiology of Unnatural Death Due to Suspected Poisoning in Varanasi, India

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Abstract: ***Poisoning has a serious psychological and social impact on the family and community. The aim of this study is to find out how death due to suspected poisoning affects incidence, age, sex, habitat, marital status, religion and manner of death. The study is based on the autopsy record of 5 consecutive years (2009 to 2013) of unnatural death cases resulting from suspected poisoning. Total numbers of autopsy cases were 10195 and death due to suspected poisoning were 896. These cases were brought to the Department of Forensic Medicine, IMS, BHU Varanasi and have been analyzed retrospectively.The suspected poisoning constitute 8.79% of total autopsied cases. Male victims (71.54%) outnumbered females (28.46%) and maximum numbers of cases were in the age group of 21-30 years (38.73%). Among those whose marital status was known i.e.194 cases (21.65%), 0% cases are male and 100% are female. More cases (73.95%) are from rural habitat than urban. Hindus outnumbered 817(91.18%) the Muslims. Regarding the manner of death, 861(96.09%) cases of death due to poisoning, were suicidal. Most of the fatal poisoning were maximum during summer season 368 (41.07%). Analysis of data suggests that age, sex, habitat, marital status, religion and manner of death significantly affect the community.***

Keywords: Suspected Poisoning, Suicide, Insecticide, Unnatural death, Household poisoning

1. Introduction

Death due to suspected poisoning mean, findings during inquest history, and grass autopsy are only suggestive but there is no confirmative test. 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 lives. Poisoning has been used by man for murder and suicide as long as recorded history. The poisoner is a murderer who has gone through a long and deliberate of cold premeditation. The word toxicology is derived from the Greek word "TOXICONE" which was used as a poisonous substance to arrow head[1].**Toxicology:** science dealing with properties, actions, toxicity, fatal dose, detection, estimation, treatment and autopsy finding (in case of death) in relation to the poisonous substances. **Poison:** It is a substance which if introduced in the living body or brought into contact with any part thereof produce ill health or death by its constitutional or local effect or both[2]. Common household poisons in India are insecticides and pesticides such as organophosphorus, aluminum phosphide and other poisons such as corrosives, kerosene, cleaning agents. According to W.H.O.**,** 3 million acute poisoning cases with 2, 20,000 deaths occur annually**.** Of these, 90 % of poisoning occur in developing countries[3].The toxic may manifest itself immediately (acute toxicity) or after a prolonged period (chronic toxicity). Both suicidal and homicidal case of poisoning are more common in India than in western countries, as poisons can be obtained easily from any bazaar (in spite of certain restrictions that have been brought about for sale). Accidental poisoning is now increasing[4].In suspected case of poisoning, vomitus, and clothing soaked with vomitus, remaining food, drinks and their containers should be submitted for analysis[5]**.** The autopsy in a suspected case of poisoning can be one of the most difficult problems faced by a forensic pathologist, not in technical procedure of the examination but in the final evaluation of all the available information. Considerable proportion of those died from suspected poisoning would have died in hospitals and it is of prime importance that the medical records be obtained and studied before the autopsy begins[6].

2. Literature Survey

Poisoning is the major preventable cause of all deaths. Regarding this to, study the demographic profile in autopsy cases with an alleged history of poisoning cases.

3. Problem Definition

Education and awareness of the laws and population policy in India.

4. Aims and Objectives

The present study was conducted to find out:

1) The aim of this study is to find out how, deaths due to suspected poisoning affect incidence and pattern of poisoning, age, sex, habitat, marital status, religion, manner of death and its medico legal consequence in the district of Varanasi ,Uttar Pradesh
2) The different aspect of poisoning along with the demographic pattern,
3) To provide further data for the characterization of fatal poisonings, because there is a scarcity of such information from Varanasi, India

5. Material and Methods

Present study is carried out at forensic medicine department, Institute Of Medical Sciences, Banaras Hindu University, Varanasi. Relevant information and subjective data like age, sex, habitat, marital status and manner of death of various causes of death victims have been collected from medico legal autopsy register. Data are analyzed retrospectively for a period of five years. Cases were grouped under various causes of death on the basis of confirmation by investigating officer and corroborative findings of medico legal examination.

