"PATTERN OF POISONING CASES AT A TERTIARY HEALTH CARE CENTRE – A CROSS SECTIONAL STUDY"

Submitted by

(REG. NO - BF0113001)

Dissertation

Submitted to the
KLE University, Belagavi, Karnataka
In partial fulfilment
of the requirements for the degree of

M. D. (Doctor of Medicine)

in

FORENSIC MEDICINE AND TOXICOLOGY

DEPARTMENT OF FORENSIC MEDICINE AND TOXICOLOGY,
JAWAHARLAL NEHRU MEDICAL COLLEGE, BELAGAVI – 590010.
KARNATAKA, INDIA.

APRIL – 2016

KLE UNIVERSITY, BELAGAVI, KARNATAKA

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Dr. PRASANNA S. JIRLI MD
Professor and Head,
Department of Forensic
Medicine and Toxicology,
J. N. Medical College,
Belagavi – 590010

Date :
Place: Belagavi

Dr. (Mrs)N.S.MAHANTSHETTI M.D(Paed)
Principal,
J. N. Medical College,
Belagavi – 590010.
Karnataka, India.

Date:
Place: Belagavi

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LIST OF ABBREVIATIONS

IV	-	Intra - Venous
CVS	-	Cardiovascular system
CNS	-	Central Nervous system
NSAID	-	Non steroidal anti – inflammatory drug
HCl	-	Hydrochloric acid
H2SO4	-	Sulphuric acid
KOH	-	Potassium hydroxide
NaOH	-	Sodium hydroxide
SC	-	Subcutaneous
EDTA	-	Ethylene diamine tetra acetic acid
NaCl	-	Sodium chloride
CO	-	Carbon monoxide
HCN	-	Hydrogen cyanide
HNO3	-	Nitric acid
H2S	-	Hydrogen sulfide
CuSO4`	-	Copper sulphate
PSS	-	Poison Severity Score
OP	-	Organophosphorous compound
MRC	-	Medical research centre

TYPE OF POISONS :

P	-	Pesticides
B	-	Bites
PD	-	Pharmaceutical drugs
A+P	-	Alcohol + Pesticides

H	-	Hydrocarbons
CN	-	Cyanide
UK	-	Unknown compound
FP	-	Food poison
A	-	Alcohol
C	-	Corrosive substances
CD	-	Cerebral deliriants

MANNER OF POISONING :

S	-	Suicidal
A	-	Accidental
H	-	Homicidal
T	-	Total
A	-	Admitted cases
E	-	Expired cases.

ABSTRACT

- **BACKGROUND AND OBJECTIVES :-**

It is estimated that some type of poison, directly or indirectly are responsible for more than 3 million cases worldwide annually, with India being among the highest contributor for these cases, reporting more than 50,000 deaths every year from toxic exposure.

But it is sad to say that all these figures are just like the tip of the iceberg, since most of the cases are unreported. Thus affecting the statistics at the central level, which is very important to form management plans and chart out preventive strategies.

Going through all these facts and figures, the present study is done to study the various patterns of poisoning cases coming to the tertiary centre, which includes – commonest type of poison, age and sex distribution, effect of occupation and literacy rate, seasonal variations, distribution of poisoning cases with respect to manner and mode of poisoning, to find the triggering factor leading to poisoning and to find out the mortality rate due to poisoning in relation to age, sex, type of poison and overall.

Study also helps to find out the burden of poisoning cases at our centre, thus contributing to formation of statistics at the central level, which will help to formulate prompt management protocols and preventive strategies.

- **MATERIALS AND METHODS**

This study is a cross sectional study, conducted at KLES's Dr Prabhakar Kore Hospital and MRC, attached with autopsy block, Belagavi, for a period of one year from January 1, 2014 to December 31, 2014. Data was collected from patients of poisoning cases visiting casualty/wards, Poison Detection Centre reports, their medical records, laboratory reports, autopsy reports and Regional Forensic Science

Laboratory reports in fatal cases, by universal sampling method. Informed and written consent was obtained and a preformed, pretested proforma was used to collect the required information.

- **RESULTS**

A total of 306 poisoning cases came to the tertiary centre during the study period, out of which, 35 cases (11.4%) expired. Maximum number of cases and deaths involved pesticide poisoning – 150 cases (49%) and 20 deaths (57.2%) respectively followed by poisoning due to animal bites – 73 cases (23.9%) and 5 deaths (14.2%). Maximum number of cases and deaths were seen in the age group between 21 - 30 years, 117 cases (38.2 %) and 11 deaths (31.4 %) respectively. Maximum number of cases and deaths involved males, 184 cases (60.1%) and 22 deaths (62.9%) respectively. Male : female ratio being 1.51 : 1 for total cases and 1.69 : 1 for total deaths. Maximum cases were seen in the month of June (11.8%) and maximum deaths in January and October (14.2% each). Maximum cases and deaths were seen in winter season 34.6% and 48.6% respectively. Most of the cases and deaths were suicidal - 67.1% and 80% respectively with maximum cases related to alleged family problems - 34.1% leading to poisoning. Most common mode of poisoning was oral - 74.2% cases and 82.9% deaths. Majority of the cases and deaths were literates - 53.3%. Majority of cases were farmers - 24.8%. 68.6% of cases were referred to tertiary centre out of which 10.5% cases expired. 59.8% of cases came to the tertiary centre within 5 hours of poisoning incident. Mortality was high in cases coming within 5 hours - 19.3%, followed by cases coming after 10 hours of incident – 17.3%. Majority of cases belonged to grade 1 (36.3%) of Poison Severity Score followed by Grade 2 – 33%.

- **CONCLUSION**

The study clearly shows pesticides are the most common means of poisoning owing to the fact that pesticides are easily available and can cause severe morbidity, leading to deaths. The most saddening fact is that most of the cases involve literate group of people, in the age group between 21 – 30 years, it's the youth who are committing large number of suicides due to various triggering factors. This shows that poisoning is more of a mental issue to manage and preventive strategies should be formulated accordingly.

The long standing problems of farmers still continues, as they continue to commit suicide due to financial problems and weather problems, which is a tough burden to resolve and requires combined efforts from the government and doctors to reduce this burden. Accidental cases in fields due to animal and insect bites are also increasing due to improper protective measures and lack of proper knowledge which has to be curbed. Industrial poisoning incidents are low compared to other causes. Homicidal cases are rare with only two cases being reported in the whole year.

The study also shows that many cases are being referred from other smaller health centers and hospitals, which are leading to delays in early diagnosis and adequate management. With the introduction of poison detection centre it is helpful to diagnose the poison early and give proper care. Such centers should be increased so that proper care is given over a larger area and delays are reduced.

KEY WORDS :- poison, pesticides, poison severity score, Poison Detection Centre, suicide, autopsy, Forensic Science Laboratory.

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INTRODUCTION

"*Health is not valued till sickness comes*"

THOMAS FULLER

"Sickness is not always in the body, its in the mind as well"

Not all sickness can be avoided or cured, but that due to poisoning, with which we are particularly concerned here, is largely curable and preventable.

Poisoning cases, both accidental and intentional (homicidal/suicidal), are a significant contributor to mortality and morbidity throughout the world[1].

Poisoning cases and deaths due to poisoning are on a rise over the years despite of the advanced knowledge and newer techniques available for management. According to WHO, more than 3 million acute poisoning cases with more than 2,20,000 deaths occur annually worldwide. Of these cases, 90% of fatal poisoning occur in developing countries particularly among agricultural workers.[1,6]

According to an estimate, number of poisoning cases in India was 39254 in 1991 and risen to an alarming level of 60809 cases in 1995[7], which shows that problem is getting worse day by day with increase in natural and synthetic chemicals, making our country one of the highest incidence of poisoning in the world. It is estimated that more than 50,000 die every year from toxic exposure[8].

In spite of such alarming levels of mortality and morbidity, no statistics are available in India regarding incidence of poisoning at home or at hospital. This may

be due to lack of data at central level as most of the cases are not reported. The known cases are just as the tip of the iceberg.

Mortality from poisoning varies from country to country depending upon type of poisons encountered, extent of awareness about poisoning, availability of treatment facilities and presence or absence of qualified personnel. In developed countries rate of mortality from poisoning is as low as 1 – 2 %, but in India it varies from shocking 15 – 35%[2].

There are more than 4000 species of medicinal plants growing in India, which are poisonous when administered in large doses. There are more than 9 million natural and synthetic chemicals and the list goes on increasing[1].

With respect to manner of poisoning – more than 20000 cases are suicidal every year[2]. Out of all the suicide cases in India, 33% of cases are poisoning cases being the highest method involved to commit suicide[1]. This is a very sad thing to note that people are killing themselves intentionally rather than accidental cases. Homicidal poisoning cases are on the rise owing to the fact that poisons are easily available and due to the thought that killing by bloodshed is a greater crime than poisoning. People working in farms are more exposed to animal bites due to improper protection and lack of knowledge, rise in industries also expose more people to hazardous poisons, thus causing increase in accidental poisoning cases.

Our college and hospital has the facilities of Poison Detection Centre, which is the only such centre in whole of North Karnataka, for detection of poison quickly and thus helps in treating a case accurately. For the interest of this study, most of the cases referred to the Poison Detection Centre were witnessed in person.

We also have the advantage of a Regional Forensic Science Laboratory in Belagavi which is only one of its kind in North Karnataka, which helps in getting chemical analysis report in autopsied cases without much delay.

Considering the above points, the objective of this study is to report promptly the pattern and incidence of poisoning cases at a regional level (like district level in this study) and point out the changing patterns of poisoning regarding various parameters and draw attention to various efforts which can be made to reduce the number of poisoning cases.

Thus such studies become very important to gather overall knowledge at central level and in turn helps in formulating management strategies and also to lay down various preventive measure to cut down the overall burden of poisoning cases.

AIMS & OBJECTIVES

1. To study pattern of poisoning cases coming to a tertiary health care centre.

2. To study the relation between poisoning cases and influencing factors.

3. To know the burden of poisoning cases in our tertiary care centre.

REVIEW OF LITERATURE

- **POISON** :

Any substance (solid, liquid or gas), which if introduced into the living body, or brought in contact with any part thereof, will produce ill effects or death, by its constitutional or local effects or both[1].

- **HISTORICAL ASPECTS OF POISONING[1,2] :**

History of poisons and poisoning dates back several thousand years and is spread through different parts of the world, including ancient Indian shastras, Egyptian Papyri, Sumerians, Babylonian, Hebrew and Greek records.

Atharva Veda (1500 BC), describes poisons. A detailed description of various poisons, and their treatment was given in Agnivesa Charaka Samhita (7^{th} century BC). In Kalpasthana, Chikitsasthana and Uttarasthana of shastras, symptoms and antidotes of poisons are given in detail. Susruta (350 BC), described how poisons were mixed with food and drink, perfumes, medicines, bathing water, mixed with clothings, put in eyes, ears etc. Kautilya in Arthashastra (2^{nd} century BC) states that art and science of poisoning was extensively studied as a separate branch and were used as offensive and defensive measures against enemies.

Hippocrates added a number of poisons in the 4^{th} century BC in Greek medicine. Theophrastus included numerous references to poisons in De Historia Plantarum (4^{th} century BC). Dioscorides, a Greek physician, in the court of Emperor Nero, attempted a classification of poisons which remained a standard for 16 centuries.

Romans made considerable use of poisons, often political. In 82 BC, Sulla issued Lex Cornelia in Rome, which was the first law against poisoning, and this later became a statute directed at careless dispensing of drugs.

The Egyptian Papyri – Ebers Papyrus (1500 BC) contains information regarding poisons extending back many centuries, containing more than 800 recipes with recognized poisons like hemlock, aconite, opium, lead, copper and antimony.

Development of Toxicology as a distinct speciality began in earnest in the 18^{th} and 19^{th} centuries with the pioneering work of Bonaventure Orfila (1787-1853) who is generally regarded as the father of modern Toxicology. He advocated the practice of autopsy followed by chemical analysis of viscera to prove poisoning. His treatise "Traite Des Poisons" published in 1814 laid the foundations of Forensic Toxicology.

Chemical poisons were used as offensive measures on a large scale in world war II which lead to mass destruction of human life. After the world war II, the role of poison control centres began to be increasingly recognized in prevention and treatment of poisoning, as well as helped in sending accurate information on Toxicological matters to medical professionals and general public.

A huge twist came in detection of poisons through the work of Fottfried Machata in 1950, who introduced Thin layer Chromatography and A T James who introduced gas chromatography in1952.

- **CLASSIFICATION OF POISONS[1] :-**

Poisons can be classified according to the chief symptoms which are produced by them :-I) **CORROSIVES** :

1) Strong acids – sulphuric acid, hydrochloric acid, carbolic acid, oxalic acids.
2) Strong alkalis – hydrates and carbonates of sodium, potassium and ammonia.
3) Metallic salts – zinc chloride, ferric chloride, copper sulphate, silver nitrate etc.

II) **IRRITANTS** :

1) Agricultural poisons.
2) Inorganic – a) Metallic = arsenic, antimony, copper, lead, mercury, silver, zinc.

   b) Non metallic = phosphorous, iodine, chlorine, bromine.

   c) Mechanical = powdered glass, diamond dust, hair.

3) Organic – a) Vegetable = abrus precatorius, castor, croton, calotropis.

   b) Animal = snake and insect venom, canthrides.

III) **SYSTEMIC** :

1) Cerebral – a) CNS depressants = alcohols, general anaesthesia, opioid analgesics sedatives and hypnotics.

   b) CNS stimulamts – cyclic antidepressants, amphetamines, caffeines.

c) Deliriants – datura, belladonna, cannabis, cocaine.

2) Spinal – nux vomica, gelsemium.

3) Peripheral – conium, curare.

4) Cardiovascular – aconite, quinine, oleander, tobacco, cyanide.

5) Asphyxiants – carbon monoxide, carbon dioxide, hydrogen sulphide.

IV) **MISCELLANEOUS** : food poisoning and botulism.

Chapter XIX of International Statistical Classification of Diseases and Related health Problems, has classified poisoning under sections T_{36} to T_{50} as "poisoning by drugs, medicaments and biological substances", and sections T_{51} to T_{65} as "Toxic effects of substances chiefly nonmedicinal as to source."[9]

T36 = Poisoning by systemic antibiotics

T36.0 = Penicillins,

T36.1 = Cefalosporins and P-lactam antibiotics,

T36.2 = Chloramphenicol group,

T36.3 = Macrolides,

T36.4 = Tetracyclines,

T36.5 = Aminoglycosides and Streptomycin,

T36.6 = Rifampcins,

T36.7 = Antifungal antibiotics,

T36.8 = Other systemic antibiotics,

T36.9 = Unspecified systemic antibiotics.

T37 = Poisoning by other systemic anti-infectives and anti-parasitics:

T37.0 = Sulphonamides,

T37.1 = Antimycobacterial drugs, except rifampicins (T36.6) and Streptomycin (T36.5);

T37.2 = Antimalarials and drugs acting on other blood protozoa excludes = Hydroxyquinoline derivatives (T37.8).

T37.3 = Other anti-protozoal drugs

T37.4 = Anti-helmenthics,

T37.5 = Antiviral drugs. Excludes = Amanatidine (T42.8), Cytarabine (T45.1)

T37.8 = Other specified systemic anti-infectives and anti-parasitics Hydroxyquinoline derivatives. Excludes = Anti-malarial drugs (T37.2)

T37.9 = Systemic anti-infective and anti-parasitic, unspecified

T38 = Poisoning by hormones and their synthetic substitutes and antagonists, not elsewhere classified

T38.0 = Glucocorticoids and synthetic analogues

T38.1 = Thyroid hormones and substitutes

T38.2 = Anti-thyroid dugs,

T38.3 = Insulin and oral anti-diabetic drugs

T38.4 = Oral contraceptives,

T38.5 = Other estrogens and progestogens

T37.6 = Antigonadotropins, Antiestrogens, anti-androgens not elsewhere classified

T38.7 = Androgens and anabolic congeners

T38.8 = Other and unspecified hormones and their synthetic substitutes – Anterior pituitary hormones.

T38.9 = Other and unspecified hormone antagonists

T39 = Poisoning by non-opioid analgesics, antipyretics and anti-rheumatics

T39.0 = Salicylates,

T39.1 = 4-Aminophenol derivatives

T39.2 = Pyrazolone derivatives

T39.3 = Other NSAID's

T39.4 = Antirheumatics, not elsewhere classified

T39.8 = Other non-opioid analgesics and antipyretics, not elsewhere classified

T39.9 = Nonopioid analgesic, antipyretic and antirheumtic unspecified

T40 = Poisoning by narcotics and psychodysleptics [Hallacinogens]

T40.0 = Opium,

T40.1 = Heroin,

T40.2 = Other opioids, Codeine and Morphine

T40.3 = Methadone,

T40.4 = Other synthetic narcotics, pethidine

T40.5 = Cocaine,

T40.6 = Other and unspecified narcotics

T40.7 = Cannabis (derivatives),

T40.8 = Lysergide

T40.9 = Other and unspecified psychodysleptics [hallucinogens], Mescaline, psilocin, psilocybine

T41 = Poisoning by anesthetics and therapeutic gases

T41.0 = Inhaled anesthetics,

T41.1 = I.V. anaesthetics thiobarbiturates

T41.2 = Other and unspecified general anesthetics

T41.3 = Local anesthetics,

T41.4 = Anaesthetic unspecified

T41.5 = Therapeutic gases, carbondioxide and oxygen

T42 = Poisoning by antiepileptic, sedative-hypnotic and antiparkinsonism drugs

T42.0 = Hydantoin derivatives,

T42.1 = Iminostilbenes – carbamazepine

T42.2 = Succinimides and oxazolidinediones

T42.3 = Barbiturates, excluding thiobarbiturates (T41.1)

T42.4 = Benzodiazepines,

T42.5 = Mixed antiepileptics

T42.6 = Other antiepileptics and sedative-hypnotic drugs

T42.7 = Antiepileptic and sedative-hypnotic drugs, unspecified

T42.8 = Anti-Parkinsonism drugs and other central muscle tone depressants

T43 = Poisoning by psychotropic drugs, not elsewhere classified

T43.0 = Tricyclic and tetracyclic antidepressants

T43.1 = Monoamine-oxidase inhibitor anti-depressants

T43.2 = Other and unspecified antidepressants

T43.3 = Phenothiazine antipsychotics and neuroleptics

T43.4 = Butyrophenone and thioxanthene neuroleptics

T33.5 = Other and unspecified antipsychotics and neuroleptics

T43.6 = Psychostimulants with abuse potential

P43.8 = Other psychotropic drugs not elsewhere classified

T43.9 = Psychotropic drug, unspecified

T44 = Poisoning by drugs primarily affecting the autonomic nervous system

T44.0 = Anticholinesterase agents

T44.1 = Other parasympathomimetics [Cholinergics]

T44.2 = Ganglionic blocking drugs, not elsewhere classified

T44.3 = Other parasympatholytics and spasmolytics

T44.4 = Predominantly α-adrenoreceptor agonists, not elsewhere classified

T44.5 = Predominantly β-adrenoreceptor agonists, not elsewhere classified

T44.6 = α-Adrenoreceptor antagonists, not elsewhere classified

T44.7 = β-adrenoreceptor antagonists, not elsewhere classified

T44.8 = Centrally acting and adrenergic-neuron-blocking agents, not elsewhere classified.

T44.9 = Other and unspecified drugs primarily affecting the autonomic nervous system

T45 = Poisoning by primarily systemic and haematological agents, not elsewhere classified

T45.0 = Antiallergic and antiemetic drugs

T45.1 = Antineoplastic and immunosuppressive drugs

T45.2 = Vitamins, not elsewhere classified. Excludes: Nicotinic acid and vitamin K

T45.3 = Enzymes, not elsewhere classified

T45.4 = Iron and its compounds

T45.5 = Anti-coagulants

T45.6 = Fibrinolysis-affecting drugs

T45.7 = Anti-coagulant antagonists, vitamin K and other coagulants

T45.8 = Other primarily systemic and hematological agents, Liver preparations and other antianaemic agents, Natural blood and blood products, Plasma substitute

T45.9 = Primarily systemic and haematological agent, unspecified

T46 = Poisoning by agents primarily affecting cardiovascular system

T46.0 = Cardiac-stimulant glycosides and drugs of similar action

T46.1 = Calcium channel blockers

T46.2 = Other antidysrhythmic drugs, not elsewhere classified

T46.3 = Coronary vasodilators, not elsewhere classified, dipyridamole

T46.4 = Angiotensin converting enzyme inhibitors

T46.5 = Other anti-hypertensive drugs, not elsewhere classified

T46.6 = Antihyperlipidemic and anti-atherosclerotic drugs

T46.7 = Peripheral vasodilators = Nicotinic acid (derivatives)

T46.8 = Antivaricose drugs, including sclerosing agents

T46.9 = Other and unspecified agents primarily affecting the CVS

T47 = Poisoning by agents primarily affecting the gastrointestinal system

T47.0 = Hisamine H2-receptor antagonists

T47.1 = Other antacids and anti-gastric secretion drugs

T47.2 = Stimulant laxatives

T47.3 = Saline and osmotic laxatives

T47.4 = Other laxatives – intestinal atonia drugs

T47.5 = Digesants

T47.6 = Anti-diarrhoeal drugs

T47.7 = Emetics

T47.8 = Other agents primarily affecting gastrointestinal system

T47.9 = Agent primarily affecting the gastrointestinal system, unspecified.

