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Trends ,Patterns And Effects of Fatal Poisoning in Coastal Odisha

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I. Introduction

Acute poisoning is one of the most common cause for emergency hospital admissions.
Poison is defined as any substance(solid ,liquid , gas) which when introduced through any manner inside the body interferes with the normal body functions and causes ill health by its systemic or local effects or both.It is caused by excessive single dose or several small doses taken over a short interval of time.India has shown increasing incidences in accidental , homicidal and suicidal poisoning because of greater use and easy availability of chemicals for industrial and domestic purposes. Knowing the pattern of poisoning in a region not only helps to take the preventive measures but also helps in early diagnosis and treatment. Poisoning is the most common method adopted in India to commit suicide.Sometimes findings of poison in the stomach is neither obtained on autopsy nor detected by chemical analysis. In such cases the opinion is either furnished on the basis of treatment papers and history or is considered as negative autopsy. Sometimes diagnosis of poison is not clear in treatment papers, in such cases gross findings in stomach mucosa might be of immense help to correlate and make the diagnosis of poisoning.Provisional diagnosis of particular variety of poison is usually mentioned in FSL requisition , which helps them to analyze the suspected poison first and to furnish the report at the earliest . It narrows down the waiting period.Keeping these facts in view it was considered worthwhile to study the gross findings in stomach in cases of fatal poisoning at SCB MCH Cuttack Odisha .
"All substances are poisons , there is no such thing as non poison" – PARACELSUS.

The word poison is evolved from the Latin word POTION meaning to drink for health.In due course of time the definition of poison has changed to its present form that is any substance in any amount by any route if it produces harmful effects like disease , deleterious effects or death over the body it will be labeled as poison.
Primitive man was aware of natural poisons from animal and plants and indeed used them on his weapons. The study of poisons is started from 1500 BC in Ebers papyrus(the earliest collection of medical records).

II. Material & Methods

The present study was done in dept of forensic medicine in SCB MCH Cuttack Odisha to access trends , patterns and effects of fatal poisoning.From all dead bodies coming for postmortem examination , cases with history of suspected or confirmed poisoning and those persons declared dead on arrival at casualty and suspected to be a case of poisoning were selected.Out of total 2989 autopsies done in a period of 1 year from January 2016 to December 2016 , total 930 cases of death due to poisoning were selected . During autopsy procedure after opening of thoracic and abdominal cavity , stomach was dissected out and mainly involvement of the parts of stomach that is fundus , body and pylorus were noted.Mucosal changes of stomach – congestion , hemorrhage , erosion , prominent rugae , edema and colour changes were noted.Stomach along with its contents , piece of small intestine (30cm), piece of liver(500gm) , spleen and half of each kidney were collected and preserved in a saturated solution of common salt or rectified spirit(in cases of corrosive poisoning) and sent to regional FSL for chemical analysis. Snake bite cases being a type of accidental poisoning are also included in this study.To evaluate trends and patterns following criteria were considered - age , sex , region , occupation , literacy , marital status , route of poisoning , survival period , manner of poisoning , stomach mucosal appearances and type of poison.All the data collected from different sources were recorded in specially designed Performa for each case for further collective evaluation.

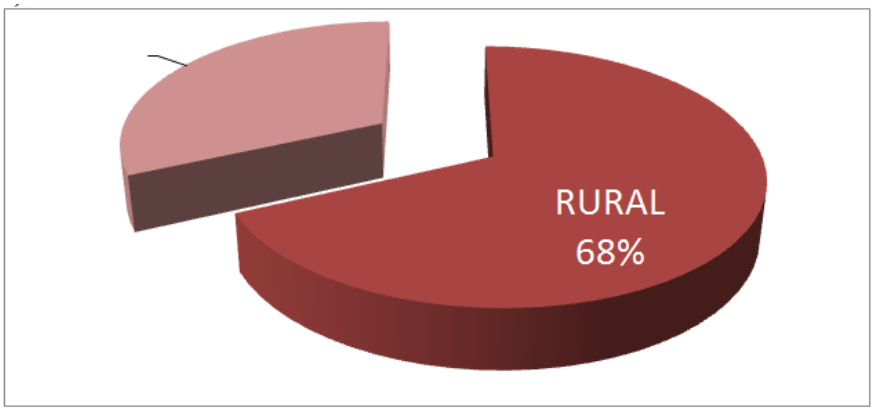
A) **Results And Discussion Sex Wise Distribution** - In the present study of total 930 fatal cases of poisoning , 492 were males and 438 were females with M : F = 1.12 : 1 . Number of male victims marginally exceeded female victims which was consistent with studies by Ranjit K[1] , Dalbir et al[2] , Siwach et al[3] , Sharma et al[4] , Shaukat et al[5]. Only Samaria et al[6] have observed a female preponderance.
B) **Age Wise Distribution** – The most commonly affected age group was 40 to 50 years- 317 cases(34.08%) followed by 20 to 30 years - 274 cases(29.46%) in contrary to reports by Dalbir et al , Shauket et al , who have found the most common age group to be 20 to 30 years.

