

ANTISEPTICS & DISINFECTANTS

Sterilization

- Freeing of an article, surface or medium by removing or killing all micro-organisms including vegetative form of bacteria, spores, viruses, fungii

Disinfection

- Destruction or inhibition of growth of all pathogenic organisms (bacteria, viruses, fungii) on non living surfaces
- If spores are also killed process is Sterlization

Antiseptics

- These are chemical substances which inhibit the growth or kill micro-organisms on living surfaces such as skin & mucous membrane.

Properties of good antiseptic/ disinfectant

1. Cidal
2. Non staining & good odour
3. Active against all pathogens
4. Active in presence of pus, blood & exudates
5. Rapid acting
6. Non irritating to tissues / non corrosive
7. Non absorbable
8. Non sensitizing/

Mechanisms of action of antiseptic and disinfectants

- Oxidation of bacterial protoplasm
 - Potassium permagnate, H_2O_2 , Halogens
- Co-agulation (denaturation) of bacterial proteins & disrupt cell membrane
 - Phenols, chlorhexidine, alcohols, aldehydes
- Detergent like action \uparrow permeability of bacterial cell membrane
 - Cetrimide, soaps

Classification

- **Phenol derivatives:**

- phenol, cresol, hexachlorophene, chlorohexylenol (dettol)

- **Oxidizing agents:**

- Hydrogen peroxide.

- **Halogens:**

- Iodine, chlorine, chlorophores.

- **Biguanides:**

- Chlorhexidine.

- **Quaternary ammonium:**

- Cetrimide.

- **Alcohols:**

- Ethanol, isopropanol

- **Aldehyde:**

- Formaldehyde

- **Acids:**

- Acetic acid, boric acid

- **Metallic salt:**

- Mercuric compounds, silver & zinc salts

- **Dyes:**

- Gentian violet, acriflavine

Phenol

- Earliest used, reference standard
- Protoplasmic poison,
 - injures tissues & cells at high conc causes skin burn
- MOA:
 - denaturing bacterial proteins.
- USES :
 - To disinfect urine, faeces, pus, burns.
- Extremely irritating, corrosive

CRESOL (Lysol)

- Methyl Derivative of phenol, less damaging to tissues than phenol.
- 3-10 times more active
- used for disinfection of utensils, excreta & for washing hands.

Chloroxylenol (Dettol)

- Phenol derivative
- Does not co-agulate proteins,
- Non corrosive, Non irritating to skin
- Commercial 4.8 % solution used for surgical antisepsis
- Skin cream and soap: 0.8%
- Mouth wash 1%

Hexachlorophene

- Commonly incorporated in soap
- Effectively only against Gm+ve
- Slow but persistent action
- >2% preparations banned

Oxidizing agents

- Potassium permagnate:
 - Purple crystals, highly water soluble, liberates oxygen which oxidizes bacterial protoplasm.
 - Used for gargling, irrigating wounds, urethra (condy`s lotion diluted solution of 1:4000 to 1:10,000)
 - High conc cause burns
 - It is also used to disinfect water in ponds.
 - Stomach wash in alkaloidal poisoning

Oxidizing agents

Hydrogen Peroxide

- liberates nascent oxygen which oxidizes necrotic matter & bacteria.
- Helps in loosening & removing slough, ear wax etc.

Benzoyl Peroxide

- Widely used drug for acne.
- liberates O₂ in presence of water which kills bacteria, specially anaerobes

Halogens

- Iodine,
- Iodophores,
- Chlorine,
- Chlorophores

Iodine

- Rapidly acting broad spectrum (bacteria, fungi, virus)
- Acts by iodinating and oxidizing microbial protoplasm.
- Used for cuts, degerming skin before surgery.
- Adverse effect: cause burns & blisters

Iodophores

- Known as povidine iodine.
- Non toxic, non staining prolonged action.
- Used on
boils, furunculosis, burns, ulcers, tinea, surgical
scrub, disinfecting surgical instruments, non
specific vaginitis.