T48 = Poisoning by agents primarily acting on smooth and skeletal muscles and the respiratory system

T48.0 = Oxytocic drugs

T48.1 = Skeletal muscle relaxants

T48.2 = Other and unspecified agents primarily acting on muscles

T48.3 = Anti-tussives

T48.4 = Expectorants

T48.5 = Anti-common cold-drugs

T48.6 = Anti-asthmatics, not elsewhere classified

T48.7 = Other and unspecified agents primarily acting on the respiratory system

T49 = Poisoning by topical agents primarily affecting skin and mucus membrane and by ophthalmological, otorhinolaryngological and dental drugs

T49.0 = Local antifungal, anti-infective and anti-inflammatory drugs

T49.1 = Anti-pruritics

T49.2 = Local astringents and local detergents

T49.3 = Emollients, demulscents and protectants

T49.4 = Keratolytics, keratoplastics and other hair treatment drugs and preparations

T49.5 = Opthalmological drugs and preparations

T49.6 = Otorhinoloryngological drugs and preparations

T49.7 = Dental drugs, topically applied

T49.8 = Other topical agents

T49.9 = Topical agent, unspecified

T50 = Poisoning by diuretics and other unspecified drugs, medicaments and biological substances

T50.0 = Mineralocorticoids and their antagonists

T50.1 = Loop diuretics

T50.2 = Carbonic anhydrase inhibitors, benzothiadiazides and other diuretics

T50.3 = Electrolytic, caloric and water-balance agents

T50.4 = Drugs affecting uric acid metabolism

T50.5 = Appetite depressants

T50.6 = Antidotes and chelating agents, not elsewhere classified

T50.7 = Analeptics and opioid receptor antagonists

T50.8 = Diagnostic agents

T50.9 = Other and unspecified drugs, medicaments and biological substrates, Acidifying agents, alkalizying agents, immunoglobulin, immunologicals, lipotropic drugs, parathyroid hormones

T51 = Toxic effect of alcohol

T51.0 = Ethanol – ethyl alcohol

T51.1 = Methanol – methyl alcohol

T51.2 = 2 propanol-isopropyl alcohol

T51.3 = Fusel oil, Alcohol – Amyl, butyl, propyl

T51.8 = Other alcohols

T51.9 = Alcohol, unspecified

T52 = Toxic effect of organic solvents

T52 = Petroleum products, Gasoline, kerosene, paraffin wax, Petroleum : ether, naptha, spirits

T52.1 = Benzene

T52.2 = Homologens of benzene, Toluene and xylene

T52.3 = Glycols

T52.4 = Ketones

T52.8 = Other organic solvents

T52.9 = Organic solvent, unspecified

T53 = Toxic effect of halogen derivatives and aliphatic and aromatic hydrocarbons

T53.0 = Carbonterachloride

T53.1 = Chloroform

T53.2 = Trichloroethylene

T53.3 = Tetrachloroethylene

T53.4 = Dichloromethane

T53.5 = Chloroflurocarbons

T53.6 = Other halogen derivatives of aliphatic hydrocarbons

T53.7 = Other halogen derivatives of aromatic hydrocarbons

T53.9 = Halogen derivatives of aliphatic and aromatic hydrocarbons, unspecified

T54 = Toxic effect of corrosive substances

T54.0 = Phenol and phenol homologues

T54.1 = Other corrosive organic compounds

T54.2 = Corrosive acids and acid-like substances, HCl and H_2SO_4

T54.3 = Corrosive alkalies and alkali-like substances, KOH & NaOH

T54.9 = Corrosive substances, unspecified

T55 = Toxic effects of soaps and detergents

T56 = Toxic effect of metals

T56.0 = Lead and its compounds

T56.1 = Mercury and its compounds

T56.2 = Chromium and its compounds

T56.3 = Cadmium and its compounds

T56.4 = Copper and its compounds

T56.5 = Zinc and its compounds

T56.6 = Tin and its compounds

T57.7 = Beryllium and its compounds

T56.8 = Other metals

T56.9 = Metal, unspecified

T57 = Toxic effect of other inorganic substances

T57.0 = Arsenic and its compounds

T57.1 = Phosphorus and its compounds

T57.2 = Manganese and its compounds

T57.3 = Hydrogen cyanide

T57.8 = Other specified inorganic substances

T57.9 = Inorganic substances, unspecified

T58 = Toxic effect of carbon monoxide

T59 = Toxic effect of other gases, fumes and vapours

T59.0 = Nitrogen oxides

T59.1 = Sulfur dioxide

T59.2 = Formaldehyde

T59.3 = Lacrimogenic gas

T59.4 = Chlorine gas

T59.5 = Fluorine gas and hydrogen fluoride

T59.6 = Hydrogen sulfide

T59.7 = Carbon dioxide

T59.8 = Other specified gases, fumes and vapours

T59.9 = Gases, fumes and vapours, unspecified

T60 = Toxic effect of pesticides

T60.0 = Organophosphate and carbamate insecticides

T60.1 = Halogenated insecticides

T60.2 = Other insecticides

T60.3 = Herbicides and fungicides

T60.4 = Rodenticides

T60.8 = Other pesticides

T60.9 = Pesticide, unspecified

T61 = Toxic effect of noxious substances eaten as seafood

T61.0 = Ciguatera fish poisoning

T61.1 = Scombroid fish poisoning

T61.2 = Other fish and shellfish poisoning

T61.8 = Toxic effect of other sea foods

T61.9 = Toxic effect of unspecified sea food

T62 = Toxic effect of other noxious substances eaten as food

T62.0 = Ingested mushrooms

T62.1 = Ingested berries

T62.2 = Other ingested parts of plants

T62.8 = Other specified noxious substances eaten as food

T62.9 = Noxious substance eaten as food, unspecified

T63 = Toxic effect of contact with venomous animals

T63.0 = Snake venom

T63.1 = Venom of other reptiles

T63.2 = Venom of scorpion

T63.3 = Venom of spider

T63.4 = Venom of other arthropods

T63.5 = Toxic effect of contact with fish

T63.6 = Toxic effect of contact with other marine animals, jelly fish, sea anemone, shell fish.

T63.8 = Toxic effect of contact with other venomous animals

T63.9 = Toxic effect of contact with unspecified venomous animals

T64 = Toxic effect of aflatoxin and other mycotoxin food contaminants:

T65 = Toxic effect of other and unspecified substances

T65.0 = Cyanides

T65.1 = Strychnine and its salts

T65.2 = Tobacco and nicotine

T65.3 = Nitroderivatives and aminoderivatives of benzene and its homologues

T65.4 = Carbon disulphide

T65.5 = Nitroglycerin and other nitric acids and esters

T65.6 = Paints and dyes, not elsewhere classified

T65.8 = Toxic effect of other specified substances

T65.9 = Toxic effect of unspecified substance

Poisoning can be also classified as follows[2] :-

1) **Acute poisoning** – excessive single dose or several smaller doses of poison over a short interval.
2) **Chronic poisoning** – exposure to smaller doses of poison over a long period of time.
3) **Subacute poisoning** – shows features of both acute and chronic poisoning.
4) **Fulminant poisoning** – produced by massive dose of poison. Death occurs rapidly.

- **GENERAL MANAGEMENT OF POISONING[1,2] :**

The most important aspect in case of poisoning is the management of cases, which includes early diagnosis and prompt treatment measures.

A) **Diagnosis in living patients** :- is done by the following –

1) Complete detailed history should be obtained patient himself or from the relatives or friends.
2) Signs and symptoms – which can be very random at times.
3) Detailed clinical examination.
4) Preservation of stomach wash, vomitus, blood, urine, stains on body or clothings, left over bottles of any drinks or food sample, so that these samples can be sent to poison detection centres or forensic science laboratories for analysis.

B) **PROMPT MANGAGEMENT** : it includes the following measures –

1) Stabilization : A = Airway

B = Breathing

C = Circulation

D = Depression of CNS

- Respiratory Insufficiency:
  - Establish airway
  - Patient in semi-prone position
  - Airway suction
  - Endotracheal intubation

Ventilation

- Artificial ventilation by ambu bag
- Oxygen therapy
- Intermittent positive pressure ventilation

- Circulatory failure:-
  - Foot end elevation
  - I.V. fluids with haemodynamic monitoring
  - Vasopressors = Dopamine and noradrenaline
- CNS depression:
  - Coma cocktail = Dextrose + Thiamine + Naloxone given I.V.
  - 100% oxygen in all patients with depressed mental status.

II) Evaluation:

a) Hypothermia [<95°F]
   - Warm water (115°F) bath
   - Warm blankets

b) Hyperthermia [>102°F]
   - Cold water (77°F) bath
   - Dantrolene
   - Antipyretics not useful

   Stop cooling measures when temperature falls below 102°F

c) Acid-base disorders
   - Respiratory acidosis and alkalosis
   - Metabolic acidosis and alkalosis

- Bicarbonates are used to treat metabolic acidosis.

d) Convulsions

- Oxygen
- Benzodiazepines = Diazepam or Lorazepam
- Barbiturates = Phenobarbitone, Thiopentone

e) Agitation = Chlorpromazine, diazepam or haloperidol

f) Movement disorders → Parkinsonism, motor neurons disease, myopathies, fasciculations, chorea, tremors. These are caused by various toxins and drug overdoses. Withdrawal of drug and specific anti-dote for toxin is the general line of treatment.

g) Electrolyte disturbances:

- Hyperkalemia = Glucose, insulin, sodium bicarbonate, calcium gluconate
- Hypokalemia = Oral or I.V. potassium
- Hypernatremia = Water restriction and loop diuretics
- Hyponatremia =Hypertonic saline
- Hypocalcemia = Calcium gluconate I.V.

III) Decontamination:

a) Eye = Irrigation with copious amount of water or normal saline.

b) Skin = Removal of contaminated clothes

Exposed areas irrigated and washed with soap and water.

Sepcific treatment, like polyethylene for phenolic burns, copper sulphate solution for phosphorous burns etc.

c) Gut =

- Emesis =

  Syrup of Epecac, manual stimulation of posterior pharynx, injection of apomorphine – S.C.

  Contraindications – Absolute = Convulsant poisons, coma, corrosives, petroleum products. Relative = Pregnancy, heart disease, bleeding disorders etc.

- Gastric lavage = Contraindications – Absolute = Corrosives, marked hypothermia, prior significant vomiting Relative = Oesophageal varices, advanced pregnancy, recent surgery, coma, convulsant poisoning
- Catharsis – Ionic/ saline = Magnesium citrate, magnesium sulphate, sodium sulphate, Saccharides = Sorbitol.
- Whole bowel irrigation = Saline and polyethylene glycol
- Activated (medicinal) charcoal

IV) Elimination:

- Forced diuresis – Alkaline = Dextrose + Sodium Bicarbonate

  Acid = Dextrose + NaCl + Arginine hydrochloride

- Extra corporeal techniques = Haemodialysis, haemoperfusion, peritoneal dialysis, haemofiltration, plasmapheresis, plasma perfusion, cardiopulmonary bypass

V) Antidote Administration:

a) Mechanical or physical antidotes. E.g. Activated charcoal; Demulscents like milk, starch, egg white, milk of magnesia, aluminium hydroxide etc; bulky food.

b) Chemical antidotes. E.g. Common salt for silver nitrate, Albumin for mercuric chloride, Dialysed iron for arsenic, Potassium permanganate for opium, strychnine, cyanides etc.

c) Universal antidote. Activated charcoal – 2 parts, Magnesium oxide – 1 part, Tannic acid – 1 part.

d) Physiological or pharmacological antidotes. E.g. Atropine and physostigmine.

e) Chelating agents. E.g. Dimercaprol, EDTA, penicilamine, desferrioxamine.

VI) Nursing Care:

- Attention to pressure points to prevent bed sores
- If no spontaneous blinking, methyl cellulose drops to avoid exposure keratitis.
- Frequent change of bed linen soaked with urine, faeces and other secretions.
- Catheters in urinary incontinence
- Frequent aspiration of gastric and respiratory secretions
- Passive physiotherapy to prevent stiffness and atrophy.

VII) Psychiatric care:-

After medical stabilization, the most important aspect of management is psychiatric counseling, particularly in suicide cases to prevent recurrence. Today psychosocial assessment has become an important component in comprehensive evaluation of toxicologic emergencies.

- **DIAGNOSTIC CRITERIA IN DEATHS DUE TO POISONING[1,2] :**

1) Clinical records or history in inquest report of the deceased mentioning the details as narrated above.
2) **Post-mortem examination :**
   a. External post-mortem findings
      i. Postmortem staining: Deep blue = Asphyxiants and Aniline
         Cherry red = CO and HCN
      ii. Colour changes in corroded skin and mucus membrane
         Grey becoming black from blood = H_2SO_4 and HCl, Brown = HNO_3
      iii. Detectable smell
         Garlicky odor = Phosphorus, arsenic, parathion, malathion
         Sweet or fruity = Ethanol, chloroform, nitrites
         Rotten eggs = H_2S, disulfiram
      iv. Deep cyanosis = opium and cardiac poisons
      v. Early rigor mortis = Strychnine

vi. Blood tinged froth from mouth and nose = organophosphorus compounds

vii. White froth from mouth and nose = Opium and its alkaloids

viii. Injection marks = Injection of poisons (Snake bite) or signs of treatment

b. Internal postmortem findings:

i. Corrosion, ulceration and desquamation of inner aspects of lips, mucus membrane of mouth, tongue and oesophagus = Corrosive agents

If the corroded area is yellowish = Nitric acid, charred = sulphuric acid, Hardened and white = Carbolic acid.

ii. Stomach

Thickening and softening of the wall = Corrosives

Hard and leathery = Formaldehyde

Discoloured with yellowish discolouration = HNO_3, bluish = $CuSO_4$

Content and its smell = Blood → corrosive or irritant

Luminous → Phosphorus

Kerosene smell → Organophosphorus compound

Alcoholic or sweetish odor → Ethanol

iii. Chest cavity – Smell of volatile poisons, cyanogens, opium etc.

The above mentioned are some of the obvious detectable findings during post-mortem examination in different poisoning cases.

3) Preservation of viscera and other material for laboratory examination:

a. Stomach and its contents = in one container

b. The upper part of small intestine, about 30 cms length in the same container of stomach

c. Liver = not less than 500 gms, preferably along with gall bladder

d. Kidney = Longitudinal half of each kidney. Liver and kidney in one container

e. Blood = 100 ml, minimum 10 ml

Separate container = Screw capped bottle

f. Urine = 100 ml or full content of bladder

Separate container = Screw capped bottle

Viscera are collected in glass bottles of one litre capacity, wide mouthed, fitted with glass stoppers.

Preservatives:-

For viscera = Saturated solution of sodium chloride or rectified spirit.

For blood = Sodium fluoride, 10 mg/ml of blood.

For urine = Sodium fluoride, 10 mg/ml of blood or no preservative needed.

- **DUTIES OF A DOCTOR IN A CASE OF SUSPECTED POISONING[1,2] :**

1) **Medical duty** – early diagnosis and proper treatment should be given to the patient.
2) **Legal duties** :
   a) If a case of poisoning is indubitably accidental or suicidal in nature, then the attending doctor is in no legal obligation to notify the police in case he is working in a private hospital. But if patient dies, police has to be informed. Death certificate must not be issued.
   b) Doctors working in government hospitals are required to report every case of poisoning regardless of nature to the police.
   c) All cases of homicidal poisonings (definite or suspected) must be compulsorily reported to the police. Failure to do so will make it culpable under section 176 IPC.
   d) If police require any Information regarding any case of poisoning, suicidal ore homicidal, attending doctor has to divulge it. There is no scope for professional secrecy in such cases.
   e) Evidence suggestive of poisoning like vomitus, faeces, stomach washings, contaminated food etc should be preserved and sent for chemical analysis to the nearest centre.
   f) If the patient is on the verge of death then dying declaration should be recorded.
   g) If the patient dies before the exact diagnosis is made, or body brought dead to the hospital then police should be informed who

will in turn order an autopsy to be done. Death certificate should not be issued.

h) Detailed records should be made of every case of poisoning and kept in safe custody.

i) In case of food poisoning cases public health authorities must be informed.

- **VARIOUS STUDIES ON DIFFERENT PATTERNS OF POISONING :**

A) FOREIGN STUDIES :-

In a hospital based study carried out in the patients admitted with the history of poisoning to Dhulikhel Hospital, Kavre, Nepal, for a period of one year between April 2011 to March 2012 with objective of determining the pattern and severity of poisoning cases admitted to Dhulikhel Hospital, Kavre, Nepal, there were total 137 cases during the one year duration and maximum case belonged to second and third decade of life. Most common manner of poisoning was suicidal and the incidence was more common during evening hours. Organophosphorus was the most commonly abused substance. Most of the cases had arrived hospital after one hour of exposure and duration of hospital stay in many cases were less than four days[20].

In a retrospective study carried out in patients coming to Emergency Department of Thammasat University Hospital, Thailand, between October 1, 2006 and September 30, with the objective of evaluating the pattern, severity and clinical outcome of acute poison exposure at the hospital, total 76,805 Emergency Department visits were reviewed out of which, 1112 cases were related to acute poison exposures, which were accounted for 1.4%. 65% cases were female. 21 to 40 years age group showed the highest rate of acute poison exposures. Intentional and

unintentional exposures accounted for 52.7% and 44.9%, respectively. Intentional exposure was the major cause of exposure in the age group of 11-40 years, while unintentional exposure was the major cause of exposure in children. Pharmaceutical products (38.1%) were the most common category of substances involved in acute poison exposure followed by bites and stings (31.7%) and household products (17.6%). The substances most frequently involved were acetaminophen (17.7%) and toilet cleaning agents (12.3%). Fifty-six (5%) cases developed severe clinical course and three (0.27%) patients died. Pesticide and toilet cleaning agents were responsible for all these fatalities[25].

In a retrospective study conducted at Erciyes University Medical School, Kayseri, Turkey to evaluate 1254 adults who presented with acute poisoning to the Emergency Department from January 2007 to December 2009, with objectives to evaluate the etiologic and demographic characteristics of acute adult poisoning cases and to obtain up-to-date information on acute poisonings. Acute poisonings comprised 1.40% of Emergency Department patients; 65% were female, while 47% were between the ages of 16 and 25 years. Medicinal drugs were the most common cause of poisonings (68%), followed by gases (9.5%). Antidepressants were the most frequent drug ingested (18%), followed by analgesics (16%). Intentional poisonings constituted the majority of cases (78%). Most suicide attempts were made by women (68%) and majority of the patients were married (57%). Twenty patients (1.6%) died during their hospital stay, with organophosphate pesticides being the most common agent (n = 8) involved in fatal poisonings[26].

In a retrospective study conducted by Poison Control and Drug Information Center, An-Najah National University, Nablus, Palestine, analysis of cases diagnosed

with acute poisoning and admitted to the emergency department of Al-Wattani governmental hospital during the year of 2008 was carried out. The objectives were to analyse the pattern of poisoning and study gender distribution and management protocol of poisoning in patients diagnosed with acute poisoning. There were 674 cases due to poisoning, which accounted for 1.5% of the total admissions to the hospital. The mean age was 21.8 ± 18.1 years. Approximately, 58% of poisoning cases occurred at home. Male to female ratio was 1.5:1. The maximum number of poisoning occurred during summer season. Poisoning cases were maximum in the age category >18 years. (92%) of the cases were of unintentional type of poisoning. Unintentional poisoning was significantly more common among males (61.3%; $p < 0.01$), while intentional was more common among females (64.8%; $p < 0.001$). The causative agents encountered were mainly biological agents (77.4%), pharmaceuticals (11.6%), and other chemicals (10.9%). The most common route of poisoning was through stings (72.3%), followed by oral ingestion (23.5%) and inhalation (3.4%). The majority (91.1%) of cases did not undergo any decontamination methods[22].

A descriptive retrospective study of acute intoxication cases registered at the Complexo Hospitalario de Pontevedra (CHOP) between January 2005 and December 2008 was performed by Servicio de Farmacia, Hospital Povisa, to find out the number and types of poisoning cases treated, their distribution according to patient's sex and age, chronology, type of toxic agents involved, intentionality, history, symptoms, clinical development, treatment and toxicological analysis used for diagnosis. A total of 1893 patients with a mean age of 35.6 ± 17.6 years (66% men) were included. Highest rates of poisoning were recorded on Saturdays and Sundays during the summer months (June, July and August). Drugs of abuse were the most

common toxic agents (70.4%), ethyl alcohol accounting for 61% of these cases, which often involved males and with people with high degrees of dependency. In second place was poisoning resulting from the abuse of medical drugs, more commonly associated with females, and involving benzodiazepines in 73.2% of cases. The majority of these intoxications were intentional, and suicide attempts accounted for 18.8%. The problems most commonly resulting from the poisoning were neurological, and mortality rate was just 0.2%[16].

This retrospective study was carried out in the Medicine Department of Khulna Medical College, the biggest tertiary hospital in the southern part of Bangladesh to observe the trends of poisoning in southern part of Bangladesh over four years including age and sex variation, mode of poisoning, type of poison used and outcome of poisoning. The hospital medical records of all patients, aged 10 years and above with history of acute poisoning from January, 2003 to December, 2006 were enrolled. Among 1903 cases, 1012 (53.1%) were male and 891 (46.8%) female with a ratio of 1.4: 1. The year wise total number of cases were progressively decreased from 627 (2003) to 353 (2006). Most commonly found toxic agent was Organo-Phosphate compound (526; 27.64%) with a very little sexual variation & this trend remained same in all study years. Poisoning with unknown substance was the second leading cause (16.03%) followed by Copper-sulphate (14.03%), Sedative (13.35%), Snakebite (12.93%) etc. Incidence of unknown poisoning, sedatives, snake-bite and corrosives were found to be gradually decreased over the study years. Male were found mostly affected in majority type of poisoning except Copper-sulphate, kerosene, puffer fish, paracetamol and other drugs category. Age group II (710; 37.3%) was the most vulnerable group with male (57.89%) preponderance followed by group I (643; 33.7%), III (329; 17.2%) and IV (221; 11.6%)

respectively. Highest 1308 (68.7%) cases were suicidal in mode followed by 304 (15.9%) accidental and 291 (15.2%) homicidal. Out of 1903, 140 (7.3%) patients died. Death rate was highest in OPC poisoning (52.1%) followed by unknown substance (13.5%), snakebite and copper-sulphate (11.4%)[13].