C) **Marital Status** – In our study 766 cases (82.36%) were found to be married and 164 cases (17.63%) were unmarried which matched the findings of Gargi et al [7] and Sinha et al [8]. In 20 to 30 year age group married females(89) outnumbered the married males(69) where as in 30 to 50 years married males(254) far exceeded married females(153).

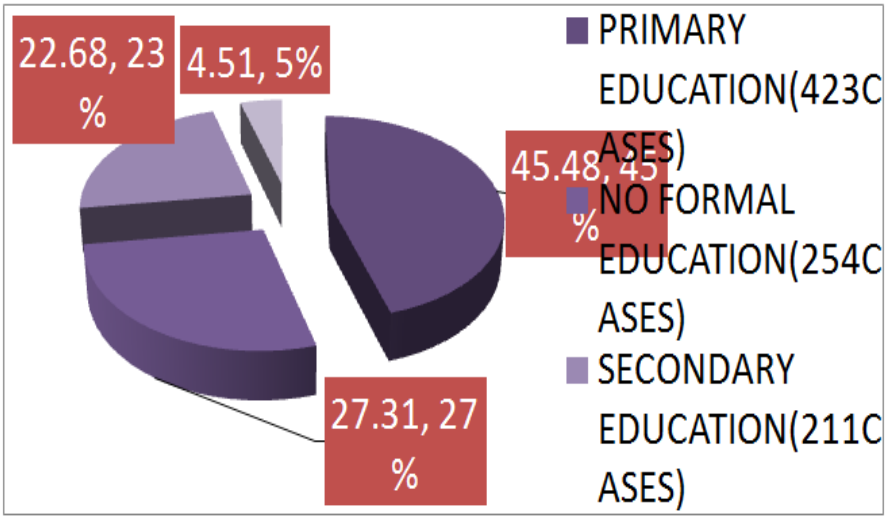
AGE	MALE 492 52.90%			FEMALE 438 47.09%		
	MARRIED 414 84.14%		UNMARRIED 78 15.85%	MARRIED 352 80.36%		UNMARRIED 86 19.63%
	<7 YEARS	>7YEARS		<7YEARS	>7 YEARS	
<20 YEARS 63 6.77%	3 25%	0	9 75%	21 41.18%	8 15.68%	22 43.13%
20-30 YEARS 274 29.46%	41 31.78%	28 21.70%	60 46.50%	49 33.79%	40 27.51%	56 38.65%
30-40 YEARS 106 11.39%	13 18.30%	51 71.83%	7 9.82%	9 25.71%	20 57.14%	6 17.14%
40-50 YEARS 317 34.08%	0	190 98.95%	2 1.04%	0	124 99.20%	1 0.8%
50-60 YEARS 85 9.13%	0	49 100%	0	0	35 97.22%	1 2.77%
>60 YEARS 85 9.13%	0	39 100%	0	0	46 100%	0

D) Region - Out of 930 cases , 634 were from rural areas(68.17%) and 296 were from urban areas(31.82%). Somewhat similar urban rural representation is also reported by Siwach et al , Sharma et al who reported 74% cases in rural and 26% in urban areas.

