

FORENSIC TOXICOLOGY

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TOXICOLOGY



TOPIC COVERED

- Definition Forensic Toxicology
- Scope
- Types of Poisoning
- Routes of exposure
- Classification of Poisons
- Action of Poison
- Examination and collection of exhibits in Fatal and Non-fatal poisoning cases

What is TOXICOLOGY?

The study of poisons
[or]
the unfavourable or bad effects of
chemical and physical agents on
living organisms.

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FORENSIC TOXICOLOGY

Forensic toxicology is the application of toxicology and other disciplines such as pharmacology, analytical chemistry, and clinical pathology in medico legal investigation of death, poisoning, and drug use.

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SCOPE

- Poisons are frequently involved in homicidal, accidents or suicidal deaths.
- They are used sometimes to destroy animals and plants and even mankind.
- The detection of poisons, their identification and quantification are one of the important aspects of forensic science.

TYPES OF POISONING

FULMINATE:- Massive dose of a poison, death occurs rapidly without producing symptoms.

ACUTE:- Single large dose/several small doses taken in a short period.

CHRONIC:- Small doses taken over a long period.

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POISON

Poison is a substance if ingested or inhaled by a living organism or came into contact with any portion of the body produces adverse health effects.

Dose of a substance makes it poisonous. Even substances like common salt, sugar which are harmless can act as poison if taken in large quantities.



Routes through which poison is given or taken

- Ingestion (water and food)
- Absorption (through skin)
- Injection (bite, puncture, or cut)
- Inhalation (air)

CLASSIFICATION OF POISONS

- Poisons are classified in many ways.
- The following classification is based on their action on the body.

1. Corrosives

2. Irritants

3. Neurotics

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Corrosives

These are of two types :

Strong acids & Strong alkalis

Strong acids: e.g. Sulphuric acid
Nitric acid
Hydrochloric acid

Strong alkalis: e.g. Sodium Hydroxide
Potassium Hydroxide
Ammonium Hydroxide

Irritants

- Inorganics
- Organics
- Animals
- Mechanical

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Inorganics:

These are of two types

Non metallic: E.g. Phosphorous, Chlorine.

Metallic: E.g. Arsenic, Antimony, Copper.

Organic: E.g. Caster.

Madar.

Coroton oil.

Animal: E.g. Snake venom

Cantharides.

Insect bites.

Mechanical: E.g. Glass powder.

Diamond dust.

Neurotics

These are of three types.

- + Cerebral
- + Spinal
- + Cardio- respiratory

Cerebral

These are three types

Narcotics:- e.g.: Opium and its alkaloids

Inebriants:- (Intoxicants)

e.g.: Alcohol, Ether

Deliriant:- e.g.: Datura.

Belladonna

Cocaine

Spinal

These are two types

Excitant: e.g.: Nux vomica
Strychnine

Depressant: e.g.: Gelsemium

Cardio- respiratory

These are two types

Cardiac e.g. Aconite, Digitalis

Asphyxiants e.g. Carbon monoxide
Carbon dioxide
Hydrogen sulphide

ACTION OF POISONS ON HUMAN ORGANS

- When poison is taken by mouth, it first goes to the stomach, where hydrochloric acid and some enzymes present in the stomach act on it.
- As an immediate reaction, vomiting and frothing may throw out the poison, and the remaining goes to the small intestine where the substance becomes assailable.
- From the intestine it enters into the blood circulation.
- It then goes to liver where the liver tries to detoxify the poison.

- ✚ From the liver it is sent to the kidney to be eliminated as urine in the metabolic form.
- ✚ The stomach and intestine (small) form one group of organs where in major part of the poison may be detected in its original form.
- ✚ The liver and kidney form another group, where in the major part of poison both in its original and metabolic form, may be detected.
- ✚ The poison circulated throughout the body by means of blood.

- ✚ When poison is injected intravenously it goes into circulation quickly.
- ✚ If it is injected intramuscularly it goes in circulation slowly
- ✚ It may remain in the tissue at the site of injection for few hours.
- ✚ Hence this tissue may be useful for the detection of poison.

EXAMINATION & COLLECTION

- ✚ The examination of the victim, collection of suspicious material and noting the history of the case are the important functions of the investigating officer at the scene of crime.
- ✚ The sign and symptoms shown by the person should be noted carefully.
- ✚ In case of death an early arrangement should be made for the postmortem examination.