This prospective observational study was undertaken to analyze characteristics and possible determinants of acute poisoning in adults in Qatar. During 2010, 18,073 patients attended the emergency department of Hamad General Hospital, a teaching hospital in Qatar. Out of them, 599 (3.3%) patients were diagnosed as "poisoning case" with either chemical or pharmaceutical substances. The prevalence rate of poisoning incidence was 35.3/100,000 population. Seven patients died, corresponding with a case-fatality rate of 0.39/1000. The majority were male (65%) and the mean age was 34 years. The poisons involved were mainly chemicals (61.6%) and pharmaceuticals (38.4%). Female, mainly single, suffered more intentional poisoning compared to male. Of the patients aged 60 years and above (7.2%), the majority (95.3%) suffered unintentional poisoning with pharmaceuticals; 56% with warfarin, 12% with digoxin and 7% with insulin. Multivariate analysis shows that female gender, single status, younger than 35 years of age, being poisoned by pharmaceutical products, and the need for hospitalization are significant determinants for acute intentional poisoning after adjusting all other possible covariates[14].

In a retrospective study conducted at Tikur Anbessa Specialized University Hospital, Ethiopia from January 2007 to December 2008, a total of 116 adult cases were seen, among which, Females outnumbered males. Mean age was 21 years. Most (96.5%) were intentional self-harm poisonings. Household cleansing agents were the

leading causes of poisoning (43.1%) followed by organophosphate (21.6%) and phenobarbitone (10.3%). Loss of consciousness, vomiting and epigastric pain were the common presenting features accounting 46.2%, 23.8% and 22.5%, respectively. A total of 13(11.2%) patients had already known mental illness and 12 of them poisoned by using their own medications. Among 65 patients who reported their reason of poisoning, temporary quarrel (57%) and emotional disturbance (26%) were frequently cited. The case fatality rate was 8.6%. Death was most occurred by organophosphate (5/25) and phenobarbitone poisoning (3/12)[15].

In a prospective study including all patients with confirmed or suspected poisoning presenting to Institute of Pharmacy, Pharmacology and Toxicology, University of Iceland, Reykjavik, Iceland during the twelve-month period from April 2001 until March 2002, with an objective to assess the incidence and type of toxic exposures presenting to emergency medical facilities in Iceland, a total of 1,121 toxic exposures were documented representing an incidence of 3.91 cases per 1,000 inhabitants per year. The female to male ratio was 1.23. The majority of exposures (56.7%) occurred in the patient's home, 60% were deliberate, 72% had drugs and/or alcohol as their main cause, and 11% involved illicit drugs. Exposures to chemicals other than drugs were usually unintentional[17].

In a retrospective study with an aim to assess demographic, etiological, and clinical characteristics of patients presenting to the Tarsus State Hospital, Department of Emergency Medicine, Mersin, Turkey. This study included a total of 509 (0.27%) patients diagnosed with poisoning at emergency department within a 3-year period. 71.3% (n = 363) of the patients were female. The majority of the victims were in the 18-25 years age group ($P < 0.001$). The poisoning incident was for suicidal purposes

in 83.7% of patients. Among the patients presenting with prescription drug poisoning, 92.9% were poisoned in a suicide attempt while 73.2% of patients presenting with poisoning with non-medical substances were poisoned accidentally. Suicidal poisonings were more common in young age group and females ($P < 0.001$). The most common poisoning agent was antidepressants (17.6%) followed by analgesics (12.8%), and other psychotropic drugs (6.1%). Antidepressant drugs were the most common prescription drugs taken for suicidal purposes ($P < 0.001$). Poisonings occurred with a single agent in 72.5% of cases and with two or more agents in 27.5% of cases. Analysis of duration of hospital stay revealed that 52.6% ($n = 60$) of patients stayed in hospital for 2 days. The mortality rate was 0.4%[18].

Study was done in Poisons Information Centre, Department of Paediatric Medicine, Red Cross War Memorial Children's Hospital and University of Cape Town, Rondebosch, Cape Town with an objective to compare the trends of causative agents from 2003 to 2008. Of the total incidents (N=2 872), paraffin (kerosene) was the commonest agent (n=692, 24%) with 124 poisonings including two deaths. Drugs were the most common toxin group (n=988, 34%), including 139 single-drug poisonings with 5 deaths; 4 associated with traditional medicine use. Household cleaning product incidents (n=302, 10%) resulted in 29 single product poisonings with no deaths. Pesticide incidents (n=311, 10%) included 6 deaths; 203 (65%) incidents were due to organophosphates or carbamates. The suburban distribution of the main toxin groups varied. Comparing 1987 and 2008, the number of incidents decreased from 1 116 to 447; drug and paraffin incidents decreased respectively (from 673 to 150 and from 332 to 87), household cleaning products and cosmetics increased (21 to69) and pesticide incidents increased (7 to 69)[24].

A prospective observational study included all poisoning-related intervention cases over 3 years (1999-2001) in the Department of Family Medicine, University of Ljubljana, Celje region, Slovenia, covering 125 000 inhabitants. 244 poisoning-related EMS interventions were recorded among a total of 4486 interventions (5.4%) corresponding to an average annual rate of 0.56 poisonings per 1000 inhabitants per year. Psychoactive agents were detected in 56.5% of the cases. Two-thirds of the poisonings took place outside patients' home. In 30% of the cases, the administration of poison was because of suicidal intentions. The most common substance ingested was alcohol alone or in combination with prescription or illegal drugs in 42.6% of cases, followed by drugs alone or in combination with alcohol in 39.2%cases. More than one-fifth of the poisonings were because of the use of illegal drugs. At the time of the arrival of EMS 23.5% of the patients were in coma. EMS applied antidote in 23.2% of the patients. After emergency care, 9.3% of the patients were still in coma, 15.6% were comatose, 26.6% were somnolent, 18.6% were disoriented and 30% had complete consciousness. Of these, 84.4% of the patients were admitted to hospital or specialized care and 15.6% were sent back home[23].

To determine the annual rate of poisoning-related Accident & Emergency Department visits at Sultan Qaboos University Hospital in Oman, a prospective observational study was conducted over 4 years (1996-1999). 204 poisoning-related Accident & Emergency Department visits were recorded corresponding to an average annual rate of 1.8/1000 Accident & Emergency Department visits. Therapeutic agents were most commonly involved (50% of all cases). Accidental poisoning in toddlers was most commonly caused by drugs. Intentional poisoning in adults involved mainly therapeutic agents (50%), particularly analgesics, followed by industrial and environmental agents (25%). Animal poisoning (14%) was most

commonly encountered in adult males. Traditional remedies constituted 7% of all poisoning cases. A total of 148 patients (73%) were admitted for 1 to 175 days[21].

A study was conducted by Rambam Health Care Campus, affiliated with Rappaport Faculty of Medicine, Technion-Israel Institute of Technology, Haifa, Israel, with objective to report data on the epidemiology of poisonings and poison exposures in Israel. A total of 31,519 poison exposure cases were recorded, a 157.6% increase compared with 1995. Children < 6 years of age were involved in 43.1% of cases; 74.0% of calls were made by the public and 23.7% by physicians; 74.8% of exposures were unintentional and 9.1% intentional. Chemicals were involved in 35.8% of all cases (single and multiple substances), pharmaceuticals in 48.8%, bites and stings in 3.8%, and plants and mushrooms in 1.6%. Substances most frequently involved were analgesics, cleaning products and antimicrobials. Clinical severity was moderate/major in 3.4%. Substances most frequently involved in moderate/major exposures were corrosives, insecticides and snake venom. Four fatalities were recorded; all were intentional exposures in adults (corrosive, medications, energy drink)[19].

A retrospective analysis of medical records of chemical poisoning cases among children ≤ 12 years had been carried out to profile the background, identifying the sources, determining the probability, determining the extent of the severity and the risk of chemical poisoning, by Department of Toxicology, Advanced Medical and Dental Institute, USM Bertam, Malaysia. Medical records of patients admitted from 2007 to 2011 were reviewed. The records showed a total of 192 poisoning cases and 41 chemical poisoning cases involving children occurred during five years period. Cases involving males (61%) outnumbered the females (39%). The most vulnerable

age group included children in 0-2 years old (68.3%) with the majority being Malays (97.6%). Most of the incidence happened in the evening (1800-2359) hours (46.3%) and in most cases (61%), children were brought to the hospital within their conscious state. Vomiting was the most common symptoms observed (34.1%). All of the patients fully recovered after the treatment. Among the category of sources, cleaning agents (39%) and fuel (31.7%) were the commonest poisoning seen with household bleach and kerosene as the main agents. Chemical poisoning had accounted for 40% from the total of children poisoning cases (103) reported in five years period. High incidences of chemical poisoning cases had been reported in 2009 (0.11). Based on PSS score, the severity of majority of the cases showed minor sign and symptoms (87.8%)[27].

B) <u>INDIAN STUDIES:-</u>

A retrospective study was to done to characterize the poisoning cases admitted to the *KMC/MGM Hospital, Warangal, Andhra Pradesh,* Southern India, between the months of January and December, 2007, 2,226 patients were admitted to the hospital with different poisonings; the overall case fatality rate was 8.3% (*n* = 186), two-third of the patients were 21–30 years old, 5.12% (*n* = 114) were male and 3.23% (*n* = 72) were female, who had intentionally poisoned themselves[41].

In a study conducted with an objective to ascertain the trend of poisoning cases admitted to the Government District Headquarters Hospital, a secondary care center in Udhagamandalam, Nilgiris District, Tamil Nadu, India, over a five-year period, a total of 1860 poisoning cases (80 deaths) were reported during the period from October 2008 to September 2013. The incidence of poisoning was found to increase every year. The average incidence was 1.60 per 1000 population, while the

average case fatality rate and mortality rates were 40.51 and 0.07, respectively. A total of 1148 (62%) were males. The majority of cases were seen in the 21-30 age group (41.24%). The poisonings were largely deliberate self-harm (*n* = 1,755; 94.35%), followed by accidental (*n* = 85; 4.57%). Agrochemicals were the main choice of poisoning agents and among these, organophosphates were the major cause[40].

It is a retrospective study conducted during Jan 2009-Jan 2012 in Annapoorana Medical College & Hospitals, Salem, Tamil Nadu, to find out the Profile of poisoning cases in a Tertiary care Hospital, Tamil Nadu 150 cases of acute poisoning in adults due to drugs and chemicals were included, 148 cases were of intentional poisoning and two cases were of accidental poisoning. In all the cases the route of exposure was oral. Males (92 cases) outnumbered females (58 cases) and 101 cases were married. Peak occurrence was in the age group of 21-30 years (47 cases). Occupation wise poisoning was commonly found among male laborers (18.66%) and farmers (13.33%) followed by house wives (28%) and students (16.66%). 147 cases (98%) were Hindus. More cases were reported during summer season (36%) and day time (80%). Organophosphorus was the commonest agent (58.66%). Associated co-morbid conditions were found in 16 cases[38].

This retrospective study evaluated the hospital records of patients with acute OP poisoning in the Department of Medicine, Narayana Medical College Hospital, Chinthareddypalem, Nellore, Andhra Pradesh. A total 101 patients were included in the study. Young adult males were more commonly involved than females (M:F 2.5:1). The mean age of the patients was 28 years (range 2-72 years, SD ± 14.3 years). Mean time to receive treatment was 5.2 ± 7.4 (range 1-48 h). About 45.5% patients

received first aid before coming to the hospital. The reason was suicide in 88.1% cases and accident in 12 (11.9%, all children). Seventy-nine patients received pralidoxime (PAM) and the mean duration was 1.7 ± 1.1 (range 1-4 days). Atropine was given in all patients. Mean duration was 5.1 ± 3.1 (range 1-19 days). Mean hospital stay was 7.5 ± 4.7 days (range 1-26 days). Mortality was 9.9% in the present series[39].

The present paper evaluates pattern of poisoning cases including deaths over a period of five years from 2006 to 2011 in SMI Hospital, Dehradun, Uttarakhand. Male to female ratio was 1.14:1; peak incidence was observed in the age group 21-30 years; more than 80% cases belonged to medium socioeconomic status; and 58.1% cases were from rural areas. Organophosphate compounds was the most commonly (22.9%) abused substance[37].

In a cross sectional study designed to evaluate the pattern of acute poisoning cases treated in a tertiary care hospital in Navi Mumbai, India. conducted at Dr. D. Y. Patil Medical College, Hospital and Research Centre during July 2012 to July 2013, a total of 74 cases of acute poisoning were studied, of which 51.4% were men. Most of the patients aged 20 to 29 years (44.6%). In majority of cases, the route of exposure to poison was oral (86.5%). Most of the patients reside in urban areas (52.7%). Most of the patients were Hindus (85.1%) followed by Muslims (14.9%). The exposure mostly occurred between 6:00 pm to 12:00am (30% of cases). The majority of poisonings (44.6%) was due to consumption of household products followed by pesticides (14.9%) and pharmaceutical agents (13.5%). Neurologic manifestations were the most common clinical findings (64.8%) followed by gastrointestinal manifestations (37%). All patients were treated successfully with no mortality. There was a significant

correlation between gender and intention of poisoning (P < 0.001), as the suicidal attempts were higher in women (69.4%). Moreover, a significant relationship existed between marital status and intention of poisoning (P = 0.016) as the suicidal poisonings were most common among married individuals (45.7%)[36].

In a retrospective study of poisoning cases admitted in ICU [Department of Anaesthesiology and Critical Care GMC Srinagar] from Jan 2006 to May 2014, conducted to evaluate the socio demographic variables and type of poison consumed in these cases, Organophosphorous poisoning cases were predominant, amounting to 394 cases. Maximum cases (281) were in the age group of 18 to 35 years. Female predominance was seen in the study population. It was observed that unmarried people (294) had high incidence of poisoning as compared to married people(150). Most of the cases admitted in ICU were from south zone (204) which had a population of 2,328,950 as compared to central (129) and north (111) zones of Kashmir that had a population of 1,250,173 and 2,573,169 respectively[12].

The present study is a prospective study of poisoning cases (excluding animal bites) brought to the Civil Hospital Ahmadabad, from 1st October 2006 to 30th September 2007. Total 366 cases of acute poisoning were recorded over a period of one year. Of these 70.8% were males and 29.2% female. The majority (45.08%) cases were from age group of 21-30 years.71.6% cases were from rural area. Commonest type of poison was pesticide in 33.9% cases, followed by household chemicals 26.8%, in 74.6% cases cause of poisoning was intentional. Fatality in pesticide poisoning was 25.8%[35].

This study has been aimed to determine the various parameters of poisoning, data was collected from the cases admitted with acute poisoning in medical wards of

Jawaharlal Nehru Medical College and Hospital, Aligarh, over a period of one year. Out of total 104 cases, Maximum number of cases (n=59) were recorded in the 20-29 years age group. The frequency declined as the age advanced (P<0.01). Irrespective of sex, suicide was the most common mode of poisoning. Aluminium phosphide was the most common poison and with maximum mortality (P=0.002). Majority of the cases belonged to the middle socioeconomic strata (Class III and IV). Organophosphates and aluminium phosphide constituted the majority of cases in rural areas (63%), while zinc phosphide, aluminium phoshide, sedatives and delirients accounted for majority of the urban cases (80%). The distribution pattern was statistically significant (P<.0.001). Marital discord and family problems were important causes of poisoning[11].

This Prospective, cross-sectional, hospital-based study was conducted with an aim to explore the epidemiological characteristics and clinical profile of patients presenting with poisoning in emergency department. Relevant epidemiological and clinical data from patients, presenting with history/clinical features of poisoning in emergency department of Burdwan Medical College and Hospital, Burdwan, West Bengal, India, were collected and analyzed. A total of 4,432 patients with history and/clinical features of poisoning were included in the study. The females clearly outnumbered male patients. Poisoning with suicidal intent was more frequent (81.08%) than accidental (18.92%) (P < 0.0001). Majority of the patients were housewives followed by farmers, businessmen, laborers, and students. The mean time interval between poison consumption and admission to hospital was 6.4 hours (Mean ± SD: 6.4 ± 2.29). Snakebite (31.90%) was the most common cause of poisoning followed by organophosphorus compounds (21.84%), rodenticide (16.49%), alcohol (13.80%), chemicals (9.04%), and drugs (2.3%). The mean GCS (Glasgow Coma

Scale) score of the poisoned patients at presentation was 6.85 ± 1.62. Of all the patients included in the study, 3,712 patients (83.76%) survived and 720 patients (16.24%) expired[34].

A retrospective analysis of 584 cases of acute poisoning admitted with a medical emergency to the Department of Medicine, GTB Hospital, Delhi, over a three-year period. The patients were analysed with respect to the age, sex, mode of poisoning, type of poison consumed and mortality. Of these, 42.63% were aged 20-30 years. Poisoning was used as a suicidal agent by 63.8% of the patients. The nature of the poison could not be ascertained in 15.92% of patients. Sedatives were involved in 13.36%. Aluminium phosphide poisoning was found in 11.82%. The overall mortality was estimated to be 13.18% with 53.2% being caused by the consumption of aluminium phosphide. There has been a change in the nature of poisons consumed and the number of cases of aluminium phosphide poisoning is declining. However, aluminium phosphide poisoning still remains a major threat as it carries a high mortality rate[10].

In a retrospective study of all poisoning cases admitted to Shri B M Patil Medical College Hospital & Research Centre Bijapur, Karnataka from Jan 2010 to Dec 2010, to study the pattern of poisoning, Total number of 32904 IPD cases were registered and 2197 MLC cases done, in which 378 cases (6.67%) were due to poisoning. male patients due to poisoning were 199 (52.64%) and females were 179 (47.35%) with the male: female ratio being 1.2:1. Majority (45.76%) of victims with suspected consumption of poison were in between 21 to 30 age group. Insecticides were the most common poison used for suicidal purpose. Out of 199 (52.64%), 55 % patients were married and 45% patients were unmarried. Out of the 179 females who

admitted for poisoning 65% patients were married and 35% were unmarried. The hospital stay of the admitted patients with poisoning ranged from 01 to 82 days and the mean hospital stay was 6.9 days. During the study period 21 (5.55%) of the patients had mortality due to poisoning. 353 cases (93.3 %) with poisoning admitted to the hospital were Hindus followed by Muslims in 25 cases [6.61%]. Most common (51.6%) poison used for poisoning were organophosphrous compounds 197 cases (51.63%), in 118(31.21%) cases the type of poison was not known and were treated symptomatically. 86.5% (327) of cases were from rural domicile and only 13.5 % (51) from urban population. In season wise distribution, highest cases were recorded in the month of March & April (16.9% & 9.2%)[30].

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In a retrospective and prospective study conducted at JSS Medical College, Mysuru, Case records of poisoning cases from January 2005 till January 2008 were reviewed retrospectively and prospectively from January 2008 to September 2009, with objective of assessing the prevalence and mortality incidence rate, A total of 1045 poisoning related admissions were identified, Among them, 68.40% of cases were due to intentional poisoning and 31.60% were due to accidental poisoning. Of the poisoning related admissions, 84.4% of patients recovered, whereas in 7.6% of cases condition did not improve. Mortality rate was observed 4%. Intentional poisoning was observed more in male population (60.2%) in the age group of 18-29 years. Accidental poisoning was seen more in children in the age group of 1-3 years. Incidence of overall poisoning cases were high due to pesticides (39.5%) followed by medicines (26.1%), household products (22.1%), environmental poisoning (12.1%) and heavy metals (0.2%)[29].

In a prospective study done in patients admitted with history of poisoning in the department of medicine at Victoria Hospital, Bengaluru from January 2011 to December 2011, 81 cases were recorded, among which Almost half of these belonged to the age group of 21-30 years with an average age 25 years. Males outnumbered females. 58 were male (71.6%) and 23 were female (28.4%). 66.67% belonged to the lower socio economic strata, 48 patients came from urban area while 33 were from rural settlement. 44 patients(54.3%) were referred from other hospitals.

All the patients had consumed the poison orally and all with suicidal intent. 12 different types of poisoning agents were recorded. Most of the cases were organophosphorus compound poisoning(n=61, 71.3%). There were 12 deaths out of 81(14.81%)[31].

In a research aimed to study the pattern and outcome of childhood poisoning under the age of 15 years at a tertiary care centre in Kasturba Medical College, Manipal, South India to characterize the problem of acute paediatric poisoning among the children in different age group in the region during 2010 and 2011, Acute poisoning was reported in 81 children aged below 15 years, 50.6% were boys (n = 41) and 49.4% girls (n = 40). The mean age was 6.8 years. Mean age was observed to be higher in females than males. The maximum number of cases were observed in the below 5 years age group (n = 45). A male predominance was evident in the below 5 years age group, while a female predominance in the age group between 10 and 15 years. Kerosene (n = 23, 28.4%) and organophosphate compounds (n = 16, 19.8%) were the most common agents responsible for poisoning in children. The majority of the poisoning cases were reported to the hospital within 12 h of the incident (n = 65, 83.3%). The mortality in paediatric poisoning was observed to be 7.4%. The majority of the children (n = 68, 84.0%) recovered, while seven patients had left the hospital against medical advice (8.6%)[33].

In a retrospective hospital record-based study conducted in a tertiary care hospital attached to a medical institution in, Manipal, Karnataka, a total of 136 patients of various poisoning cases were studied, in which, Incidence was more common among males (75.4%) compared to females (24.3) with a ratio of 3:1. Most cases of acute poisoning presented in the age group between 20 and 29 years (31.2%).