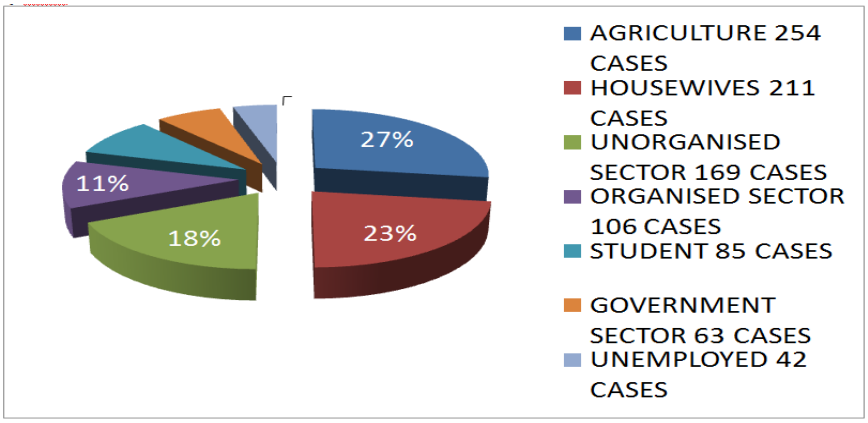
E)



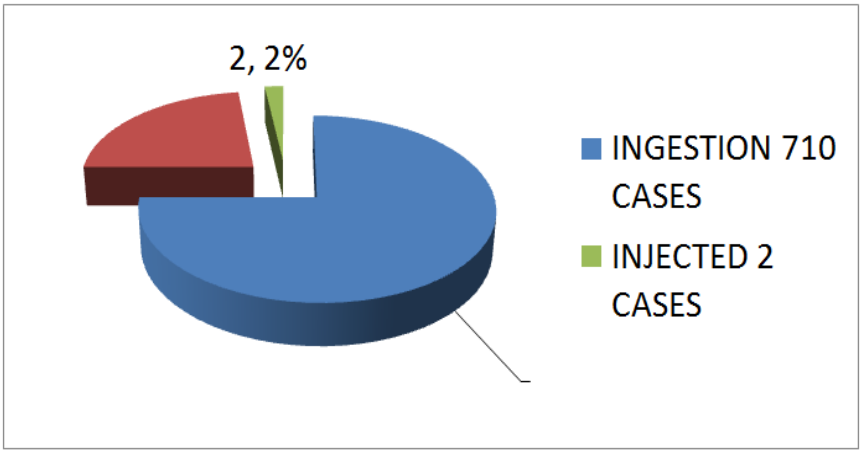
E)Educational Status – People with primary school education are more inclined to end their life with poison , 423 cases(45.48%) when compared to people with no formal education , 254 cases(27.31%). This particular observation echoes with the findings of Samaria et al.



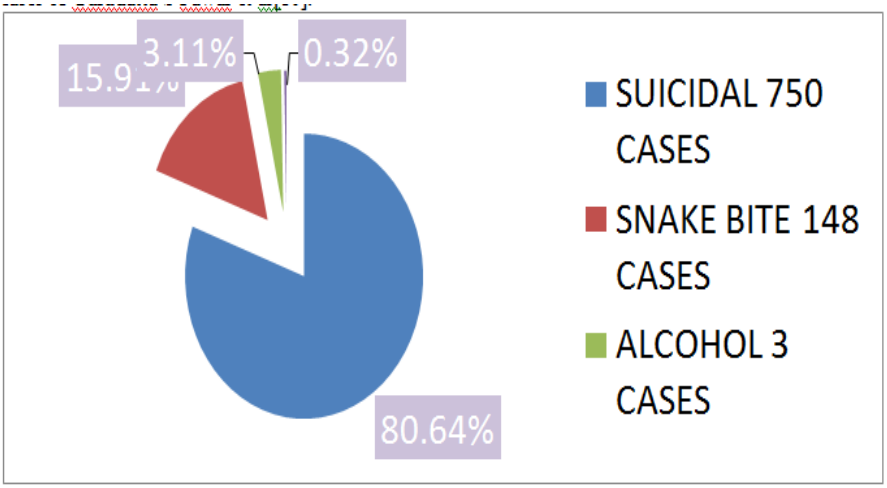
F)**Employment Status** – Ours being an agrarian society the highest (27.31% , 254 cases) ere noticed amongst persons engaged in agriculture , closely followed by housewives at 211 cases(22.68%). Farmers, farm labourers , unemployed and housewives form the bulk of the cases in our study which finds coherence in previous studies by Dalbir et al.



Route Of Poisoning - Commonest route was noticed to be ingestion which was 710 cases(76.34%) where as injectable route included 2 cases(0.21%) and 218 cases of snake bite (23.4%). According to Kishan R Siddapur et al[9] 93.8% cases were due to ingestion and 6.1% were accidental.