6. Result

Table 1: Regarding **prevalence** of unnatural death due to suspected poisoning from January 2009 through December 2013 a total of 10195 autopsies were done of which 896 involved suspected poisoning, constituting 8.79% of total autopsy cases, in these 5 consecutive years prevalence more or less static and average 20%.**Table 2:** Regarding **age and gender** the age ranged from 0 to 80 years. Fatal poisonings were seen most commonly in the 21-30 year (38.73%) followed by 31- 40 year (21.32%), and 41-50 year (10.83%) age groups, while rarely observed in the oldest and youngest age groups. Of the cases, 641 (71.54%) were males and 255 (28.46) were females. The male-female ratio is 2.51:1 in our study. **Table 3**: Regarding **marital status,** most of the victims' marital status was unknown i.e. 641(71.54%) male and 17(1.90%) female. But among those whose marital status was known, 194 (21.65%) cases were married, of which 0% are male and 100% are female. **Table 4**: Regarding **habitat** most of the rural habitats were found in 783(87.39%) cases, among these male cases 553(61.72%) and female cases are 230(25.67%).Urban habitats were found only cases 55(6.14%),among these male case are 40 (4.46%) and female cases are 15(1.67%).And rest are unknown habitats 58(6.47%). **Table 5:** Regarding **religions** in our study Hindus outnumbered 817(91.18%) than Muslim, among these male cases 577(64.40%) more common than female 250 (27.90%). Muslim cover 18(2.01%) among these male 13(1.45%) and female 3(0.33%) cases. **Table 6 & Figure1**: Regarding **manne**r of death 861(96.09%) cases of death due to poisoning were suicidal in nature among these male case are 611(68.19%) and female cases are 250(27.90%).Accidental in nature cases are 33(3.68%) among these male case are 30(3.35%) and female case are 3(0.33%). Homicidal case are only 2(0.22%).**Table7:** Regarding the **seasons**, most of the fatal poisoning were maximum during summer season with 368 cases (41.07%) followed by rainy with 279 cases (31.14%) and winter with 249 cases (27.79%).

7. Discussion

7.1 Prevalence

In our study prevalence of death due to suspected cases of poisoning constitute 8.79% of total autopsy cases which is significantly more than (3.96%) the result of the other study 7 and in few studies8 the prevalence was little less than (9.80%). This difference in the incidence may be due to geographical variation in the population.

7.2 Age and Gender

In our study, death due to suspected case of poisoning is common in 21 to 30 years age group (38.73%), followed by the age group 31 to 40 years (21.32%), which goes in more than (33.33%) of another study[7], where most common age group is 20 to 29 years, other study12 show35-44 year. Due to the fact that at this period they are by nature more stress towards job, emotional, aggressive, intolerant and irrational. In our study the male-female ratio is 2.51:1, other similar study[9] is 2.5:1, and another study[7], this ratio is less (1.66:1).

7.3 Marital status

Married outnumbered the single similar to other study[7], because after marriage economic problem and behavior of family members result in frequent quarrels and familial disharmony leading to increased stress.

7.4 Habitat

Present study shows that similar to other study[7] (73.95%), most cases (87.39%) are from rural habitat, due to bulk of population live in rural areas and agricultural activities are more prevalent. Most of the incidents took place in the residence, because agricultural insecticides used for suicidal act were available at their household.

7.5 Religions

In our study, similar to other study[7] (77.08%), most of the victims were Hindus because population of Hindu community is more in this study region.

7.6 Manner

Present study shows that similar to other study[7] (92.70%), suicidal manner is more common (96.09%) and it may be due to family quarrel, as in nuclear families in which husband and wife are dependent on each other are more prone to commit suicide as unhappiness is the most common cause for suicide. Male victims are more prone to suicide manner (68.19%) than female, similar to other study[10] male: female's ratio 3:1 in all suicides. To find the manner of death, the role of the investigator[11] to secure, document and examine the scene including wastebasket, drawers, under furniture, storage is very crucial.

7.7 Season variation

Seasonal study shows that highest cases (41.07%) took place in summer, it proves other study[7] as this is the period of active agricultural activities when pesticide and insecticide are extensively used and also may be due to more chance of dehydration during this season resulting mood irritability leading to attempt suicide.

8. Conclusion

- Analysis of data for retrospective study suggests that age, sex, habitat, marital status, religion and manner of death significantly affect community.
- Although it seems that suspected poisoning occurs in low frequency in Varanasi, the possibility of under-enumeration and under-reporting of it must also be taken into account.
- Furthermore, a comprehensive prevention plan should be designed and implemented in order to tackle the root causes of suicide i.e. family disputes, unemployment plus addiction.
- The total suspected poisoning cases constitute 8.79% of total autopsy.
- Fatal poisonings were seen most commonly in the 21-30 year age group (38.73%).
- The male-female ratio is 2.51:1 in our study.
- Most of the cases783 (87.39%) were found in rural habitat.
- Hindus outnumbered 817(91.18%) the Muslims.
- Most of the fatal poisoning were maximum during summer season 368(41.07%).

9. Future Scope

Based upon the present study following point may need in future planning regarding prevention of poisoning cases: Review poison use and/or prescribing patterns. Develop criteria and standards which describe optimal poisons use. To promotes appropriate methods for poisons uses through education and other interventions. They observe the Patterns of poison use with current recommendations or guidelines for the agrochemical system. They provide feedback of poison utilization data to prescribers. They evaluate poison use at a population level, according to age, sex, social class etc. Thus they document the extent of inappropriate prescribing of poison and also the associated adverse, clinical, ecological and economic consequences.

10. Acknowledgement

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11. Conflict of Interest

Nil

12. Source of Funding

This research was not financially supported by any funding agencies.

13. Ethical Clearance

The present study was approved by “Institutional Ethical Committee” of Institute of Medical Sciences, Banaras Hindu University Varanasi. All the information has been taken under consideration of medical ethical committee.