By occupation, 44.8% of the cases were manual laborers (61) followed by housewives (13.2%, 18), students (12.5%, 17), farmers and unemployed (10.2%, 14) and businessmen (8.8%, 12). Majority of the cases (36.0%) were due to organophosphorus compound, followed by snake bite (16.2%), drugs (11.0%), rat poison (7.3%) and others. Total mortality was found to be 15.4% (21). Mortality rate was 62.5% among patients with corrosive poisoning followed by a mortality of 26.5% in OPC. Maximum patients (7) expired when there was a delay in admission to hospital by more than 8 hours after ingestion, A total of 13 (13.3%) and 8 (21%) patients expired out of total 98 patients who received first aid and 38 patients who did not receive first aid, respectively. It was found that 77.9% (106) of cases were of intentional poisoning for suicidal attempt and 22.1% (30) of cases had accidental poisoning. A majority (73%) of accidental poisoning were due to snake bite. Of a total of 21 patients (15.4%) who expired, 2 (9.5%) were secondary to accidental poisoning and the remaining 19 (90.5%) were secondary to intentional poisoning. Median hospital stay was 4 days. Eighty-one patients (60%) underwent psychiatric workup and were given psychiatric counseling and drug therapy. Reactive depression was seen in 48 (35%) patients secondary to failure in academic, social and financial areas and crisis in interpersonal adjustment. Other contributory factors were chronic alcoholism (21, 16%), financial stress (7, 6%) and manic depressive psychosis (5, 4%)[32].

MATERIALS AND METHODS

- **SOURCE OF DATA:** Data was collected from patients of poisoning cases visiting casualty/wards, poison detection centre reports, their medical records, laboratory reports, autopsy reports and regional Forensic science laboratory reports in fatal cases at KLESs Dr Prabhakar Kore Hospital and MRC, Belagavi.

- **Study design :** Hospital based cross sectional study.
- **Study period :** From January 1, 2014 – December 31, 2014.

- **Sample size** : By universal sampling method. All the victims / patients of poisoning visiting the KLES´s Dr. Prabhakar Kore Hospital and MRC, Belagavi, during the study period were included.

- **Inclusion criteria :** All admitted and autopsied cases of poisoning of - 1. All age group 2. Both the sexes 3. All manners of poisoning (Accidental/Suicidal/Homicidal.) 4. Any route of administration (oral/injection/inhalation.). 5. Referred case/direct - coming to KLES´s Dr. Prabhakar Kore Hospital and MRC, Belagavi.

- **Exclusion criteria:** Poisoning cases discharged against medical advice.

- **Ethical Clearance:** The study was approved from Institutional Ethics Committee for Human Subject's Research, Jawaharlal Nehru Medical College, Belagavi. (Annexure I).

- **Informed consent:** Based on the selection criteria, the study participants were selected, orally informed and written informed consent (Annexure II) was obtained from all the participants, before collecting the data.

Methodology

The poisoning cases coming to the casualty are identified, informed and written consent was obtained by properly explaining them about the objectives of the intended study and necessary details needed for the study like – age, sex, type of poison used, manner of poisoning, mode of poisoning, time of poisoning, quantity of poison, educational status, intention/cause behind poisoning, admission details, any peculiar features noticed, are collected through the patient/relatives/friends/police officer, police records, hospital investigation reports and records and recorded in a proforma specially designed for this study (Annexure 3) which includes a detailed description of all the general data of the victims/ patients.

Along with these details, in live cases where the type of poison was undetermined, a sample from the stomach wash or from ryles tube aspirate was taken and sent to poison detection centre present at Jawaharlal Nehru Medical College, Belagavi, where the report was obtained using thin layer chromatography technique within 1 hour of receiving the sample and the observations were recorded in person.

In addition to these sources, in unfortunate victims who lose their lives, a thorough and meticulous post mortem examination was done and the reports were recorded. In all deaths due to poison, viscera and fluids such as –

1. Stomach along with 30cms of intestine, along with their contents in one wide mouthed plastic bottle.

2. 500gms of liver with the gall bladder and its contents and one longitudinal half of each kidney in one plastic bottle.

3. Minimum 30 ml of blood collected from neck veins or from the heart in one plastic bottle.

4. The preservative used is taken in one plastic bottle separately.

The preservative used for the viscera (first two bottles) was saturated solution of sodium chloride, which was filled up to three fourth capacity of the plastic bottle.

The preservative used for blood is sodium fluoride – 10mg/ml of blood. These viscera and fluid preserved is sent to the regional forensic science laboratory present in Belagavi and the subsequent reports were recorded.

Every day the data was collected from the casualty and follow up was done in the admitted cases. In case of deaths, cases were studied at autopsy accordingly. The statistics were prepared weekly using chi square tests.

- **Analysis Plan :** The data thus collected was analyzed and conclusions were drawn regarding the pattern of poisoning cases. The various patterns in this study included are as follows :-

1) Age and sex distribution.
2) Commonest type of poison used.
3) Manner of poisoning (accidental/homicidal/suicidal).
4) Mode of poisoning (oral/injection/inhalation).
5) Effect of occupation on poisoning.
6) Effect of literacy status on poisoning.

7) Initiating/triggering cause/factor for poisoning.

8) Effect of seasonal variation on poisoning.

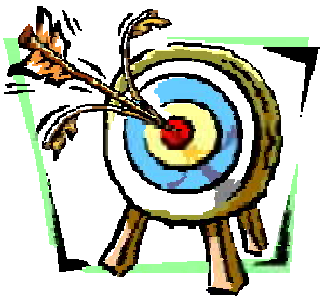
9) Relation of residential address with poisoning (rural/urban).

10) Distribution of cases and deaths in relation to time interval between incident of poisoning and arrival to hospital.

11) Mortality rate in relation to type, manner and mode of poisoning – age wise and sex wise.

12) Poison severity score.

Introduction



Objectives

Review of Literature

Methodology

Results

Discussion

Conclusion

Summary

Bibliography

Annexure-I

Annexure-II

Annexure-III

Annexure-IV

Annexure-V

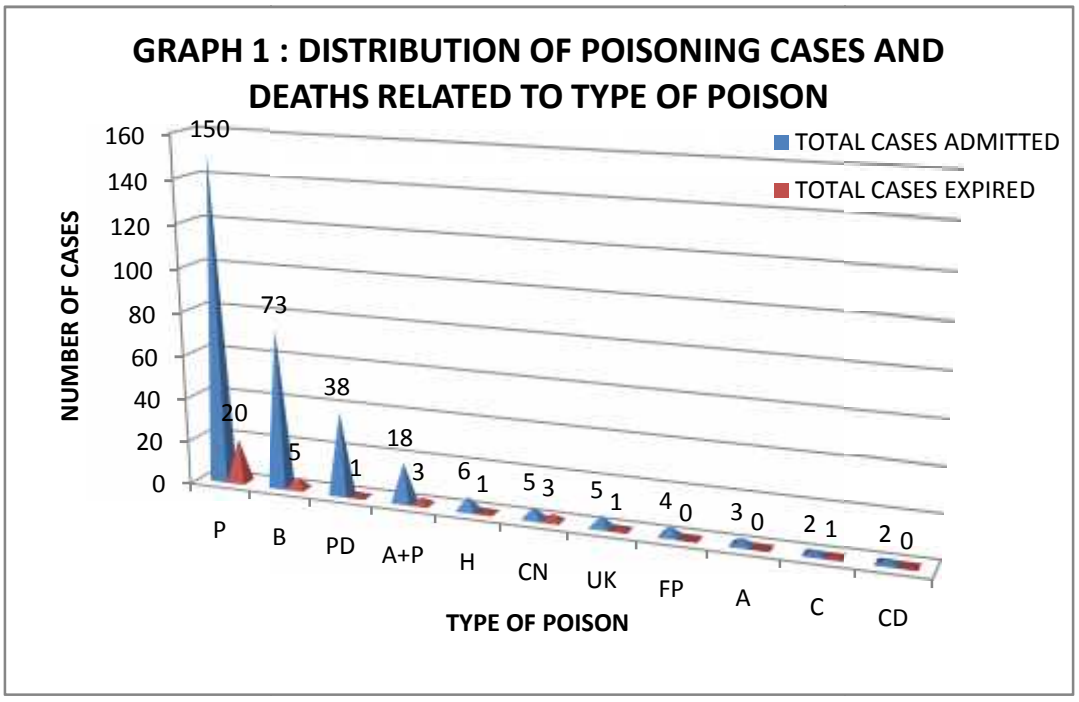
RESULTS

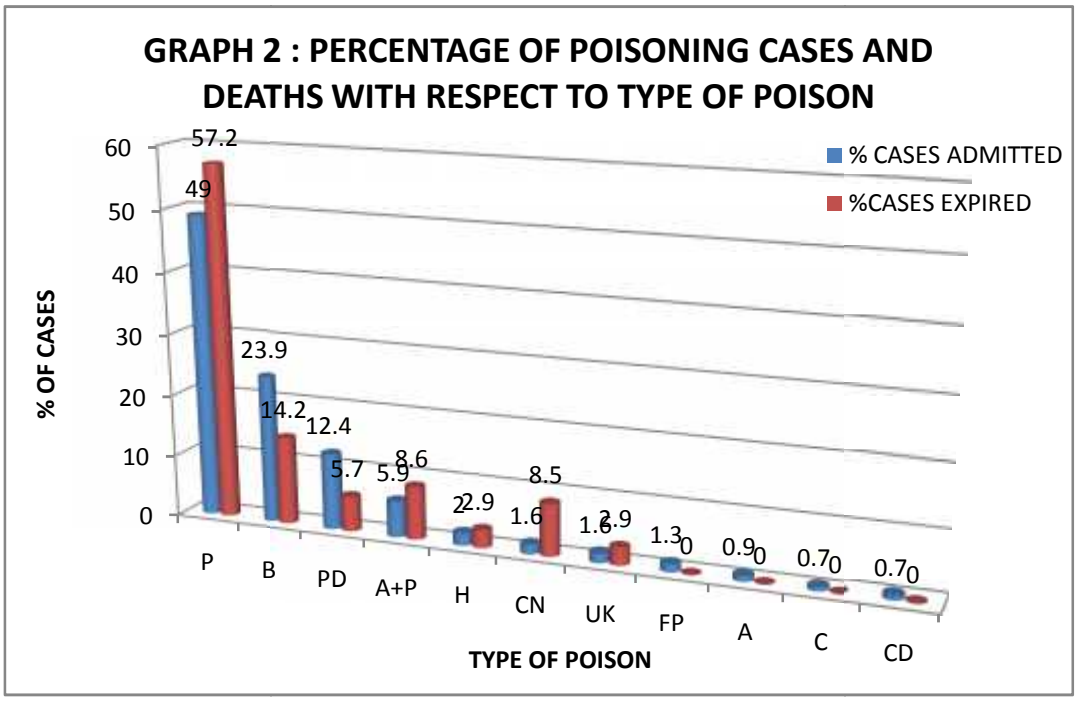
1) DISTRIBUTION OF POISONING CASES AND DEATHS RELATED TO TYPE OF POISON :-

Table 1: Distribution of poisoning cases and deaths on the basis of type of poison.

SL NO	TYPE OF POISON	CASES		DEATHS	
		TOTAL	PERCENTAGE	TOTAL	PERCENTAGE
1	PESTICIDES	150	49%	20	57.2%
2	BITES	73	23.9%	05	14.2%
3	PHARMACEUTICAL DRUGS	38	12.4%	02	5.7%
4	ALCOHOL + PESTICIDES	18	5.9%	03	8.6%
5	HYDROCARBONS	06	2%	01	2.9%
6	CYANIDES	05	1.6%	03	8.5%
7	UNKNOWN	05	1.6%	01	2.9%
8	FOOD POISONS	04	1.3%	00	00%
9	ALCOHOL	03	0.9%	00	00%
10	CORROSIVE ACIDS	02	0.7%	00	00%
11	CEREBRAL DELIRIANTS	02	0.7%	00	00%
TOTAL		306	100%	35	100%

- During the present study, a total of 306 cases due to poisoning came to KLE's Dr Prabhakar Kore Hospital and MRC, Belagavi. Out of these 35 cases expired. Thus, the overall mortality rate due to poisoning being 11.4%.
- Out of these 306 poisoning cases, maximum number of cases were due to pesticide poisoning - 150 (49%), followed by poisoning due to animal and insect bites – 73 (23.9%). Pharmaceutical drugs poisoning contributed for 12.4% of the cases, combination of alcohol and pesticides included 5.9% of cases followed by hydrocarbons (2%), cyanides (1.6%). Among the 306 cases, the type of poison was not known in 5 cases (1.6%). Other cases included food poison (1.3%), alcohol intoxication (0.9%), corrosive acid poisoning and poisoning by cerebral deliriants – 0.7% each.
- Out of the total 35 deaths due to poisoning, highest percentage of deaths were due to pesticide poisoning (57.2%) – 20 deaths, followed by poisoning due to animal and insect bites (14.2%) – 5 deaths. 3 (8.6%) deaths each resulted as a result of cyanide poisoning and combination of alcohol and pesticide poisoning. 2 deaths (5.7%) due to poisoning by pharmaceutical drugs and 1 death (2.9%) resulted due to hydrocarbon poisoning. 1 death (2.9%) was as a result of unknown poison.


GRAPH 1 : DISTRIBUTION OF POISONING CASES AND DEATHS RELATED TO TYPE OF POISON
NUMBER OF CASES
TOTAL CASES ADMITTED
TOTAL CASES EXPIRED
160
140
120
100
80
60
40
20
0
150
20
73
5
38
1
18
3
6
1
5
3
5
1
4
0
3
0
2
1
2
0
P
B
PD
A+P
H
CN
UK
FP
A
C
CD
TYPE OF POISON


GRAPH 2 : PERCENTAGE OF POISONING CASES AND DEATHS WITH RESPECT TO TYPE OF POISON
% OF CASES
% CASES ADMITTED
%CASES EXPIRED
60
50
40
30
20
10
0
57.2
49
23.9
14.2
12.4
5.7
5.9
8.6
2
2.9
1.6
8.5
1.6
2.9
1.3
0
0.9
0
0.7
0
0.7
0
P
B
PD
A+P
H
CN
UK
FP
A
C
CD
TYPE OF POISON

2) AGE WISE DISTRIBUTION OF CASES AND DEATHS DUE TO POISONING :-

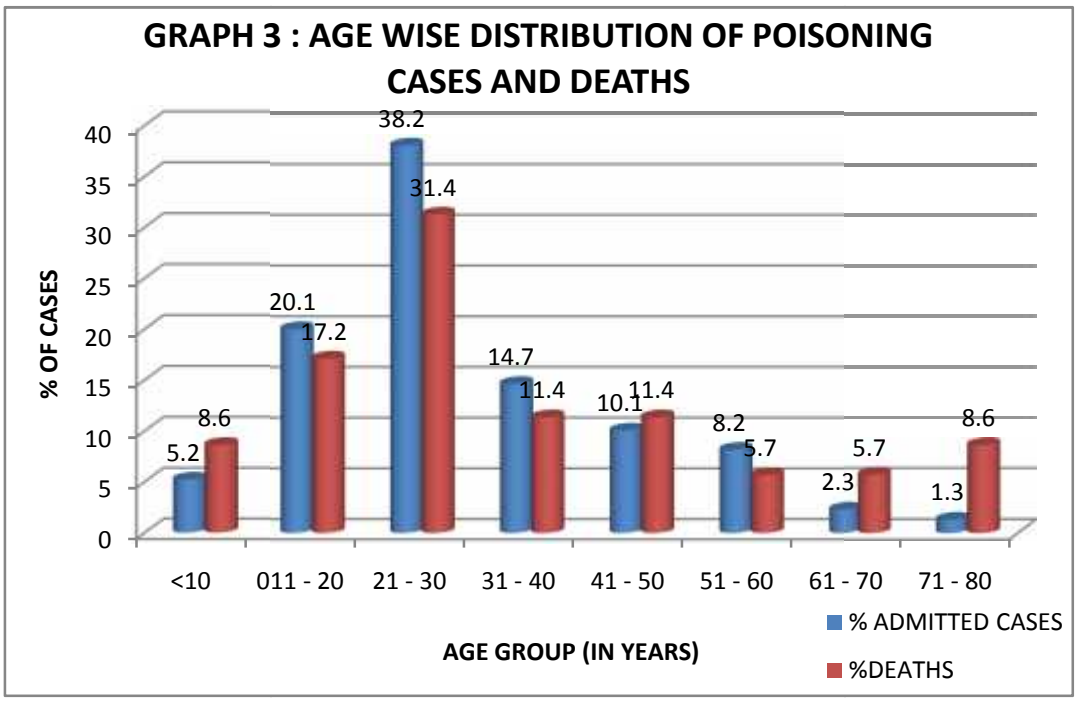
Table 2 : Age wise distribution of cases and deaths due to poisoning.

AGE GROUP (IN YEARS)	ADMITTED CASES		DEATHS	
	TOTAL	PERCENTAGE	TOTAL	PERCENTAGE
<10	16	5.2%	03	8.6%
11 – 20	61	20.1%	06	17.2%
21 – 30	117	38.2%	11	31.4%
31 – 40	45	14.7%	04	11.4%
41 – 50	31	10.1%	04	11.4%
51 – 60	25	8.2%	02	5.7%
61 – 70	07	2.3%	02	5.7%
71 – 80	04	1.3%	03	8.6%
> 80	00	00%	00	00%
TOTAL	306	100%	35	100%

- Out of 306 cases due to poisoning, maximum number of cases was seen in age group between 21 – 30 years, which was 117 cases (38.2%), followed by age group between 11 – 20 years – 61 cases (20.1%). Least cases were seen in the

age group 71 – 80 years – 4 cases (1.3%). No cases were seen above 80 years of age.

- Among the 35 deaths due to poisoning, highest number of deaths were seen in the age group between 21 – 30 years – 11 deaths (31.4%), followed by age group between 11 – 20 years – 6 deaths (17.2%). Least deaths were between 61 – 70 years – 2 deaths (5.7%).
- The minimum age of victim poisoned was 8 months and the maximum age was 80 years.

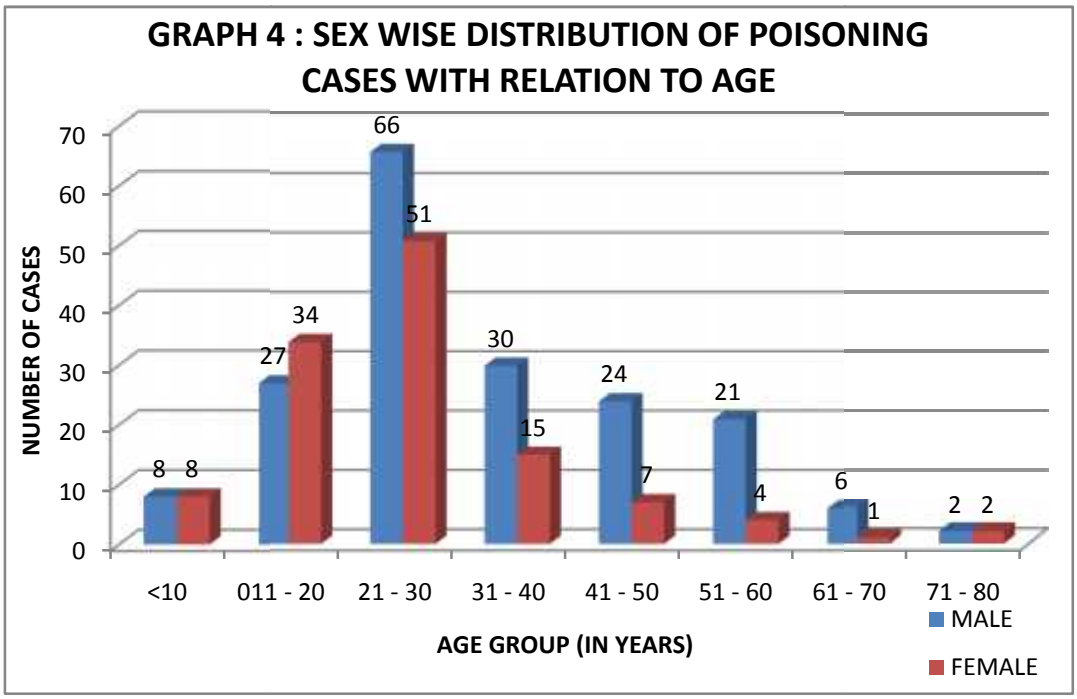


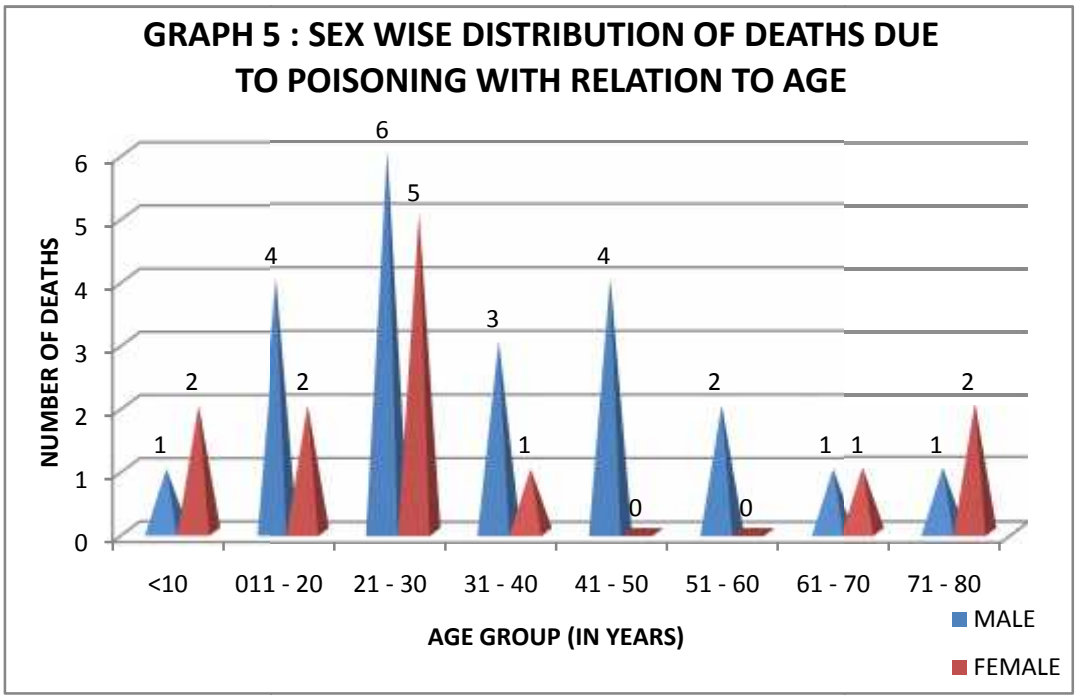
3) SEX WISE DISTRIBUTION OF POISONING CASES AND DEATHS :-

Table 3 : Sex wise distribution of cases and deaths due to poisoning with relation to age group involved.