H) **Manner Of Poisoning** –Commonest manner of poisoning was suicidal 761 cases(81.82%) followed by accidental (16.23%) which included snake bite and alcoholism cases. Similar preponderance was observed in cases of Gurudatta S Pawar et al[10].



ORGANOPHOSPHORUS 359 CASES	279 77.71%	64 17.82%	16 4.45%
ORGANOCHLORINE 42 CASES	23 54.76%	15 35.71%	4 9.52%
METALLIC/NONMETALLIC 21 CASES	0	13 61.90%	8 38.09%
OLEANDER 106 CASES	25 23.58%	76 71.69%	5 4.71%
DHATURA 43 CASES	24 55.81%	6 13.95%	13 30.23%
SNAKEBITE 148 CASES	126 85.13%	20 13.51%	2 1.35%
ALCOHOL 63 CASES	7 11.11%	47 74.60%	9 14.28%
CORROSIVES 85 CASES	74 87.05%	11 12.94%	0
DRUGS 21 CASES	3 14.28%	8 38.09%	10 47.61%
UNKNOWN 42 CASES	23 54.76%	7 16.66%	12 28.57%

Survival Period – Organophosphorus poisoning contributes to predominantly the highest number of deaths within few hours of poisoning , but when in percentage wise composition the corrosive acids have invariably been fatal within 2 days of consumption. The present study is similar with that of Gurudatta S Pawar et al who revealed most of the cases died within 12 hours of getting poisoned while some managed to survive until 24 hours and very few beyond 24 hours.

J) **Poison With History** - From the history elicited from the accompanying persons and from the police sources , involvement of various poisons are analyzed and it is found that "SULTAN" and "OLEANDER" are the commonest poisons preferably used. According to reports by Shashidhar C Mestri et al [11] metacide poisoning was commonest followed by Tik20.

Unknown	42	4.51%
Toilet Cleaner	85	9.13%
Profen	65	6.98%
N Thion	24	2.58%
Orphate	56	6.02%
Temper	52	5.59%
Sulton	101	10.86%
Terminator	29	3.11%
Sindoor	21	2.25%
Commando	41	4.40%
Endo	33	3.54%
Liquor	63	6.77%
Dhatura	43	4.62%
Oleander	106	11.39%
Ativan	6	0.64%
Valium	11	1.18%
Alprax	4	0.43%

K) **Poison Through Chemical Analysis** – Chemical analysis of viscera indicated that insecticidal poisons were the commonest that is 414 cases(44.51%) , out of which organophosphorus were 368 cases(88.88%) and organochlorines were 46cases(11.11%). Oleander was a distant second at 115cases(12.36%). Reports by Kishan R Siddapur et al[12] suggested the predominance of Organophosphorus poisoning followed by Organochlorines and aluminum phosphide.

ETHYL ALCOHOL	14	1.5%
METHYL ALCOHOL	49	5.26%
BARBITURATES	5	0.53%
BENZODIAZEPINES	21	2.25%
INSECTICIDAL	414	44.51%
ALKALOIDAL	43	4.62%
RODENTICIDAL	3	0.32%
METALLIC	27	2.90%
OLEANDER(GLUCOSIDAL)	115	12.36%
HERBICIDAL	2	0.21%
WEEDICIDAL	4	0.43%

L) **Gross Stomach Mucosal Changes In Fatal** POISONING – Stomach mucosal appearances were congested , hemorrhagic , erosive , prominent rugae , edematous , specific colour in various fatal poisoning cases. It was noted that these mucosal changes were hardly seen individually and usually occurred in combinations. Kishan R Siddapur et al in his findings reported the increased occurrence of sub mucosal hemorrhages in various fatal poisonings , followed by erosiveness in alcoholic poisons with prominent rugosities of stomach mucosa with the use of corrosives. His result has matched with the present study.