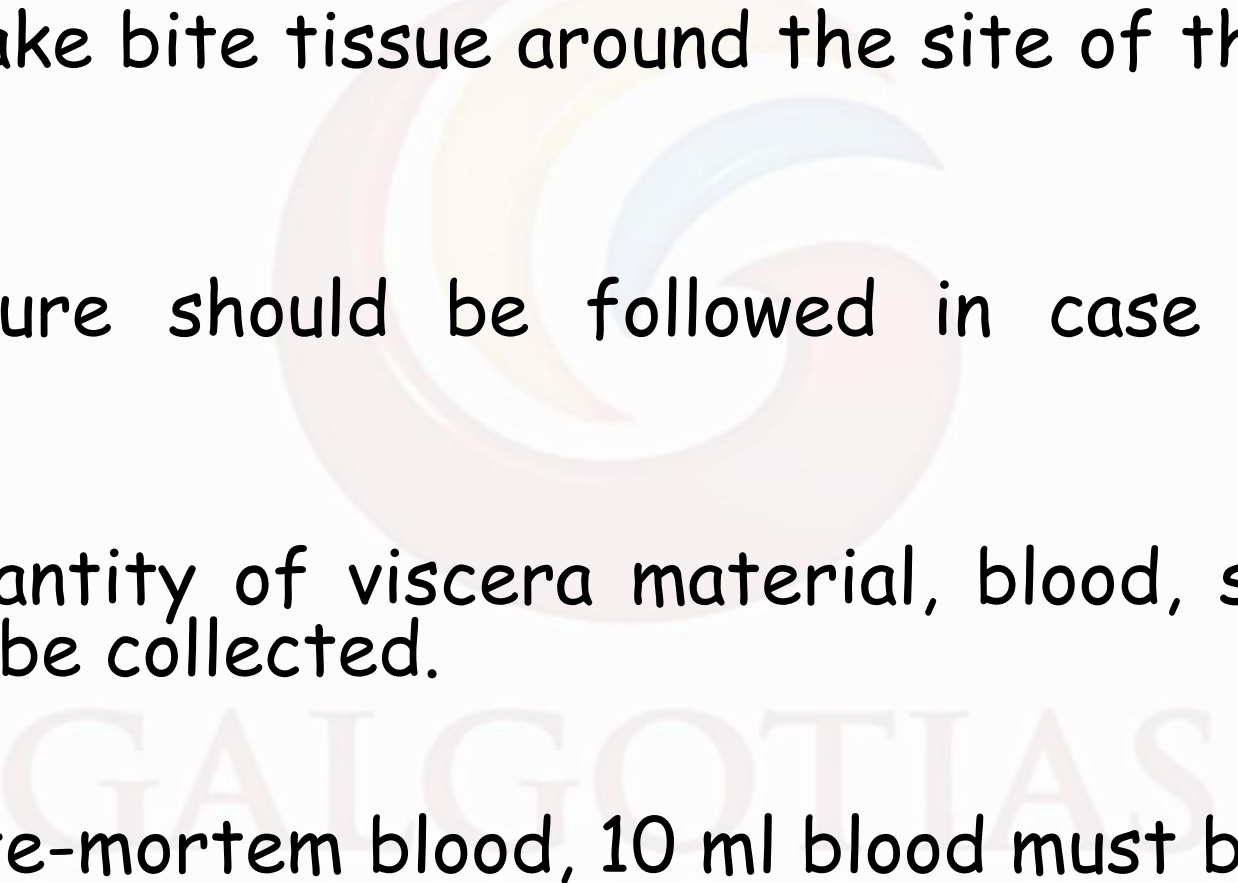
MATERIAL TO BE COLLECTED IN NON FATAL CASES

- ✚ The biological material includes vomit, saliva, froth, stomach wash, urine.
- ✚ The miscellaneous articles may include any bottle, envelope, paper, containers that might have carried the poison.
- ✚ Glass or cup which may be used for taking the poison should also be collected.

MATERIAL TO BE COLLECTED IN FATAL CASES

- ✚ The investigating officer should request the doctor to preserve the following.
- ✚ Blood, cerebrospinal fluid, stomach and intestine with its contents, liver, kidney, spleen, lungs, brain, bones, nails and hair.
- ✚ The biological material and miscellaneous articles as stated in case of non fatal cases.
- ✚ The biological material should be collected carefully in clean containers avoiding contamination.

- ✚ Each type of material must be collected in a separate container with preservative and immediately labeled in a proper manner.
- ✚ In case of exhumed body in addition to usual post mortem , the earth surrounding the body, a long bone, and bunch of hair should be collected.
- ✚ The suspected utensils and remaining food material or any drink or drug left over should be collected and sent to FSL.

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- ✚ In case of snake bite tissue around the site of the bite should be collected.
 - ✚ Same procedure should be followed in case of homicidal injections.
 - ✚ Sufficient quantity of viscera material, blood, stomach wash or urine must be collected.
 - ✚ In case of ante-mortem blood, 10 ml blood must be collected.

- ✚ In case of postmortem, 50 - 100 ml of blood should be collected.
- ✚ Entire stomach wash or urine can be collected.
- ✚ The viscera should contain whole stomach, 100cms of small intestine and its contents, 1 kg of liver and half portion of the kidney.
- ✚ Care should be taken to use proper preservative.

References

- Modi, Jaisingh, P.; Textbook of Medical Jurisprudence & Toxicology, M. M. Tripathi Publication (2001).
- Professor V.V. Pillay Textbook Of Forensic Medicine And Toxicology, Paras Medical Publisher, 18th edition (2017)
- Introduction to Forensic Science in Criminal Investigation, January 2015 by Dr. Mrs Rukmani Krishnamurthy

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The logo of Galgotias University is a circular emblem with a light beige base. Inside the circle, there are three curved, overlapping bands in shades of yellow, orange, and light blue, resembling a stylized sun or a wave.

THANK YOU

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