AGE GROUP (IN YEARS)	ADMITTED CASES		DEATHS	
	MALES	FEMALES	MALES	FEMALES
<10	08	08	01	02
11 – 20	27	34	04	02
21 – 30	66	51	06	05
31 – 40	30	15	03	01
41 – 50	24	07	04	00
51 – 60	21	04	02	00
61 – 70	06	01	01	01
71 – 80	02	02	01	02
> 80	00	00	00	00
TOTAL	184	122	22	13

- Out of 306 poisoning cases, maximum cases were males – 184 cases (60.1%). Females constituted the rest – 122 cases (39.9%). Male : female ratio being 1.51 : 1.
- Among the total deaths (35), 22 deaths were male (62.9%) and the rest 13 were female deaths (37.1%). Male female ratio being 1.69 : 1.
- Among male cases (184), maximum cases were seen in the age group between 21 -30 years – 66 cases (35.9%), followed by age group 31 – 40 years – 30 cases (16.3%). Whereas, in females, maximum cases in females was also seen in age group between 21 – 30 years- 51 cases (41.8%), but it was followed by age group between 11 – 20 years – 34 cases (27.9%).
- Among the deaths, maximum number of deaths in males and females were both seen in age group between 21 – 30 years – 6 deaths in males (27.3%) and 5 in females (38.5%).


GRAPH 4 : SEX WISE DISTRIBUTION OF POISONING CASES WITH RELATION TO AGE
NUMBER OF CASES
70
60
50
40
30
20
10
0
8 8
27 34
66 51
30 15
24 7
21 4
6 1
2 2
<10
011 - 20
21 - 30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
AGE GROUP (IN YEARS)
MALE
FEMALE


GRAPH 5 : SEX WISE DISTRIBUTION OF DEATHS DUE TO POISONING WITH RELATION TO AGE
NUMBER OF DEATHS
6
5
4
3
2
1
0
1 2
4 2
6 5
3 1
4 0
2 0
1 1
1 2
<10
011 - 20
21 - 30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
AGE GROUP (IN YEARS)
MALE
FEMALE

4) SEX WISE DISTRIBUTION OF POISONING CASES AND DEATHS WITH RELATION TO TYPE OF POISON INVOLVED :-

Table 4 : Sex wise distribution of poisoning cases in relation with type of poison involved.

TYPE OF POISON	TOTAL CASES	MALE		FEMALE	
		TOTAL	PERCENTAGE	TOTAL	PERCENTAGE
PESTICIDES	150	76	50.7%	74	49.3%
BITES	73	59	80.8%	14	19.2%
PHARMACEUTICAL DRUGS	38	14	36.8%	24	63.2%
ALCOHOL + PESTICIDES	18	18	100%	00	00%
HYDROCARBONS	06	05	83.3%	01	16.7%
CYANIDES	05	02	40%	03	60%
UNKNOWN	05	04	80%	01	20%
FOOD POISONS	04	01	25%	03	75%
ALCOHOL	03	02	66.7%	01	33.3%
CORROSIVE ACIDS	02	02	100%	00	00%
CEREBRAL DELIRIANTS	02	01	50%	01	50%
	306	184		122	

- Out of 150 pesticide poisoning cases – 76 cases (50.7%) were males and 74 cases (49.3%) were females. Thus males outnumbered females with a small marginal ratio of 1.03 : 1.

- With respect to animal and insect bites, out of 73 cases – 59 cases (80.8%) were males and 14 cases (19.2%) were females.
- Among 38 cases of poisoning due to pharmaceutical drugs 14 cases (36.8%) were male and 24 cases (63.2%) were female. All 18 cases due to combined poisoning with alcohol and pesticide were males. 5 cases (83.3%) out of 6 hydrocarbon poisoning cases were males and 1 case (16.7%) was female.
- 2 cases (40%) out of 5 cyanide cases were males and 3 cases (60%) were females. 4 cases (80%) out of 5 unknown poisoning were male and 1 case (20%) was female. All cases of food poisoning and corrosive acid poisonings involved males.
- 2 cases (66.7%) out of 3 cases of alcohol intoxication were male and 1 case (33.3%) was female. 1 case (50%) each were male and female with respect to cerebral deliriant poisoning.

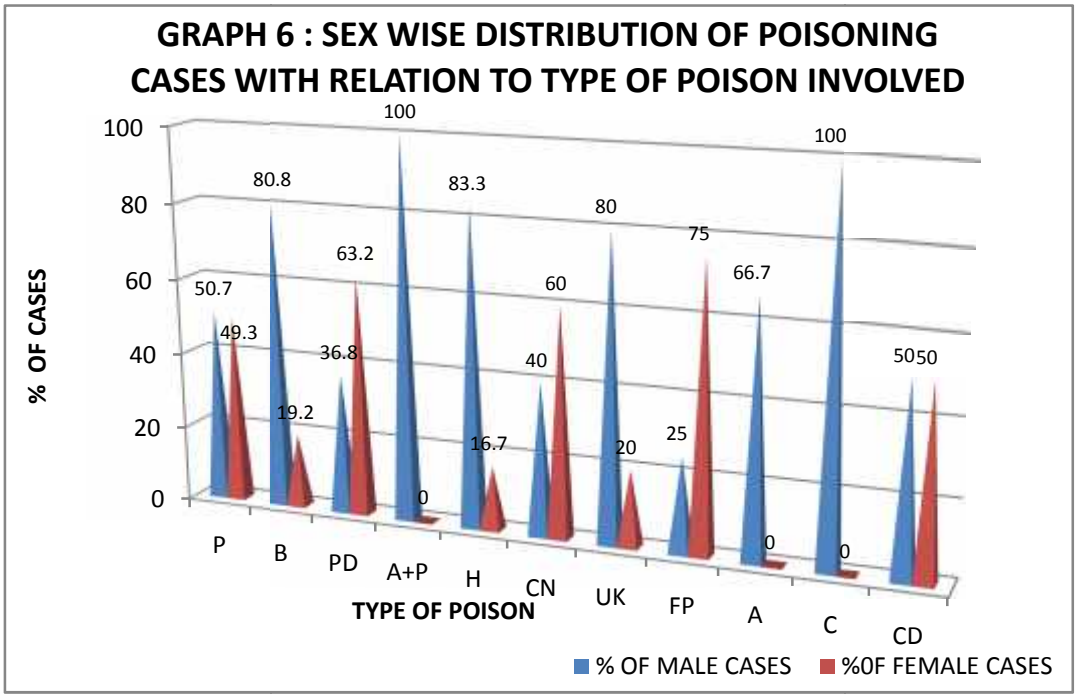


Table 5 : Sex wise distribution of deaths due to poisoning cases with relation to type of poison used.

TYPE OF POISON	TOTAL DEATHS	MALE	FEMALE
PESTICIDES	20	13	07
BITES	05	05	00
PHARMACEUTICAL DRUGS	02	00	02
ALCOHOL + PESTICIDES	03	03	00
HYDROCARBONS	01	00	01
CYANIDES	03	01	02
UNKNOWN	01	01	00
FOOD POISONS	00	00	00
ALCOHOL	00	00	00
CORROSIVE ACIDS	00	00	00
CEREBRAL DELIRIANTS	00	00	00
TOTAL	35	23	12

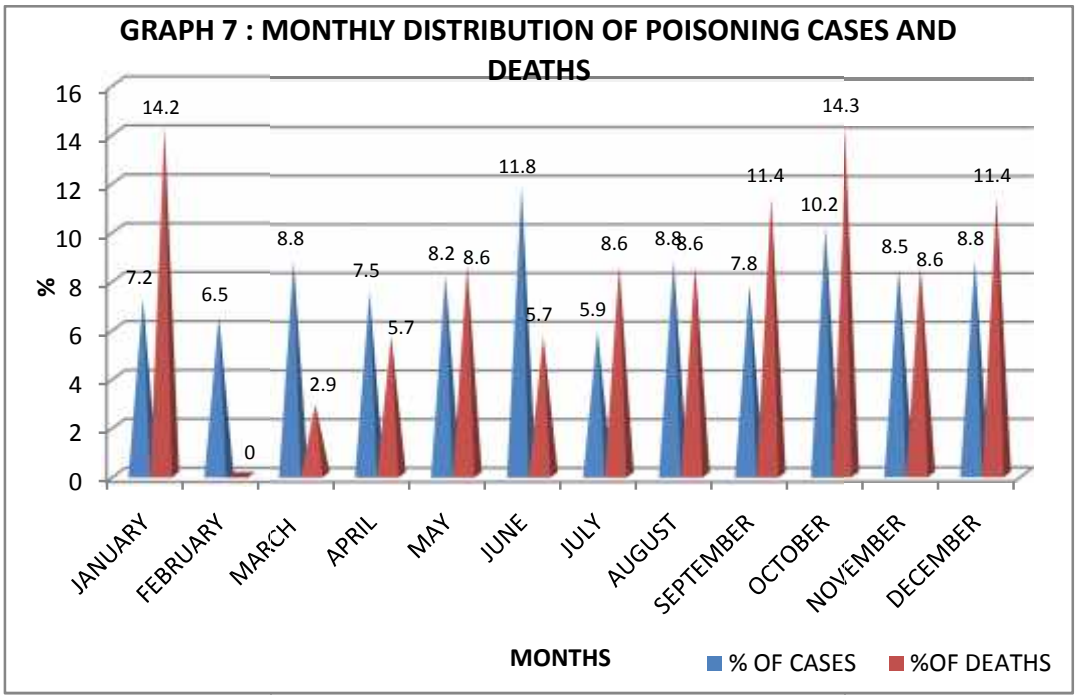
- Out of 35 deaths due to poisoning, 20 (57.1%) deaths were due to pesticide poisoning out of which 13 (65%) were male and 7 (35%) were female. 5 (14.3%) deaths were due to poisoning by animal and insect bites, 3 (8.6%) deaths due to combined poisoning by alcohol and pesticide, 1 death (2.9%) due to unknown poison, which were all male cases. 2 (5.7%) deaths were due to poisoning by pharmaceutical drugs and 1 death (2.9%) due to hydrocarbon poisoning, which were all females. Among 3 deaths (8.6%) due to cyanide poisoning 2 deaths (5.7%) were male and 1 (2.9%) was female.

5) MONTH WISE DISTRIBUTION OF POISONING CASES AND DEATHS :-

Table 6 : Monthly distribution of poisoning cases and deaths.

MONTH	CASES ADMITTED		DEATHS	
	TOTAL	PERCENTAGE	TOTAL	PERCENTAGE
JANUARY	22	7.2%	05	14.2%
FEBRUARY	20	6.5%	00	00%
MARCH	27	8.8%	01	2.9%
APRIL	23	7.5%	02	5.7%
MAY	25	8.2%	03	8.6%
JUNE	36	11.8%	02	5.7%
JULY	18	5.9%	03	8.6%
AUGUST	27	8.8%	03	8.6%
SEPTEMBER	24	7.8%	04	11.4%
OCTOBER	31	10.2%	05	14.3%
NOVEMBER	26	8.5%	03	8.6%
DECEMBER	27	8.8%	04	11.4%
TOTAL	**306**	**100%**	**35**	**100%**

- Out of 306 poisoning cases, maximum cases were seen in the month of June which was 36 cases (11.8%) followed by October – 31 cases (10.2%). Least cases were seen in the month of July – 18 cases (5.9%).
- Out of 35 deaths due to poisoning, maximum deaths were seen in the month of January and October with 5 cases (14.2%) in each month. Least deaths were seen in the month of March with only one death (2.9%). No deaths were recorded due to poisoning in the month of February.

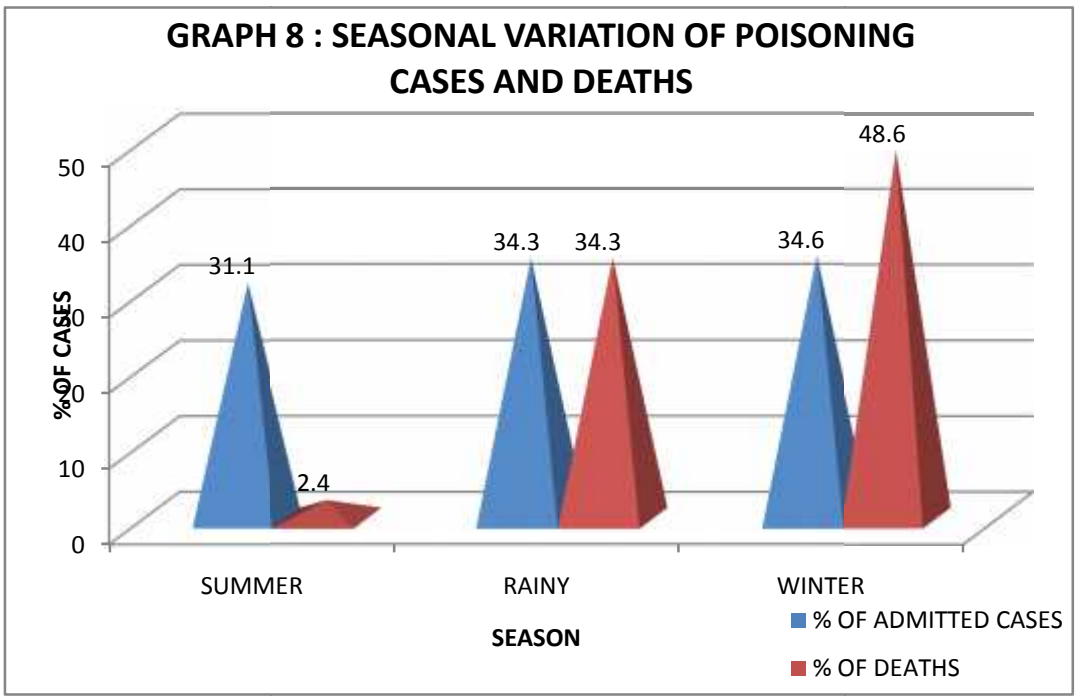


6) SEASONAL VARIATION OF POISONING CASES AND DEATHS :-

TABLE 7 : Seasonal variation of poisoning cases and deaths.

SEASON	ADMITTED CASES		DEATHS	
	TOTAL	PERCENTAGE	TOTAL	PERCENTAGE
SUMMER (FEBRUARY TO MAY)	95	31.1%	06	17.1%
RAINY (JUNE TO SEPTEMBER)	105	34.3%	12	34.3%
WINTER (OCTOBER TO JANUARY)	106	34.6%	17	48.6%
TOTAL	**306**	**100%**	**35**	**100%**

- For assessment of seasonal variation the year was divided into 3 seasons, with 4 months in each season. Summer season from February 1 to May 31, Rainy season from June 1 to September 30 and winter season from October 1 to January 31.
- Out of 306 poisoning cases, maximum number of cases was seen in the winter season which were 106 cases (34.6%) followed very closely by Rainy season with 105 cases (34.3%) and lastly the summer season with 95 cases (31.1%).
- Similarly among the 35 deaths due to poisoning, maximum deaths were seen in the winter season with 17 deaths (48.6%), followed by Rainy season with 12 deaths (34.3%) and lastly summer season with 06 deaths (17.1%).

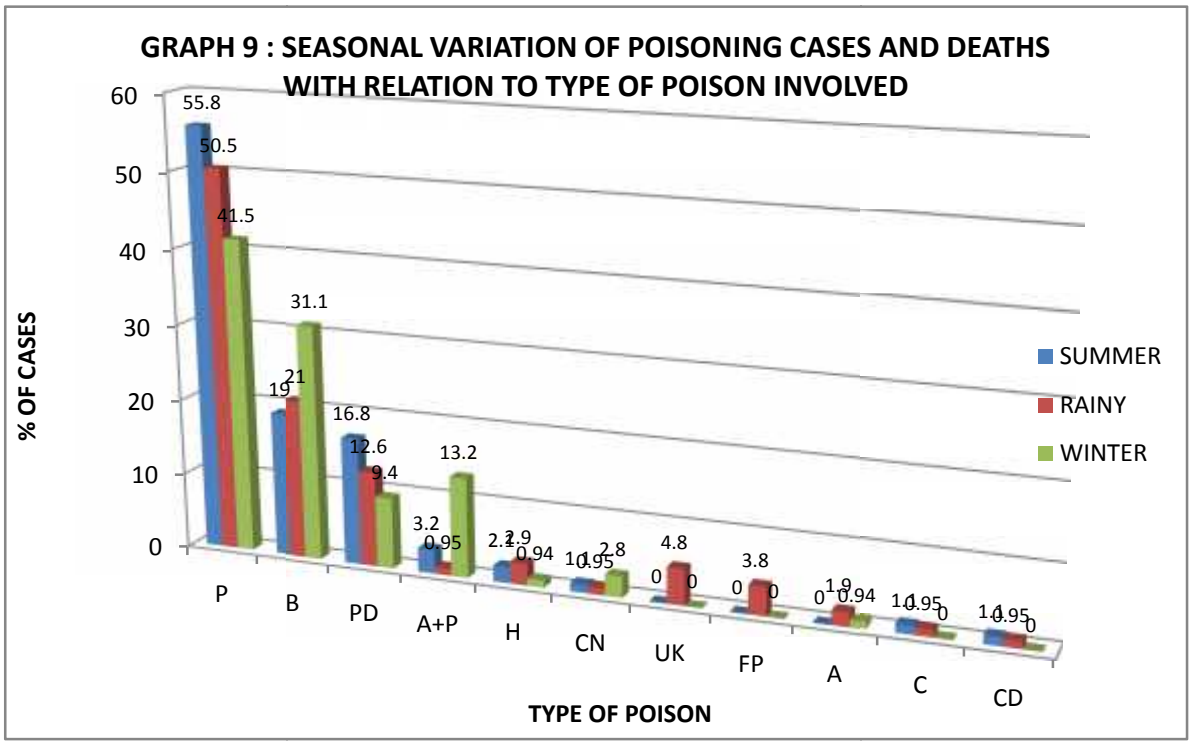

GRAPH 8 : SEASONAL VARIATION OF POISONING CASES AND DEATHS
50
40
30
20
10
0
% OF CASES
31.1
2.4
34.3
34.3
34.6
48.6
SUMMER
RAINY
WINTER
SEASON
% OF ADMITTED CASES
% OF DEATHS

7) SEASONAL VARIATION OF POISONING CASES WITH RELATION TO TYPE OF POISON INVOLVED :-

Table 8 : Seasonal variation of poisoning cases and deaths with relation to the type of poison involved

TYPE OF POISON	ADMITTED CASES (%)			DEATHS (%)		
	SUMMER	RAINY	WINTER	SUMMER	RAINY	WINTER
PESTICIDES	53 (55.8)	53 (50.5%)	44 (41.5%)	05 (83.3%)	07 (58.3)	08 (47.1%)
BITES	18 (19%)	22 (21%)	33 (31.1%)	00 (0%)	02 (16.7)	03 (17.6%)
PHARMACEUTICAL DRUGS	16 (16.8%)	12 (12.6%)	10 (9.4%)	01 (16.7%)	00 (0%)	01 (5.9%)
ALCOHOL + PESTICIDES	03 (3.2%)	01 (0.95%)	14 (13.2%)	00 (0%)	00 (0%)	03 (17.6%)
HYDROCARBONS	02 (2.1)	03 (2.9%)	01 (0.94%)	00 (0%)	01 (8.33%)	00 (0%)
CYANIDES	01 (1.1%)	01 (0.95%)	03 (2.8%)	00 (0%)	01 (8.33%)	02 (11.8%)
UNKNOWN	00 (0%)	05 (4.8%)	00 (0%)	00 (0%)	01 (8.33%)	00 (0%)
FOOD POISONS	00 (0%)	04 (3.8%)	00 (0%)	00 (0%)	00 (0%)	00 (0%)
ALCOHOL	00 (0%)	02 (1.9%)	01 (0.94%)	00 (0%)	00 (0%)	00 (0%)
CORROSIVE ACIDS	01 (1.1%)	01 (0.95%)	00 (0%)	00 (0%)	00 (0%)	00 (0%)
CEREBRAL DELIRIANTS	01 (1.1%)	01 (0.95%)	00 (0%)	00 (0%)	00 (0%)	00 (0%)
TOTAL	95	105	106	06	12	17

- Of all the cases the deaths, maximum number of cases and deaths recorded in all 3 seasons were due to pesticide poisoning which included 53 cases (55.8%) and 5 deaths (83.3%) in summer , 53 cases (50.5%) and 7 deaths (58.3%) in rainy season, 44 cases (41.5%) and 8 deaths (47.1%) in winter season.
- Highest number of cases and deaths due to poisoning and insect bites were seen in winter season which was 33 cases (31.1%) and 3 deaths (17.6%).



8) DISTRIBUTION OF POISONING CASES AND DEATHS BASED ON MANNER OF POISONING :-

Table 9 : Distribution of poisoning cases and deaths based on manner of poisoning with relation to type of poison involved.