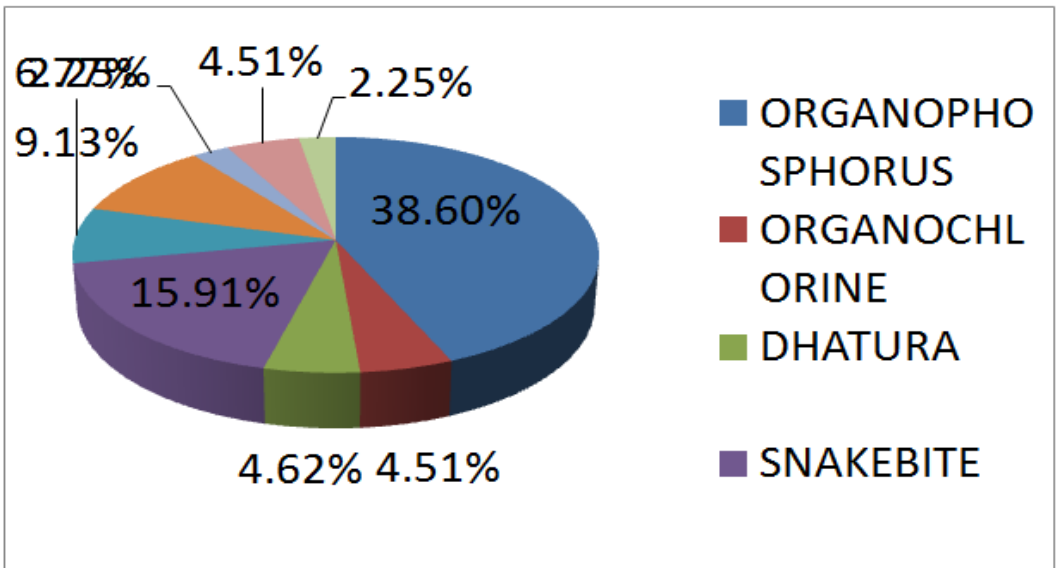
Stomach being the reservoir in digestive tract (more contact period) - -- hence is affected more. Stomach is divided into 3 parts fundus , body , pylorus. Body and pylorus were predominately affected in most of the cases by the fact that the fluid pathway from esophagus occurs usually from lesser curvature to pylorus. Fundus being affected in rodenticidal poisoning due to reaction of phosphide with moisture producing phosphine gas. Severe spasm at the site of contact of poison promotes injury. The findings were consistent with Siddapur et al [13]. Gross findings of stomach mucosa makes provisional diagnosis of particular kind of poison , which when mentioned in FSL requisition , helps to decrease the time period for analysis of variety of poison.

			LOCALISED			DIFFUSE	TOTAL				
			FUNDUS	BODY	PYLORUS						
ORGANOPHOSPHORUS 359	19 5.29%	301 83.84 %	2 0.58%	9 2.64%	29 8.52%	300 88.23%	340 94.70%	0	0	0	0
ORGANOCHLORINE 42	3 7.14%	35 83.33 %	0	8 20.51%	3 7.69%	28 71.79%	39 92.85%	0	0	0	0
METALLIC/NON METALLIC 21	6 28.57%	14 66.66 %	1 6.66%	3 20%	5 33.33%	6 40%	15 71.42%	0	6 28.57 %	0	0
OLEANDER 106	15 14.15%	91 85.84 %	0	0	67 78.82%	18 21.17%	85 80.18%	80 75.47 %	0	0	0

DHATURA 43	2 4.65%	39 90.69 %	2 4.87%	8 19.51%	12 29.26%	19 46.34%	41 95.34%	0	0	0	0
UNKNOWN 42	4 9.52%	38 90.47 %	4 11.11%	4 11.11%	4 11.11%	24 66.66%	36 85.71%	16 38.09 %	12 28.57 %	0	10 23.80%
ALCOHOL 63	5 7.93%	58 92.06 %	6 13.95%	6 13.95%	10 23.25%	21 48.83%	43 68.25%	12 19.04 %	49 77.77 %	0	0
CORROSIVES 85	--------	----------	---------	---------	----------	---------	----------	68 80%	85 100%	41 48.23 %	83 97.64%
DRUGS 21	1 4.76%	20 95.23 %	0	10 55.55%	5 27.77%	3 16.66%	18 85.71%	14 66.66 %	0	0	3 14.28%
SNAKEBITE 148	139 93.91%	0	0	8 88.88%	1 11.11%	0	9 6.08%	0	0	0	0