14. Tables

Table 1: Prevalence of unnatural death due to suspected poisoning

Total No. of autopsy	Total number of autopsy	% total number of autopsy	Number of autopsy due to suspected poisoning	% of autopsy due to suspected poisoning
2009	1986	19.48	175	19.53
2010	2025	19.86	220	24.55
2011	1974	19.36	172	19.20
2012	2081	20.41	165	18.42
2013	2129	20.88	164	18.30
Total	10195	100.00	896	100.00

Table 2: Age and sex wise distribution of unnatural death due to suspected poisoning

Age(in year)	Male		Female		Total	
	NO.	%	NO.	%	NO.	%
0-10	10	1.56	3	1.18	13	1.45
11-20	89	13.88	57	22.35	146	16.29
21-30	232	36.19	115	45.10	347	38.73
31-40	144	22.46	47	18.43	191	21.32
41-50	86	13.42	11	4.31	97	10.83
51-60	49	7.64	13	5.10	62	6.92
61-70	25	3.90	7	2.75	32	3.57
>71	6	0.94	2	99.22	8	0.89
Total	641	71.54	255	28.45	896	100.00

Table 3: Distribution of unnatural death due to suspected poisoning in relation to marital status

Marital Status	Male		Female		Total	
	NO.	%	NO.	%	NO.	%
Married	0	0.00	194	21.65	194	21.65
Unmarried	29	38.66	44	4.91	73	8.15
Unknown	612	68.30	17	1.90	629	70.20
Total	641	71.54	255	28.46	896	100

Table 4: Incidence of unnatural death due to suspected poisoning in rural and urban areas

Habitat	Male cases	% of male cases	Female cases	% of female cases	Total No. of cases	% of total cases
Rural	553	61.72	230	25.67	783	87.39
Urban	40	4.46	15	1.67	55	6.14
Unknown	48	5.36	10	1.12	58	6.47
Total	641	71.54	255	28.46	896	100

Table 5: Distribution of unnatural death due to suspected poisoning on the basis of religion

Sr. No	Religion	Male cases	% of male cases	Female cases	% of female cases	Total cases	% of total cases
1	Hindu	577	64.40	250	27.90	817	91.18
2	Muslim	13	1.45	3	0.33	18	2.01
3	Christian	4	0.45	2	0.22	5	0.56
4	Unknown	47	5.25	0	0.00	56	6.25
	Total	641	71.54	255	28.46	896	100.00

Table 6: Distribution of manner of death with sex

Manner of death	Male		Female		Total	
	NO.	%	NO.	%	NO.	%
suicidal	611	68.19	250	27.90	861	96.09
Accidental	30	3.35	3	0.33	33	3.68
Homicide	0	0.00	2	0.22	2	0.22
Total	641	71.54	255	28.46	896	100.00

Table 7: Distribution of seasonal variation with gender

Season	Total No. of cases	% of total No. of cases	Male cases	% of male cases	Female cases	% of female cases
Summer (March-JUNE)	368	41.07	255	39.78	113	44.31
Rainy (July-October)	279	31.14	206	32.14	73	28.63
Winter (Nov.-December)	249	27.79	180	28.08	69	27.06
Total	896	100.00	641	71.54	255	28.46

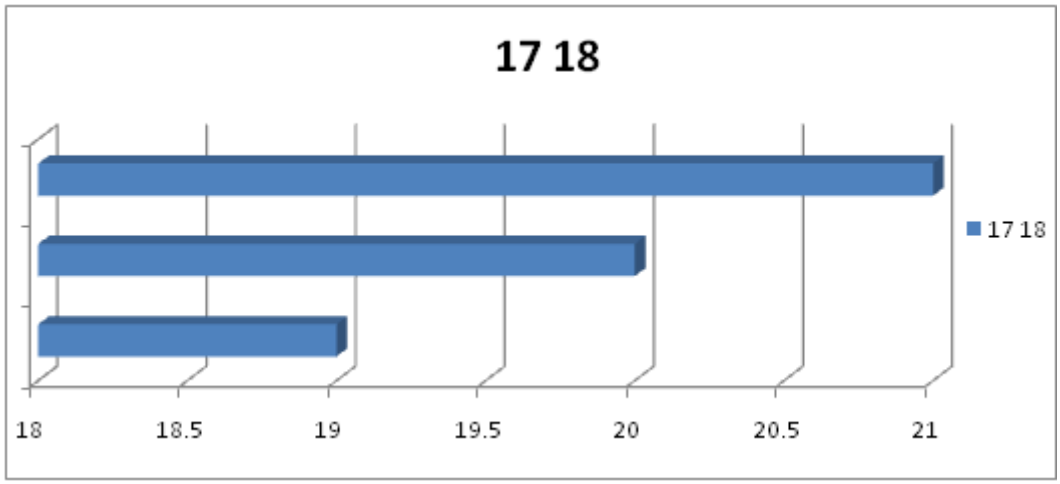

Figure 1: Distribution of manner of death with sex

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