TYPE OF POISON	ADMITTED CASES (%)			DEATHS (%)		
	SUICIDAL	ACCIDENTAL	HOMICIDAL	SUICIDAL	ACCIDENTAL	HOMICIDAL
PESTICIDES	142 (69.3%)	08 (8.1%)	00 (0%)	20 (71.4%)	00 (0%))	00 (0%)
BITES	00 (0%)	73 (73.7%)	00 (0%)	00 (0%)	05 (83.3%)	00 (0%)
PHARMACEUTICAL DRUGS	36 (17.6%)	02 (2%)	00 (0%)	01 (3.6%)	00 (0%)	00 (0%)
ALCOHOL + PESTICIDES	18 (8.8%)	00 (0%)	00 (0%)	03 (10.7%)	00 (0%)	00 (0%)
HYDROCARBONS	03 (1.5%)	03 (3%)	00 (0%)	00 (0%)	01 (16.7%)	00 (0%)
CYANIDES	02 (1%)	01 (1%)	02 (100%)	02 (7.1%)	00 (0%)	01 (100%)
UNKNOWN	03 (1.5%)	02 (2%)	00 (0%)	01 (3.6%)	00 (0%)	00 (0%)
FOOD POISONS	00 (0%)	04 (4.5%)	00 (0%)	00 (0%)	00 (0%)	00 (0%)
ALCOHOL	00 (0%)	03 (3%)	00 (0%)	00 (0%)	00 (0%)	00 (0%)
CORROSIVE ACIDS	01 (0.5%)	01 (1%)	00 (0%)	01 (3.6%)	00 (0%)	00 (0%)
CEREBRAL DELIRIANTS	00 (0%)	02 (2%)	00 (0%)	00 (0%)	00 (0%)	00 (0%)
TOTAL	205 (67%)	99 (32.4%)	02 (0.6%)	28 (80%)	06 (17.1%)	01 (2.9%)

- Out of 306 poisoning cases, 205 cases (67%) were suicidal, 99 cases (32.4%) were accidental and 2 cases (0.6%) were homicidal. Among 35 deaths due to poisoning – 28 cases (80%) were suicidal, 6 cases (17.1%) were accidental and 1 case (2.9%) was homicidal.
- Among the 205 suicidal cases – 142 cases (69.3%) involved pesticide poisoning, followed by poisoning by pharmaceutical drugs with 36 cases (17.6%). Among 99 accidental cases of poisoning – 73 cases (73.7%) were due to poisoning by animal and insect bites. Both homicidal cases involved cyanide poisoning.
- Among 28 suicidal deaths 20 deaths (71.4%) were due to pesticide poisoning, among 6 accidental deaths – 5 cases (83.3%) were due to poisoning by animal and insect bites. The only Homicidal death was due to cyanide poisoning.
- Among 205 suicidal cases – 111 cases (54.15%) were males and 94 cases (45.85%) were females. Among 99 accidental cases – 73 cases (73.7%) were males and 26 cases (26.3%) were females. Both homicidal cases were females.

Table 10 : Sex wise Distribution of poisoning cases with relation to manner of poisoning.

SEX	SUICIDAL		ACCIDENTAL		HOMICIDAL	
	TOTAL	PERCENTAGE	TOTAL	PERCENTAGE	TOTAL	PERCENTAGE
MALES (184)	111	54.15%	73	73.7%	00	00%
FEMALES (122)	94	45.85%	26	26.3%	02	100%
TOTAL (306)	**205**		**99**		**02**	

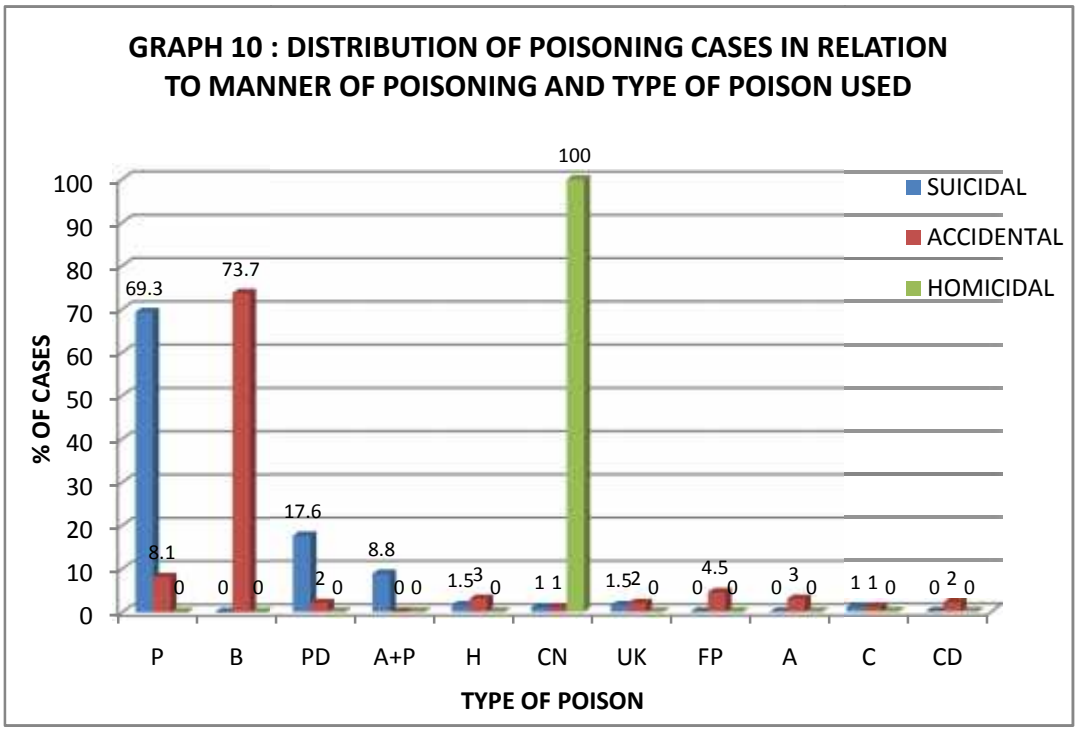
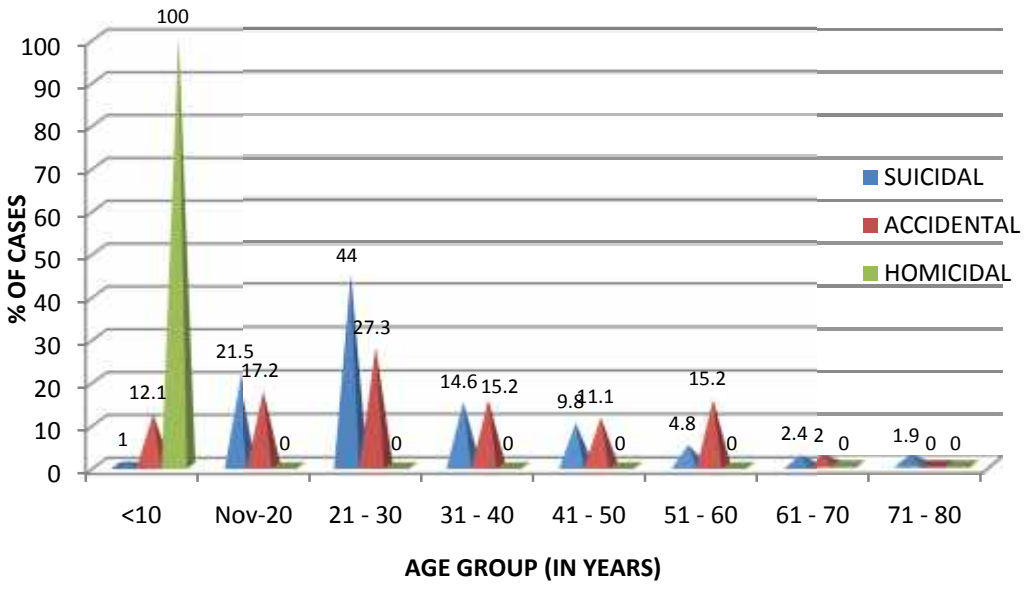


Table 11 : Distribution of poisoning cases with relation to manner of poisoning and age group.

AGE GROUP (IN YEARS)	ADMITTED CASES (%)			DEATHS (%)		
	SUICIDAL	ACCIDENTAL	HOMICIDAL	SUICIDAL	ACCIDENTAL	HOMICIDAL
<10	02 (1%)	12 (12.1%)	02 (100%)	00 (0%)	02 (33.3%)	01 (100%)
11 – 20	44 (21.5%)	17 (17.2%)	00 (0%)	05 (17.9%)	01 (16.7%)	00 (0%)
21 - 30	90 (44%)	27 (27.3%)	00 (0%)	10 (35.7%)	01 (16.7%)	00 (0%)
31 – 40	30 (14.6%)	15 (15.2%)	00 (0%)	04 (14.3%)	00 (0%)	00 (0%)
41 – 50	20 (9.8%)	11 (11.1%)	00 (0%)	02 (7.14%)	02 (33.3%)	00 (0%)
51 – 60	10 (4.9%)	15 (15.2%)	00 (0%)	01 (3.6%)	00 (0%)	00 (0%)
61 – 70	05 (2.4%)	02 (2%)	00 (0%)	03 (10.7%)	00 (0%)	00 (0%)
71 - 80	04 (1.9%)	00 (0%)	00 (0%)	03 (10%)	00 (0%)	00 (0%)
TOTAL	205 (67%)	99 (32.4%)	02 (0.6%)	28 (80%)	06 (17.1%)	01 (2.9%)

- Among the 205 suicidal cases – maximum number of cases were seen in the age group between 21 – 30 years which was 90 cases (44%). Among the 99 accidental cases – highest cases were seen in the age group between 21 – 30 years which was 27 cases (27.3%). Both homicidal cases were seen in the age group less than 10 years.
- Among 28 suicidal poisoning deaths – 10 deaths (35.7%) were in the age group between 21 – 30 years. Among 6 accidental deaths – 2 deaths each (33.3%) were seen in the age group between 41 – 50 years and age group less than 10 years. Both homicidal deaths were seen in age group less than 10 years.

GRAPH 11 : DISTRIBUTION OF POISONING CASES WITH RELATION TO MANNER OF POISONING AND AGE GROUP



9) DISTRIBUTION OF POISONING CASES WITH RELATION TO TRIGGERING FACTOR :-

Table 12 : Distribution of poisoning cases with relation to triggering factor and age group.

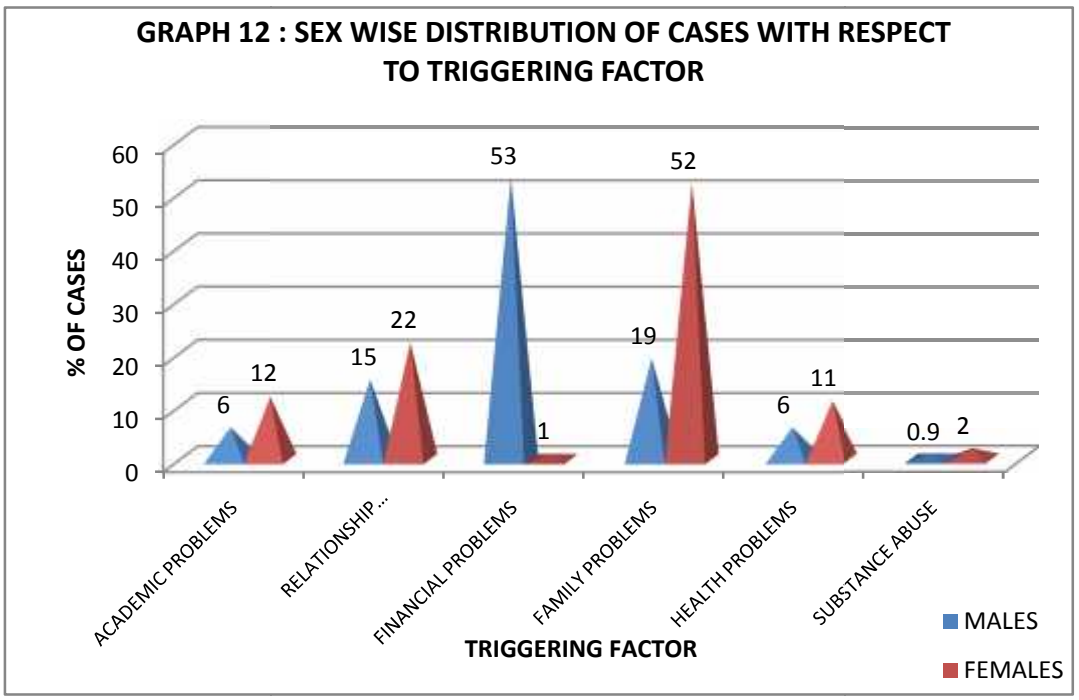
AGE GROUP (IN YEARS)	TRIGGERING FACTOR						TOTAL
	ACADEMIC PROBLEMS	RELATIONSHIP PROBLEMS	FINANCIAL PROBLEMS	FAMILY PROBLRMS	HEALTH PROBLEMS	SUBSTANCE ABUSE	
<10	00	00	00	04	00	00	**04**
11 – 20	18	18	00	08	00	01	**45**
21 – 30	01	20	26	38	06	00	**91**
31 – 40	00	00	14	13	03	00	**30**
41 – 50	00	00	14	06	00	00	**20**
51 – 60	00	00	05	03	02	02	**12**
61 – 70	00	00	02	00	03	00	**05**
71 – 80	00	00	00	00	04	00	**04**
TOTAL	**19**	**38**	**61**	**72**	**18**	**03**	**211**

- Out of 306 cases – 211 cases had a triggering factor for the incident of poisoning. Thus, only these cases are analyzed for assessing the distribution of poisoning cases based on triggering factor.
- Out of 211 cases – 72 cases (34.1%) were due to family problems, 61 cases (28.9%) were due to financial problems, 38 cases (18%) cases were due to relationship problems, 19 cases (9%) were due to academic problems, 18 (8.5%) cases were due to health problems and 3 (1.4%) cases involved substance abuse.

- Maximum number of cases involving family problems, financial problems, health problems and relationship problems were seen in the age group between 21 – 30 years. Maximum cases due to academic problems included the age group between 11 – 20 years. Maximum cases involving substance abuse was seen in the age group between 41 – 50 years.

Table 13 : Sex distribution of poisoning cases with relation to triggering factor.

TRIGGERING FACTOR	MALES		FEMALES	
	TOTAL	**PERCENTAGE**	**TOTAL**	**PERCENTAGE**
ACADEMIC PROBLEMS	07	6.2%	12	12%
RELATIONSHIP PROBLEMS	17	15%	21	22%
FINANCIAL PROBLEMS	60	53.1%	01	1%
FAMILY PROBLEMS	21	18.6%	51	52%
HEALTH PROBLEMS	07	6.2%	11	11%
SUBSTANCE ABUSE	01	0.9%	02	2%
TOTAL	113		98	



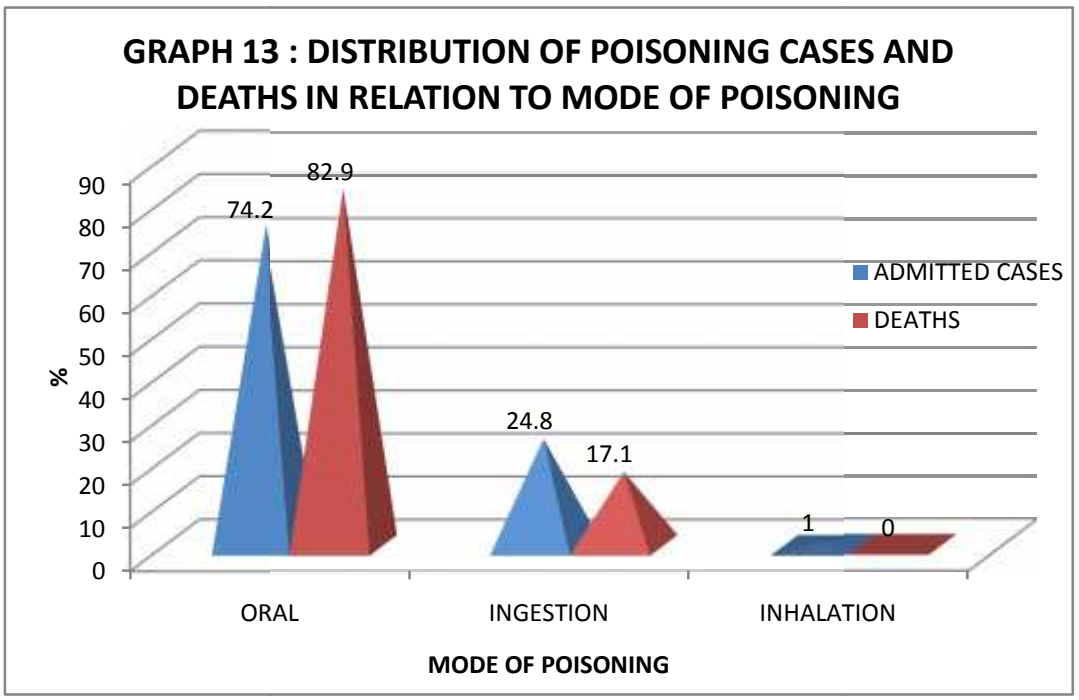
- Among the 211 cases involving triggering factor – 113 cases (53.6%) were male and 98 cases (46.4%) cases were females.
- Among 113 male cases – 60 cases (53%) were due to financial problems and 21 cases (19%) involved family problems.
- Among the 98 female cases – 51 cases (52%) were due to family problems and 21 cases (22%) involved relationship problems.

10) DISTRIBUTION OF POISONING CASES AND DEATHS WITH REPSECT TO MODE OF POISONING :-

Table 14 : Distribution of poisoning cases and deaths in relation to mode of poisoning.

MODE OF POISON	ADMITTED CASES		DEATHS	
	TOTAL	PERCENTAGE	TOTAL	PERCENTAGE
ORAL	227	74.2%	29	82.9%
INJECTION	76	24.8%	06	17.1%
INHALATION	03	1%	00	0%
TOTAL	**306**		**35**	

- Out of 306 poisoning cases – 227 cases (74.2%) involved oral route, 76 cases (24.8%) involved injectable route and 3 cases (1%) involved inhalation route of poisoning.
- Out of 35 deaths due to poisoning – 29 cases (82.9%) involved oral route, 6 cases (17.1%) involved injectable route and no deaths were seen with inhalation route of poisoning.


GRAPH 13 : DISTRIBUTION OF POISONING CASES AND DEATHS IN RELATION TO MODE OF POISONING
90
80
70
60
50
40
30
20
10
0
%
74.2
82.9
24.8
17.1
1
0
ADMITTED CASES
DEATHS
ORAL
INGESTION
INHALATION
MODE OF POISONING

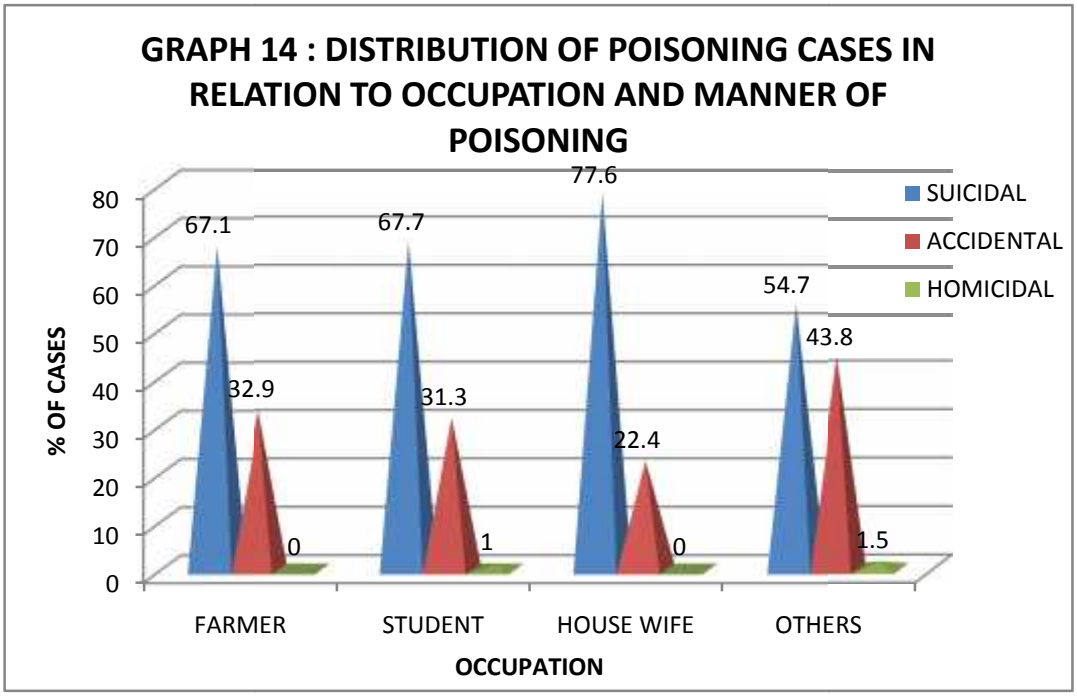
11) DISTRIBUTION OF POISONING CASES WITH RESPECT TO OCCUPATION

Table 15 : Distribution of poisoning cases in relation to occupation along with manner of poisoning and type of poison involved.