VARIETY OF POISO

Colour Of Shomad Contents	List Of Poisonous Substances									
	Organo Phosphorus 359	Organo Chlorine 42	Metallic/Non Metallic 21	Oleander 106	Dhatura 43	Alcohol 63	Corrosives 85	Drugs 21	Snakebite 148	Unknown 42
Yellow	0	0	0	81 76.41%	6 13.95%	11 17.46%	0	0	0	3 7.14%
Green	0	0	0	0	0	0	0	0	86 58.10%	10 23.80%
Black	250 69.63%	4 9.52%	0	0	0	5 7.93%	57 67.05%	0	0	4 9.52%
Red	0	0	20 95.23%	0	0	0	21 24.70%	0	0	2 4.76%
White/Grey	89 24.79%	30 71.42%	0	0	32 74.41%	40 63.49%	2 2.35%	10 47.61%	0	1 2.38%
Yellow With Crushed	0	0	0	20 18.86%	0	0	0	0	0	0
Non specific Mixed	0	0	0	0	3 6.97%	3 4.76%	0	5 23.80%	0	15 35.71%
Empty	20 5.57%	8 19.04%	5 4.71%	5 4.71%	2 4.65%	4 6.34%	5 5.88%	6 28.57%	62 41.89%	7 16.66%



Colour Stomach Contents	List Of Poisonous Substances									
	Organo Phosphorus 359	Organo Chlorine 42	Metallic/ Non Metallic 21	Oleander 106	Dhatura 43	Alcohol 63	Corrosives 85	Drugs 21	Snakebite 148	Unknown 42
Yellow	0	0	0	81 76.41 %	6 13.95 %	11 17.46 %	0	0	0	3 7.14%
Green	0	0	0	0	0	0	0	0	86 58.10%	10 23.80%
Black	250 69.63%	4 9.52%	0	0	0	5 7.93 %	57 67.05%	0	0	4 9.52%
Red	0	0	20 95.23%	0	0	0	21 24.70%	0	0	2 4.76%
White/Grey	89 24.79%	30 71.42 %	0	0	32 74.41 %	40 63.49 %	2 2.35%	10 47.61 %	0	1 2.38%
Yellow With Crushed Seeds	0	0	0	20 18.86 %	0	0	0	0	0	0
Nonspecific Mixed With	0	0	0	0	3 6.97 %	3 4.76 %	0	5 23.80 %	0	15 35.71%
Empty	20 5.57%	8 19.04 %	5 4.71%	5 4.71%	2 4.65 %	4 6.34 %	5 5.88%	6 28.57 %	62 41.89%	7 16.66%

ODOUR	LIST OF POISONOUS SUBSTANCES								
	ORGANOPHOSPHORUS 359	0RGANOCHLORINE 42	METAL/ NONMETAL 21	OLEANDER 106	DHATURA 43	SNAKEBITE 148	ALCOHOL 63	CORROSIVE 85	DRUGS 21
DANADAR/KEROSENE/GARLICKY	187 52.08%	0	0	0	0	0	0	0	0
VARNISH	144 40.11%	25 59.52%	0	0	0	0	0	0	0
PUNGENT	28 7.79%	10 23.80%	15 71.42%	58 54.71 %	3 6.97 %	0	10 15.87 %	0	2 9.52%
NONSPECIFIC CHEMICAL LIKE	0	0	0	0	0	0	2 3.17 %	10 11.76 %	16 76.19 %
SOUR	0	0	0	0	0	0	48 76.19 %	0	0
NO ODOUR	0	7 16.66%	6 28.57%	48 45.28 %	40 93.02 %	148 100%	3 4.76 %	75 88.23 %	3 14.28 %

III. Summary And Conclusion

Since decades males are exposed to stress , strain and occupational hazards to a greater extent. Being married they are more liable of taking their own lives because of financial burden.Poverty , unemployment , early marriage, illiteracy , unresolved psychological problems are major stress factors responsible for high incidence of suicidal deaths in rural areas. Easy availability of poisons made them easy victims.Ingestion is the most convenient way in poisoning. Medical and paramedical professionals and drug addicts are more familiar with injectable poisons. The inference of manner of death was based on history given either by police or relatives. However there are numerous factors determining gross mucosal findings of stomach - quantity and quality of poison , biological factors , full or empty stomach , treatment intervention and the postmortem interval.Incidence , morbidity and mortality due to poisoning can be possibly curtailed by strict vigilance over the sale and distribution of poisons , educating the users regarding the safety measures , good treatment facilities at rural areas and establishing poison information centers .The education of public as regards to carrying poison bottle consumed and information leaflet to the hospital helps the doctor to initiate proper treatment and use of specific antidote.

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Thank you

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