Chlorine

- potent germicide. Kills pathogens in 30 sec. used to disinfect urban water supplies.
- 0.1 to 0.25 ppm

Cholorophores

(1) Chlorinated lime (bleaching powder)

- obtained by action of chlorine on lime.
- used to disinfect drinking water

(2) Sodium hypochlorite

- Powerful disinfectant used in dairies for milk cans.
- Too Irritant to be used as antiseptic.
- Root canal therapy in dentistry

Biguanides

Chlorhexidine: (Savlon)

- Acts by disrupting bacterial cell membrane & denaturation of bacterial proteins
- Non irritant ,more active against gram +ve bacteria.
- Used in for surgical scrub, neonatal bath, mouth wash & general skin antiseptic.
- Most widely used antiseptic in dentistry 0.12-0.2% oral rinse or 0.5 -1 % tooth paste

Quarternary ammonium antiseptics

cetrimide

- Detergents: Cidal to bacteria, fungi & viruses.
- Act by altering permeability of cell membrane
- Efficiently remove dirt and grease
- Widely used as antiseptics & disinfectants for surgical instruments, gloves etc
- Combined with chlorhexidine (savlon)

Soaps

- Anionic detergents
- Weak antiseptics with cleansing action
- Washing with soap and warm water one of the most effective methods of preventing disease transmission
- Affect only Gm+ bacteria

Alcohols

- Ethanol
 - Antiseptic, cleansing agent at 40-90% conc.
 - Act by precipitating bacterial proteins
 - Irritant, should not be applied on mucous membrane, ulcers, open wounds.

Aldehydes (Formaldehyde)

- Used for fumigation.
- 37 % aqueous solution called as formalin.
- Protoplasmic poison , denaturates proteins.
- Used for preserving dead tissues.
- Use as antiseptic restricted due to bad odour & irritation
- Glutaraldehyde is a better sterilizing agent

Acids

Boric acid

- weak antiseptic , bacteriostatic.
- used for mouth wash, irrigation eyes, glossitis.
- Adverse effect: vomiting ,abdominal pain on systemic absorption.

Metallic salts

SILVER COMPOUNDS

- Silver sulphadiazine is active against pseudomonas seen in burns patient.
- Silver nitrate highly active against gonococci

ZN SALTS

- Mild antiseptic, used as eye wash, ear drops.

Dyes

Gentian violet:

- Active against bacteria (gram + ve), fungi
- Used on chronic ulcers, furunculosis, bed sores, ring worms.

Acridlavine

- Active against gram +ve bacteria & gonocci
- suitable for chronic ulcers & wounds
- Do not retard healing, non irritant

Ectoparasiticides

- These are drugs used to kill parasites that live on body surfaces
 - lice → cause pediculosis (hair infection)
 - mites → cause scabies (skin infection)

Drugs used are

- (1) PERMETHRIN
- (2) LINDANE
- (3) BENZYL BENZOATE
- (4) IVERMECTIN
- (5) CROTAMITON
- (6) SULFUR

Permethrin

- Broad spectrum causes neurological paralysis in insects.
- 100 % cure rate nearly
- Single application needed in most cases.
- Few patients experience itching ,burning.
- first drug of choice for scabies & pediculosis.

Scabies: apply all over the body except face & head . Wash after 8- 12 hrs.

Head louse: massage about 30 g in to scalp and wash after 10 min.

Lindane

- Broad spectrum insecticide which kills lice and mites by penetrating their chitinous cover
- Properties similar to permethrin.
- Cure rate low & resistance seen.
- Disadvantage: being lipid soluble CNS toxicity like vertigo , convulsions seen.
- Application similar to permithrin.
- combination with benzyl benzoate is more effective.

Benzyl benzoate

- Oily liquid with aromatic smell.
- Cure rate 76 – 100% ; second application required after 24 hrs.
- Toxicity is low. Application similar to permethrin.
- Use has declined due to skin irritation.
- Contra indicated in children because of neurological symptoms & skin irritation.
- combination with lindane highly effective.

Crotamiton

- low cure rates
- Better results if applied for 5 days in children
- Less irritation and toxicity
- May be preferred in children as second choice

Ivermectin

- Anti helminthic drug which has been recently found effective against scabies & pediculosis.
- A single 0.2 mg /kg (12mg in adults) has 91-100 % cure rate.
- Contra indicated in children < 5yrs ,
pregnant & lactating women.