TYPE OF POISON	OCCUPATION															
	FARMER				STUDENT				HOUSEWIFE				OTHERS			
	S	A	H	T	S	A	H	T	S	A	H	T	S	A	H	T
PESTICIDES	35	01	00	36	50	03	00	53	39	02	00	41	18	02	00	20
BITES	00	22	00	22	00	22	00	22	00	11	00	11	00	18	00	18
PHARMACEUTICAL DRUGS	01	00	00	01	15	00	00	15	11	00	00	11	09	02	00	11
ALCOHOL + PESTICIDES	13	00	00	13	01	00	00	01	00	00	00	00	04	00	00	04
HYDROCARBONS	01	00	00	01	00	02	00	02	00	00	00	00	02	01	00	03
CYANIDES	00	00	00	00	00	00	01	01	01	00	00	01	01	01	01	03
UNKNOWN	01	00	00	01	00	01	00	01	01	00	00	01	01	01	00	02
FOOD POISONS	00	00	00	00	00	02	00	02	00	01	00	01	00	01	00	01
ALCOHOL	00	01	00	01	00	00	00	00	00	01	00	01	00	01	00	01
CORROSIVE ACIDS	00	00	00	00	01	00	00	01	00	00	00	00	00	01	00	01
CEREBRAL DELIRIANTS	00	01	00	01	00	01	00	01	00	00	00	00	00	00	00	00
TOTAL	**51**	**25**	**00**	**76**	**67**	**31**	**01**	**99**	**52**	**15**	**00**	**67**	**35**	**28**	**01**	**64**

- Among 306 poisoning cases 76 cases (24.8%) involved farmers. Out of these 76 cases – maximum cases were suicidal – 51 cases (76.1%), involving 35 pesticide poisoning cases (68.6%).

- 99 cases (32.3%) involved students, out of which – maximum cases were suicidal – 67 cases (67.7%), involving 50 cases (74.6%) of pesticide poisoning.
- 67 cases (21.9%) involved house wives, out of which 52 cases (77.6%) were suicidal involving 39 cases (75%) of pesticide poisoning.
- 64 cases (20.9%) involved other occupation, out of which 35 cases (54.7%) were suicidal – involving 18 cases (51.4%) of pesticide compound poisoning.

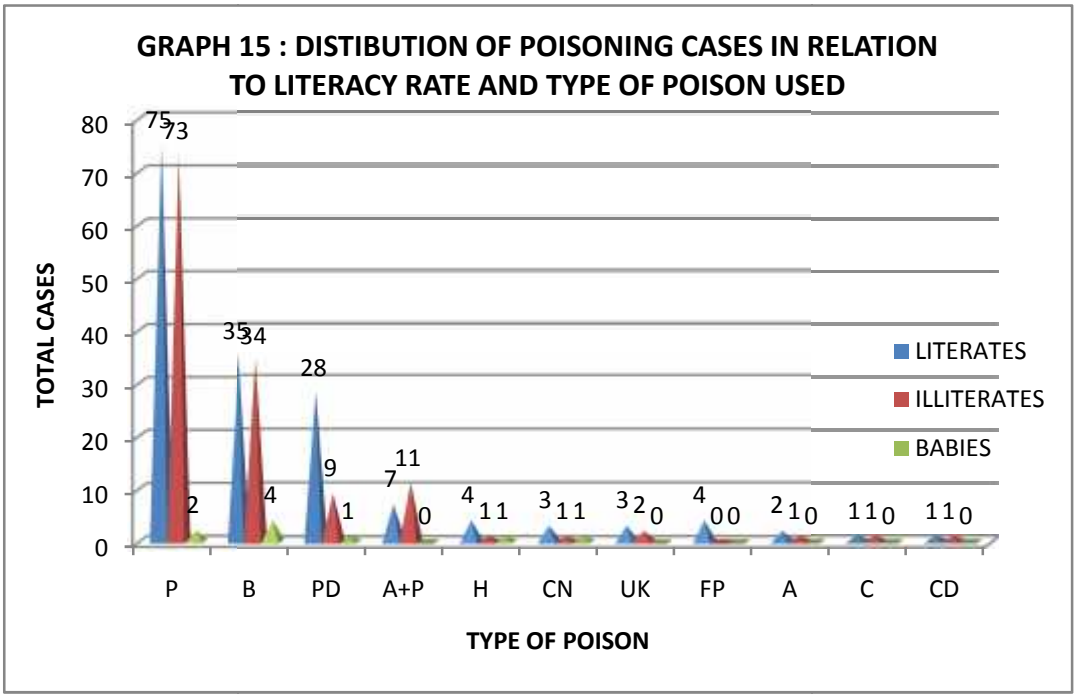


12) DISTRIBUTION OF POISONING CASES IN RELATION TO LITERACY RATE

Table 16 : Distribution of poisoning cases in relation to literacy rate, manner of poisoning and type of poison involved :

TYPE OF POISON	LITERATES				ILLITERATES				BABY			
	S	A	H	T	S	A	H	T	S	A	H	T
PESTICIDES	72	03	00	75	70	03	00	73	00	02	00	02
BITES	00	35	00	35	00	34	00	34	00	04	00	04
PHARMACEUTICAL DRUGS	27	01	00	28	09	00	00	9	00	01	00	01
ALCOHOL + PESTICIDES	07	00	00	07	11	00	00	11	00	00	00	00
HYDROCARBONS	02	02	00	04	01	00	00	01	00	01	00	01
CYANIDES	01	01	01	03	01	00	00	01	00	00	01	01
UNKNOWN	01	02	00	03	02	00	00	02	00	00	00	00
FOOD POISONS	00	04	00	04	00	00	00	00	00	00	00	00
ALCOHOL	00	02	00	02	00	01	00	01	00	00	00	00
CORROSIVE ACIDS	01	00	00	01	00	01	00	01	00	00	00	00
CEREBRAL DELIRIANTS	00	01	00	01	00	01	00	01	00	00	00	00
TOTAL	111	51	01	163	94	40	00	134	00	08	01	09

- Out of 306 poisoning cases - 163 cases (53.3%) involved literate population, of which 111 cases (68.1%) cases were suicidal using pesticide poison in 72 cases (64.9%).
- 134 cases (43.9%) involved illiterate population, out of which 94 cases (70.1%) cases were suicidal using pesticide poison in 70 cases (74.5%).
- 9 cases (2.9%) involved babies less than 5 years of age, out of which 8 cases (88.9%) were accidental and 1 case (11.1%) was homicidal.



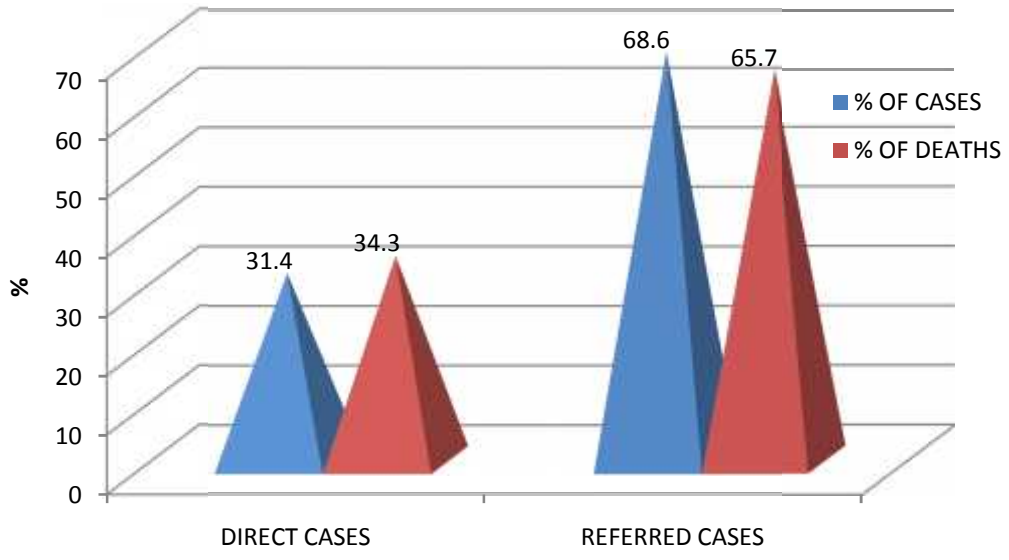
13) DISTRIBUTION OF POISONING CASES AND DEATHS BASED ON TIME INTERVAL BETWEEN INCIDENT OF POISONING AND ARRIVAL TO HOSPITAL :-

Table 17 : Distribution of poisoning cases and deaths with relation to incident of poisoning and arrival to hospital.

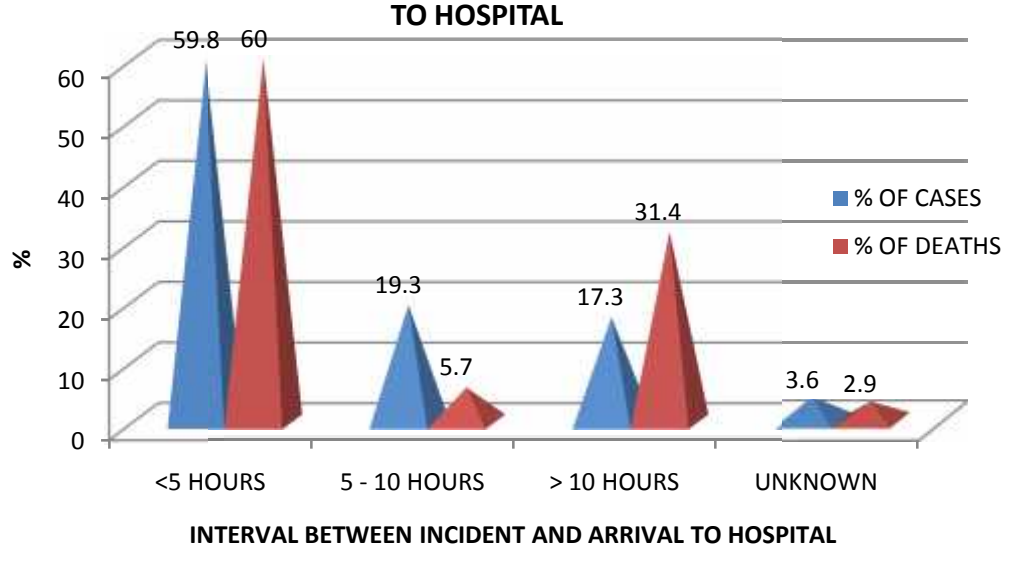
TYPE OF POISON	DIRECT CASES (96)						REFERRED CASES (210)					
	<5 Hrs		5 - 10 Hrs		>10 Hrs		<5 Hrs		5 – 10 Hrs		>10 Hrs	
	A	E	A	E	A	E	A	E	A	E	A	E
PESTICIDES	27	03	05	00	01	00	64	09	24	01	20	05
BITES	12	01	03	00	00	00	31	00	08	00	18	04
PHARMACEUTICAL DRUGS	16	02	07	01	03	00	06	00	02	00	03	00
ALCOHOL + PESTICIDES	04	01	01	00	00	00	09	01	02	00	01	01
HYDROCARBONS	02	01	00	00	00	00	02	00	00	00	02	00
CYANIDES	04	03	00	00	00	00	00	00	00	00	01	00
UNKNOWN	00	00	00	00	01	00	01	00	02	00	01	01
FOOD POISONS	00	00	04	00	00	00	00	00	00	00	00	00
ALCOHOL	01	00	01	00	00	00	01	00	00	00	00	00
CORROSIVE ACIDS	01	00	00	00	00	00	01	00	00	00	00	00
CEREBRAL DELIRIANTS	00	00	00	00	00	00	01	00	00	00	01	00
TOTAL	**67**	**11**	**21**	**01**	**05**	**00**	**116**	**10**	**38**	**01**	**48**	**11**

- Out of 306 poisoning cases – 210 cases (68.6%) were referred to tertiary centre from other hospitals, out of which 116 cases (55.2%) were referred within 5 hours of incident, 38 cases (18.1%) were referred within 5 – 10 hours of incident and 48 cases (22.9%) were referred after more than 10 hours of incident. Out of these 210 referred cases – 22 cases (10.5%) expired which was 62.9% of total deaths (35). 11 deaths (50%) of these 22 deaths were referred after more than 10 hours of the incident.
- Out of 306 poisoning cases – 96 cases (31.4%) came directly to the tertiary care hospital, out of which, 67 cases (69.8%) came within 5 hours, 21 cases (21.9%) within 5 – 10 hours and 5 cases (5.2%) after 10 hours of incident of poisoning. Of these 96 cases – 12 cases (12.5%) expired which was 34.3% of total deaths. 11 deaths (91.7%) came within 5 hours and 1 death was seen in case coming within 5 – 10 hours.
- Out of 306 cases – 183 (59.8%) cases came to tertiary care hospital within 5 hours of incident, 59 cases (19.3%) came within 5 – 10 hours and 53 cases (17.3%) came after 10 hours of incident.
- Out of 35 deaths - 21 deaths (60%) were seen in cases coming within 5 hours of incident, 11 deaths (31.4%) seen in cases coming after 10 hours of incident and 2 deaths in cases coming within 5 – 10 hours of incident. In 1 case the time of incident was not known so it was excluded from this analysis.
- Pesticide poisoning was the most common type of poison involved in all cases and deaths, except in direct cases coming after 5 hours which saw pharmaceutical drug poisoning being the most common type of poison.

GRAPH 16 : DISTRIBUTION OF POISONING CASES AND DEATHS BASED ON ARRIVAL TO HOSPITAL



GRAPH 17 : DISTRIBUTION OF POISONING CASES AND DEATHS BASED ON TIME INTERVAL BETWEEN INCIDENT AND ARRIVAL TO HOSPITAL

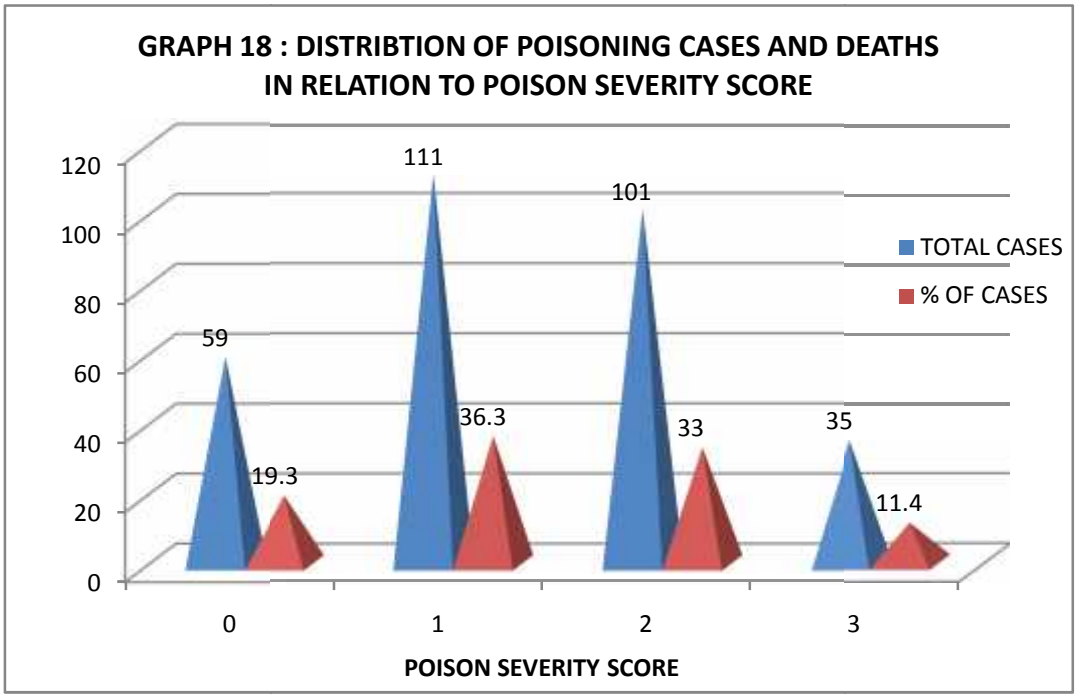


14) DISTRIBUTION OF POISONING CASES AND DEATHS BASED ON POISON SEVERITY SCORE :-

Table 18 : Distribution of poisoning cases and deaths in relation to poison severity score :

TYPE OF POISON	POISON SEVERITY SCORE			
	0	**1**	**2**	**3**
PESTICIDES	23	61	47	20
BITES	18	22	28	05
PHARMACEUTICAL DRUGS	11	14	10	02
ALCOHOL + PESTICIDES	01	04	10	03
HYDROCARBONS	01	01	03	01
CYANIDES	00	02	00	03
UNKNOWN	04	00	00	01
FOOD POISONS	00	04	00	00
ALCOHOL	00	02	01	00
CORROSIVE ACIDS	00	01	01	00
CEREBRAL DELIRIANTS	01	00	01	00
TOTAL	**59**	**111**	**101**	**35**

- Poison severity score includes 4 grades = 0 – nil/minimal signs and symptoms. 1 – mild, transient and spontaneously resolving symptoms. 2 – pronounced or prolonged symptoms. 3 – severe or life threatening symptoms..
- Out of 306 cases – maximum cases belonged to grade 1 = 111 cases (36.3%), followed by grade 2 = 101 cases (33%), grade 0 = 59 cases (19.3%) and lastly grade 3, the deaths = 35 cases (11.4%).
- Pesticide poison was the most common type of poison involved in all grades.



DISCUSSION

1) **COMMON TYPE OF POISON INVOLVED** :-

During the present study period of 1 year from January 1, 2014 to December 31, 2014, a total of 306 poisoning cases were admitted to KLES's Dr Prabhakar Kore Hospital and MRC, Belagavi. Out of these, maximum number of cases were due to pesticides – 150 cases (49%).

This result is similar to the results conducted at Khulna Medical College, Bangladesh[13], where it was 27.64%, Annapoorna Medical College and Hospitals, Salem, Tamil Nadu with 58.66%[38], JSS Medical College, Mysuru, with 39.5%[29] and many other studies had the same result in favour of pesticides with varying percentages.

But this result of pesticide dominancy is in contrast with results of studies conducted at Emergency Department of Thammasat University Hospital, Thailand, where most common type of poison involved were pharmaceutical drugs (38.1%)[25], Complexo Hospitalario De Pontevedra, Spain – where 70.4 % cases were due to drugs of abuse, including 61% cases of ethyl alcohol[16], Emergency Medical Department of Burdwan Medical College and hospital, Burdwan, West Bengal – where maximum cases 31.9% were due to snake bites[34], and many other studies which involved theraupatic medicines with or without alcohol as highest number of cases in varying percentages.

These contrasting results show that pesticide poisoning cases are more common in Indian states and nearby Asian countries like Nepal and Bangladesh, where as pharmaceutical drugs and alcohol intoxication are more

commonly involved in Middle East countries, European and North American countries.

These differences can be attributed to a number of factors like – India being a developing country depends a lot on agriculture, making pesticides easily available at many homes. The people are educated about such chemicals as well making them a common means to commit intentional poisoning cases. Whereas in other countries which are developed, not depending more on agriculture – pharmaceutical drugs and alcohol are the poisons which are being used more commonly. West Bengal being a place with dense forests has more number of poisoning as a result of snake bites. Thus type of poison depends upon the geographical areas, knowledge about poisons in various communities, social practices and easy availability of poisons.

2) **OVERALL MORTALITY AND MORTALITY RELATED TO TYPE OF POISON** :-

In the present study, out of 306 cases, 35 cases expired which is an overall mortality rate of 11.4%. This result is similar to the results conducted at Medical emergency to the Department of Medicine, GTB Hospital, Delhi, where overall mortality rate was 13.18%[10], Kasturba Medical College, Manipal – 16.24%[32], Department of Medicine, Victoria Hospital, Bengaluru – 14.81%[31], Narayana Medical College and Hospital, Nellore – 9.9%[39], Tikur Anbessa University, Ethiopia – 8.6%[15].

The results of the present study are in contrast with the results of the studies which were done at Emergency Department of Thammasat University Hospital, Thailand, where overall mortality rate was 0.27%[25], Erciyes UniversityMedical School, Kayseri, Turkey – 1.6%[26], Complexo Hospitalario

De Pontevedra, Spain – 0.2%[16], Hamad General Hospital, Qatar – 1.17%[14], Tarsus State Hospital, Mercin, Turkey – 0.4%[18], Dr. D.Y. Patil Medical College, Navi Mumbai – 0%[36], JSS Medical College, Mysuru – 4%[29], Shri B M Patil Medical College, Bijapur – 7.4%[30].

The results of these studies can again be attributed to the same reasons quoted previously. The agents which are meant to protect crops, are unfortunately being used by humans to kill themselves. This variation in mortality rate evidently shows that developing countries like India and Bangladesh, where agriculture is a main occupation have more fatality due to pesticide poisoning. Whereas, the developed countries like USA, European countries, Middle-eastern countries have a very low mortality rate due to poisoning. This also proves that the developed countries have a better setup with modern instruments and management techniques to deal with any case of poisoning. Even the financial status plays a major factor in affording the best medical treatment possible. All these factors have brought down the mortality rate in developed countries.

3) **AGE WISE DISTRIBUTION OF POISONING CASES AND DEATHS**:-

In the present study, out of 306 poisoning cases the maximum number of cases and deaths were in the age group between 21-30 years – 117 cases (38.2%) and 11 deaths (31.4%) respectively. This result is similar to the result obtained from studies conducted at Thammasat University, Thailand, where 21-40 years age group showed the highest number of poisoning cases[25], Erciyes University, Kayseri, Turkey – 47%[26], KMC/MGM Hospital, Warangal, Andhra Pradesh – 66%[41], Government District Hospital, Nilgiris, Tamil Nadu – 41.24%[40], SMI Hospital, Dehradun, Uttarakhand – 80%[37], Dr.

D.Y. Patil Medical College, Navi Mumbai – 44.6%[36], Civil Hospital, Ahmadabad – 45.08%[35], Victoria Hospital, Bengaluru – 50%[31], GTB Hospital, Delhi – 42.6%[10], B M Patil Medical College, Bijapur – 45.76%[30], Manipal Hospital, Karnataka, 31.2%[32].

Contrasting results were seen in studies conducted at Complexo Hospitalario De Pontevedra, Spain, where the mean age was 35 years[16], Khulna Medical College, Bangladesh – 37% of cases were in between the age group 11-20 years[13]. Hamad General Hospital, Qatar, mean age group involve was 35 years[14]. Haifa, Israel – 43.1% cases involved children less than 6 years of age[19].

The present study and along with the other studies gives a clear picture that the youth between 21-30 years of age are more associated with poisoning cases. Among these, majority of the cases are suicidal, which is a big loss to a nation. Reasons for these results are many which have already been explained, like financial problems, relationship problems, family problems, academic problems, health related problems, etc.

4) <u>SEX WISE DISTRIBUTION OF POISONING CASES AND DEATHS :-</u>

In the present study, out of 306 cases, 184 cases (60.1%) are males and the rest 122 cases (39.9%) are females. Male: Female ratio being 1.51:1. Among the deaths – 22 deaths (62.9%) were males and the rest 13 deaths (37.1%) were female with male : female ratio of 1.69 : 1.

The results obtained in this study were similar to the results which were obtained from studies conducted at An-Najah National University,

Nablus, Palestine, where the male : female ratio was 1.5 : 1[22], Khulna Medical College, Bangladesh – 1.4 : 1[13], Hamad General Hospital, Qatar – where 65% of poisoning cases were associated with males[14], USM Bertam, Malaysia – where 61% of poisoning cases were associated with males[27]. Among Indian studies almost all results show male predominance in poisoning cases with varying percentage and ratios.

Contrasting results were seen in studies conducted at Thammasat University Hospital, Thailand – where 65% of cases realted to poisoning were associated with males[25], Erciyes University Medical School, Kayseri, Turkey – 65% poisoning cases involved females[26], University of Iceland – female : male ratio was 1.23 : 1[17]. Among Indian studies conducted at GMC, Srinagar[12] and Burdwan Medical College and Hospital[34] – the results showed predominance of females in these areas in relation to poisoning cases.

These results of male predominance can be attributed to the fact that – males being the dominant and working half of the family is exposed to lot of stress due to various factors as explained earlier which may lead to increased number of cases, and also the fact that males are the ones involved in more of travelling, so are more exposed to poisoning by animal bites. Whereas females, in India are well guarded from adversities of life from childhood to old age, by parents, husband and then by children making them less vulnerable to stress and so are less exposed to poisonings. But the trends are changing slowly with time, exposing the females to more of stress thus slowly increasing the incidence of poisonings in females.

5) **DISTRIBUTION OF CASES BASED ON MANNER OF POISONING** :-

In the present study, out of 306 cases, 205 cases (67%) were suicidal, 99 cases (32.4%) were accidental and 2 cases (0.6%) were homicidal. Among 35 deaths due to poisoning – 28 cases (80%) were suicidal, 6 cases (17.1%) were accidental and 1 case (2.9%) was homicidal.

This result is similar to almost all the studies conducted in India and also out of India with varying percentages except in a study which was conducted at Poison Control and Drug Information Centre, An-Najah National University, Nablus, Palestine – where 92% of the cases were unintentional type of poisoning, with poisoning through stings being the most common type of poison[22].

From these results it is evident that – in most of the poisoning cases all over the world, suicide is the most common manner of poisoning, irrespective of developed and developing countries. The intentions behind these poisonings differ with each area and with age groups.

In this study the triggering factor behind the intentional poisoning is also studied which is not done in other studies. Thus, making this one of the unique feature of this study. Out of 306 poisoning cases, 211 cases were intentional, out of which - 72 cases (34.1%) were due to family problems, 61 cases (28.9%) were due to financial problems, 38 cases (18%) cases were due to relationship problems, 19 cases (9%) were due to academic problems, 18 (8.5%) cases were due to health problems and 3 (1.4%) cases involved substance abuse.

According to the age group, among the cases belonging to age group 11 – 25 years – academic and relationship problems are the most common triggering factors for suicide and among the adults – financial and family problems are the most common causes leading to suicide.

6) **DISTRIBUTION OF CASES BASED ON OCCUPATION** :-

In the present study, among 306 poisoning cases - 76 cases (24.8%) involved farmers, 99 cases (32.3%) involved students, 67 cases (21.9%) involved house wives and 64 cases (20.9%) involved other occupation. Maximum number of poisoning cases involved students.

According to study conducted at Annapoorana Medical College and Hospital, Salem, Tamil Nadu – poisoning cases were commonly associated with housewives (28%) followed by male labourers (18.66%), students – 16.6% and farmers (13.33%)[38]. In a study conducted at Burdwan Medical College and Hospital, Burdwan, West Bengal – majority of the poisoning cases involved housewives followed by farmers, businessmen, labourers and students respectively in varying percentages[34]. In a study conducted at Manipal, Karnataka – 44.8% of cases involved labourers, followed by housewives (13.2%), students (12.5%)[32].

These all results show changes in trends of poisoning. Earlier it was the farmers who were commonly associated with poisoning cases, but now the trends are changing, housewives (as evident in other studies) and children (as evident in present study) are now being exposed to lot of stress leading to increase in poisoning cases among these population. Children are exposed to academic stress, relationship break ups etc causing increased mental tension which ends up in consumption of poison available at home. Same with

housewives who are exposed to mental stress due to increased family problems, making them vulnerable.

7) **DISTRIBUTION OF CASES BASED ON LITERACY LEVEL** :-

In the present study, out of 306 poisoning cases - 163 cases (53.3%) involved literate population, 134 cases (43.9%) involved illiterate population and 9 cases (2.9%) involved babies less than 5 years of age.

This result shows changes in trends of poisoning. Earlier studies have shown that it's the illiterate population which were more commonly associated with poisoning cases, more commonly suicides – due to financial problems, but now there are many triggering factors which have come up to lead to poisoning in majority of population with varying age groups.

It is indeed very disappointing to state that maximum poisoning cases are associated to literate population – most of them use pharmaceutical drugs followed by pesticides for poisoning, in contrast to illiterate population who commonly use pesticides. This shows that easy availability of pesticides and pharmaceutical drugs can be so hazardous.

8) **SEASONAL VARIATION IN POISONING CASES** :-

In the present study, out of 306 poisoning cases - maximum number of cases was seen in the winter season which were 106 cases (34.6%) followed very closely by Rainy season with 105 cases (34.3%) and lastly the summer season with 95 cases (31.1%). Similarly among the 35 deaths due to poisoning, maximum deaths were seen in the winter season with 17 deaths (48.6%), followed by Rainy season with 12 deaths (34.3%) and lastly summer season with 06 deaths (17.1%).

Contrasting results were obtained in studies conducted at An-Najah National University, Nablus, Palestine – where maximum number of cases occurred during the summer season[22], Complexo Hospitalario de Pontevedra, Spain[16] – also shows maximum cases in the summer season. Among Indian studies – studies conducted at Annapoorana Medical College and Hospital, Salem, Tamil Nadu[38] and at Shri B M Patil Medical College Hospital and Research Centre, Bijapur[30] – both show maximum number of poisoning cases in summer season with varying percentages.

According to the results obtained it is clear that there is a change in trend as related to seasonal variation. All others studies show maximum number of cases in summer season but in this study maximum cases are associated with winter season, demonstrating changes in trends and pattern.

9) **DISTRIBTION OF CASES BASED ON MODE OF POISONING** :-

In the present study, out of 306 poisoning cases - 227 cases (74.2%) involved oral route, 76 cases (24.8%) involved injectable route and 3 cases (1%) involved inhalation route of poisoning. Out of 35 deaths due to poisoning – 29 cases (82.9%) involved oral route, 6 cases (17.1%) involved injectable route and no deaths were seen with inhalation route of poisoning.

Contrasting result is obtained in only one study which was conducted at An-Najah National University, Nablus, Palestine – where maximum number of cases involved stings as a route of poisoning – 72.3%[22].

This result is the same in almost all the studies. Apart from poisoning due to animal bites, most of the poisons used or involved are commonly taken orally, making oral route the most common mode of poisoning. Inhalational

exposure is rare in all the places. Pesticides being the most common poison used - also shows that oral route is easiest way to get exposure to a poison.

10) **DISTRIUTION OF CASES BASED ON TIME INTERVAL BETWEEN INCIDENT OF POISONING AND ARRIVAL TO HOSPITAL** :-

In the present study, out of 306 poisoning cases - 183 (59.8%) cases came to tertiary care hospital within 5 hours of incident, 59 cases (19.3%) came within 5 – 10 hours and 53 cases (17.3%) came after 10 hours of incident. Out of 35 deaths - 21 deaths (60%) were seen in cases coming within 5 hours of incident, 11 deaths (31.4%) seen in cases coming after 10 hours of incident and 2 deaths in cases coming within 5 – 10 hours of incident.

Out of 306 poisoning cases - 210 cases (68.6%) were referred to tertiary centre from other hospitals and 96 cases (31.4%) came directly to the tertiary care hospital.

According to a study conducted at Burdwan Medical College and Hospital, Burdwan, West Bengal – the mean time interval between exposure to poison and admission to hospital was 6.4 hours with standard deviation of 2.29 hours[34]. According to a study conducted at Department of Medicine, Victoria Hospital, Bengaluru – 54.3% of the cases were referred from other hospitals[31]. No other studies have mentioned about the relation between time interval between incident of poisoning and arrival to hospital.

From this result it is evident that – the cases which come to the hospital early have better chances of survival, as the time gap increases between the incident of poisoning and arrival to hospital – the chances of survival decreases. Among the cases which come directly to the tertiary care – better care and early detection and prompt management is given and survival rate is

good, whereas cases referred from other hospitals, the survival rate reduces as there is delay in detection of type of poison, facilities for management are not adequate – leading to improper management of the case, thus reducing the survival chances and increasing the mortality and morbidity. This highlights the need of poison centres at village levels where maximum cases are associated with.

11) **DISTRIBUTION OF CASES BASED ON POISON SEVERITY SCORE** :-

In the present study, out of 306 poisoning cases – maximum cases belonged to grade 1 = 111 cases (36.3%), followed by grade 2 = 101 cases (33%), grade 0 = 59 cases (19.3%) and lastly grade 3, the deaths = 35 cases (11.4%).

Only one study has mentioned about the poison severity score – a study conducted at Department of Toxicology Advanced Medical and Dental Institute, USM Bertam, Malysia – where 87.8% of cases belonged to grade 0 – minor signs and symptoms[27].

No other studies have mentioned about the Poison Severity Score making this a unique study. Knowing the severity scores of poisoning cases and poison used helps to understand the burden of poisoning cases in the area and improve the management techniques wherever possible.

CONCLUSION

- The incidence of poisoning in India is among the highest in the world. It is estimated that more than 50,000 people die every year from toxic exposure. India still being a developing country, depends largely on agriculture, which leads to maximum number of cases of poisoning due to pesticides, mainly organophosphorous compounds. While in developed countries rate of mortality is as low as 1 – 2%, in India it varies from a shocking 10 – 35%.
- The present study is done to study the pattern of poisoning cases in the area, which also demonstrates that pesticides are the most common type of poison causing poisoning in this region with 49% of cases followed by poisoning due to insect and animal bites with 23.9% of cases. Out of 35 deaths which is total mortality rate of 11.4 %, maximum number of deaths, 57.1% deaths, were as a result of pesticide poisoning.
- It is a very sad thing to state the maximum number of cases and deaths were seen in literate population of the area 53.3%, out of which 68.1% cases were suicidal. Out of all cases 67% cases were suicidal, among which maximum number of cases involved family problems as a triggering factor for the incident, followed by 28.9% cases as a result of financial problems and 18% cases due to relationship problems.
- Most of the cases and deaths were seen in the age group between 21 – 30 years, 38.2% and 32.4% respectively, which is a very disheartening fact seen during the study. Most of the literate youths committing suicide in this region show that poisoning cases are not only physical but also involves mental aspect as well.

- By studying the various triggering factors it is clear that, females cases are more due to family problems, male poisoning cases are maximum due to financial problems, and maximum cases in age group between 11 – 30 years are due to academical and relationship problems. Financial problems being more common among the farmers, which is known fact since a long time and still continues.
- These problems of farmers can be curbed by educating them about newer and proper methods of agriculture, subsidies by the government, proper agricultural loan system, avoiding middle men (brokerage) for selling products, and providing pension schemes and other facilities for the below poverty line people and their families. Frequent awareness campaigns regarding such measures should be done in villages to prevent the cases.
- Accidental poisoning cases were maximum due to poisoning by animal and insect bites, especially in people working in fields and outer areas, which can be curbed by wearing proper clothing, proper footwear and imparting prompt education regarding bites and its proper management. Accidental cases in children and babies are due to household pesticide products and pharmaceutical drugs kept open at home, which can be reduced by properly capping the poisonous bottles and labelling them clearly and should be kept at a safe place away from kids and babies. Proper watch has to be kept over the babies and kids.
- The study also shows that maximum cases and deaths due to poisoning are seen in cases which are referred to the hospital and significant cases reach the hospital after 5 hours of incident of poisoning, and among the total deaths, most of the deaths are seen in cases coming within 5 hours of poisoning

incident. These facts may be due to poor management techniques at other centres and also due to problems at tertiary hospital where treatment is given based on the signs and symptoms solely, which is correct in initial stages, but later the type of poison has to be confirmed and proper required treatment should be started.

- In relation to the above facts, role of Poison Detection Centres/ Poison Information Centres, Forensic Science Laboratories becomes important and has to be highlighted. Our tertiary centre has the facility of a Poison Detection Centre, which helps in early detection of type of poison in living cases within one hour and prompt treatment can be started as soon as possible. A Regional Forensic Science Laboratory is also available in the region, which helps in detection of type of poison in deaths due to poisoning. Such centres should be established in maximum areas so that the delays and referral cases are reduced.
- Such centres also help in recording the correct statistics with respect to type of poison, at the regional level which in turn helps to get a central level statistics and the burden of poisoning cases can be found out at both regional and central level, thus formulating prompt management protocols and preventive strategies to reduce the incidence and mortality due to poisoning.
- Thus in the light of results of the study and all these possible causes for it – curbing the poisoning cases and deaths is a very tough job, but not impossible. With combined effects from the government, doctors, other related authorities and most importantly by the individual himself, the burden can be reduced to a very large extent.

  One such effort is done by conducting this study.

SUMMARY

- The present study is a cross sectional study, conducted at a tertiary care centre which is KLES's Dr Prabhakar Kore Hospital and MRC, along with attached autopsy block, Belagavi, for a period of 1 year from January 1, 2014 to December 31, 2014.
- The objective of the study was to study the pattern of poisoning cases coming to the tertiary care centre, and study the relationship between all the factors and thus to know the burden of poisoning cases and deaths due to poisoning at the centre.
- During the study period total of 306 poisoning cases came to tertiary centre out of which 35 cases expired and were subjected to autopsy at the same centre. A predesigned and pretested proforma was used to collect the required data, and the details were collected from the relatives, attenders, casualty medical officers, by examination of the victims in the casualty/wards and from the medical records of the victims, autopsy reports, Forensic Science laboratory reports and Poison Detection centre reports.
- After analyzing the data collected, following were the findings :-

1. A total of 306 poisoning cases came to the tertiary centre during the study period, out of which 150 cases (49%) were due to pesticide poisoning followed by 73 cases (23.9%) of poisoning from animal and insect bites.

2. Out of the total 306 poisoning cases, 35 cases expired leading to an overall mortality rate of 11.4%, among which maximum leading to death were due to pesticide poisoning – 20 deaths (57.2%), followed by 5 deaths (14.2%) as a result of poisoning by animal and insect bites.

3. Maximum number of poisoning cases and deaths due to poisoning both were seen in the age group between 21 – 30 years – 117 cases (38.2%) and 11 deaths (31.4%) respectively.

4. Majority of the total cases were males – 184 cases (60.1%) and the rest 122 cases (39.9%) were females. The male : female ratio being 1.51 : 1. Among the total deaths – 22 deaths (62.9%) were males and rest 14 deaths (37.1%) were females. The male : female ratio being 1.69 : 1.

5. Maximum poisoning cases were seen in the month of June with 36 cases (11.8%). Maximum deaths due to poisoning were recorded in the month of January and October with 5 deaths (14.2) in each month. No deaths were recorded due to poisoning in the month of February.

6. Maximum number of cases were seen in the winter season – 106 cases (34.6%) followed closely by rainy season with 105 cases (34.3%). Among the deaths due to poisoning, maximum deaths were seen in winter season with 17 deaths (48.6%).

7. Out of 306 poisoning cases, 205 cases (67%) were suicidal, 99 cases (32.4%) were accidental and 2 cases (0.6%) were homicidal. Among 35 deaths due to poisoning – 28 cases (80%) were suicidal, 6 cases (17.1%) were accidental and 1 case (2.9%) was homicidal.

8. Out of 306 cases – 211 cases had a triggering factor for the incident of poisoning. Out of 211 cases – 72 cases (34.1%) were due to family problems, followed by 61 cases (28.9%) due to financial problems.

9. 227 cases (74.2%) involved oral route of poisoning, and, 29 deaths (82.9%) involved the oral route of poisoning.

10. Among 306 poisoning cases 76 cases (24.8%) involved farmers. Out of these 76 cases – maximum cases were suicidal – 51 cases (76.1%), involving 35 pesticide poisoning cases (68.6%).

11. Out of 306 poisoning cases - 163 cases (53.3%) involved literate population, of which 111 cases (68.1%) cases were suicidal using pesticide poison in 72 cases (64.9%).

12. Out of 306 poisoning cases – 210 cases (68.6%) were referred to tertiary centre from other hospitals, out of which22 cases (10.5%) expired, which was 62.9% of total deaths (35).

13. Out of 306 cases – 183 (59.8%) cases came to tertiary care hospital within 5 hours of incident, 59 cases (19.3%) came within 5 – 10 hours and 53 cases (17.3%) came after 10 hours of incident. Out of 35 deaths - 21 deaths (60%) were seen in cases coming within 5 hours of incident, 11 deaths (31.4%) seen in cases coming after 10 hours of incident.

14. Based on poison severity score : Out of 306 cases – maximum cases belonged to grade 1 = 111 cases (36.3%), followed by grade 2 = 101 cases (33%), grade 0 = 59 cases (19.3%) and lastly grade 3, the deaths = 35 cases (11.4%).

15. Among the 35 deaths, type of poison was confirmed by Forensic science laboratory report in 18 cases (51.4%), whereas in the rest of cases type of poison was analyzed from clinical diagnosis and poison detection centre reports.

16. Out of 125 cases referred to Poison Detection Centre from January 1, 2014 to August 18, 2014 – type of poison was detected in 87 cases (69.6%).

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ANNEXURE II : CONSENT FORM

"PATTERN OF POISONING CASES AT A TERTIARY HEALTH CARE CENTRE – A CROSS SECTIONAL STUDY"

Introduction:

You have been invited to participate in this study, to understand the pattern of poisoning cases at a tertiary health care centre which is KLES´s Dr. Prabhakar Kore Hospital and MRC, Belagavi. However, your participation in this study is completely your voluntary.

Explanation of procedure: In the present study you will be asked some questions regarding your socio-demographic status, age, sex, type of poison used, manner of poisoning, mode of poisoning, time of poisoning, quantity of poison, educational status, intention/cause behind poisoning, admission details, which takes about 5 to 10 minutes. After collecting the information results will be analyzed.

Possible benefits: The investigator does not promise or guarantee that you will get any direct benefit from this study, but it will benefit the whole community because by this study we will know the various problems and patterns related with poisoning cases. This study will surely help in the future for development of better management options and safety measures for the community.

Confidentiality: You and/or your child's identity will not be revealed. All information will be collected and coded so that no one will know your identity.

Withdrawal: Participation in this study is voluntary. If you don't wish to participate in this study, you will not lose benefits to which you are entitled.

Cost of participation: The cost of the study will be borne by the researcher. There will be no additional cost to you for taking part in this study.

Payment for participation: No incentive will be paid to you for participating in this study.

Risks involved in the study to the participants: This survey does not contain any intervention or major procedure hence has no adverse effects on the participants. However, if you have any questions about this study, you can contact Dr.(Mrs) Ganga Pilli, Professor & Head Department of Pathology, J N Medical College Belagavi-590010, chairman Institutional Ethics Committee on human subjects research, at 09448863866.

Legal rights: By signing this consent form, you are not waiving any of your legal rights.

Publication rights: The results of the survey will be used for teaching and medical publications. However the participant's identity will be kept confidential.

CONSENT STATEMENT :

I volunteer and consent for the participation of myself and/or my child in this study. I have read the consent or it has been read to me. The study has been fully explained to me and I was given sufficient time to clarify my doubts.

Participant name: _____. Participant sign/thumb print: _____.

Investigator's name: Investigator's sign:_____

Witness´s name:_____. Witness's sign:_____

If the patients/victims are minors(less than 18 years) the consent of the parents or guardians will be taken.

Parent's/Guardian´s name:_____

Parent's/Guardian´s signature/thumb print:_____

Place:_____Date:_____

ANNEXURE I : ETHICAL CLEARANCE

K.L.E SOCIETY'S
JAWAHARLAL NEHRU MEDICAL COLLEGE,
NEHRU NAGAR, BELGAUM-590010 (KARNATAKA-INDIA)
(Affiliated to KLE University, Belgaum)

Website: http\www.jnmc.edu
E-Mail : domejnmc@sancharnet.in
: jnmc@sancharnet.in

Phone: (+ 91-(0)831 Office : 2471350
Principal: 2471701
Fax No. +91 (0)831 – 2470759

Ref: MDC/DOME/ **Date: 07/12/2013**

To,

(REG. NO - BF0113001)

Sub: Institutional Ethical Clearance for the study.

With reference to the above, we wish to inform you that your proposed research project titled **"PATTERN OF POISONING CASES AT A TERTIARY HEALTH CARE CENTRE – A CROSS SECTIONAL STUDY,"** is ethical and justifiable. The proposed research project has been cleared by the JNMC Institutional Ethics Committee on Human Subjects Research.

(Dr.Hema Dhumale)
Member Secretary
JNMC Institutional Ethics Committee
on Human Subjects Research,
J.N.Medical College, Belgaum.

(Dr.Ganga Pilli)
Chairman,
JNMC Institutional Ethics Committee
on Human Subjects Research,
J.N.Medical College, Belgaum.

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