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Review Article

ANTISEPTICS AND DISINFECTANTS: A PIVOTAL ROLE IN RESEARCH, MANAGEMENT AND THERAPEUTICS

Amit Shukla[1*], Sakshi Tiwari[2], Soumen Choudhury[3], Anita[4] and Sanjay Kumar Bharti[5]

[1*]Assistant Professor, Department of Veterinary Pharmacology and Toxicology, DUVASU, Mathura

[2]Ph.D. Scholar, Department of Veterinary Pathology, LUVAS, Hisar

[3]Assistant Professor, Department of Veterinary Pharmacology and Toxicology, DUVASU, Mathura

[4]Assistant Professor, Department of Livestock products Technology, GBPUA&T, Pantnagar

[5]Assistant Professor, Department of Livestock products Technology, DUVASU, Mathura

E-mail: princu.dr@gmail.com (**Corresponding Author*)

Abstract: Treatment of any ailment lies within the absolute removal of the etiological agent from the host body system. Appropriate use of antiseptics and disinfectants keeps the living surface and non living surface devoid of microbes such as bacteria, fungus etc. The surgical operative procedures are conducted in conductive aseptic environment to minimise postsurgical contamination. In modern day the role of antiseptic and disinfectant become quintessential. The strike over pathogenic microbes is only feasible by judicious use of antiseptics. Commonly used antiseptics and disinfectants are chlorhexidine, glutaraldehyde, ethanol etc. Present note will summarise the need and utility of aforesaid terms in veterinary research, management and therapeutics.

Keywords: Antiseptics, Disinfectants, Sterilization, Iodine etc.

INTRODUCTION

The treatment of any ailment lies within the absolute removal of the etiological agent from the host body system. Antiseptic use in surgery was started by Joseph Lister. Sterilization refers to a physical or chemical process that completely destroys or removes all microbial life, including spores (Block, 1991). Antiseptics and disinfectants are used extensively in hospitals and other health care settings for a variety of topical and hard-surface applications. In particular, they are mainstay in mitigation of nosocomial infection (Rutala, 1995; Larson, 1996). The methods that play an important part in this procedure are sterilization procedures. Appropriate use of antiseptics and disinfectants keeps the living surface and non living surface devoid of microbes such as bacteria, fungus etc. The surgical operative procedures are conducted in conducive aseptic environment to minimise postsurgical contamination. As the science advances, it also follows the advanced chemicals to serve as disinfectants and

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antiseptics. In the present narration, we focus on examples, utility and role of disinfectants and antiseptics with respect to their importance in veterinary sciences.

MECHANISM OF ACTION OF DISINFECTANTS AND ANTISEPTICS

Considerable progress has been made in understanding the mechanisms of the antibacterial action of antiseptics and disinfectants (Russell and Chopra, 1996; Russell et al., 1997). Battery of techniques are used to study the mechanism includes examination of uptake, lysis and leakage of intracellular constituents (Denyer, 1991), effects on membranes, inhibition of enzymes, electron transport chain and oxidative phosphorylation, chemicobiological interaction with macromolecules (Russell etal., 1973), effects on macromolecular biosynthetic processes (Eklund, 1991), and microscopic examination of biocide-exposed cells (Beveridge, 1991). Many of these procedures are valuable for detecting and evaluating antiseptics or disinfectants used in combination (Heinzel, 1988).

ANTISEPTICS

Antiseptic can be defined as one of the chemical agent that reduces microbial population on skin and other living tissue without causing injurious effects when applied to body surface or to exposed tissues. Antiseptics are applied to the breach skin or mucous membranes, to burns and to open wounds in order to prevent sepsis by removing or excluding microbes from these areas.

Property of an ideal antiseptic

- ❖ It should have broad spectrum of activity.
- ❖ It should have low toxicity and high penetrability.
- ❖ It should maintain activity even in pus and necrotic tissue debris.

True chemical sterilization : EPA registered agents capable of killing all infective organism including bacteria, fungi and their spores within 10 hours is called true chemical sterilization. There are following examples of antiseptics that have significant role in veterinary science research and therapeutics as:

1. Iodine: Iodine has been modified for use as an antiseptic. **Polyvidone-iodine**, an example of halogenated family of antiseptics, is effective against a number of microbes as bacteria, fungi, viruses, protozoa, cysts and spores and significantly reduces surgical wound infections. It releases iodine on contact with the skin.

2. Chlorhexidine: It is biguanide derivatives and synthetic cation compound .It posses good antibacterial activity and is effective against both Gram-positive and Gram-negative bacteria. It produces its action by disrupting cell membrane and precipitating cellular content.

Inhibition of F1 ATPase is the primary target for chlorhexidine. It is used as 4% solution or as 2 % liquid.

Chlorine containing solution first introduced by Dakin in early 1900s in the form of sodium hypochlorite. It is also inactive against bacterial spores. Chlorhexidine is incompatible with soaps and other anionic materials, such as bicarbonates, chlorides, and phosphates, forming salts of low solubility which may precipitate out of solution.

3. Alcohol: 50 %Isopropyl alcohol and 70 % ethyl alcohol are commonly used alcohol for antisepsis and disinfection. Alcohol has bactericidal activity and is used to disinfect skin prior to injection, venepuncture or surgical procedures.

Alcohol is also effective against cytomegalovirus, HIV and herpes simplex virus etc.

They produce their action by solubilising lipid cell membrane and by denaturing membrane cellular proteins.

DISINFECTANTS

A disinfectant is a chemical substance that destroys or inhibits growth of pathogenic micro-organisms in the non-sporing or vegetative state. Disinfectants do not necessarily kill all organisms but reduce them to a level, which does not harm health or the quality of perishable goods. Disinfectants are generally applied to surface of inanimate objects as instruments in order to control and prevent infection.

In veterinary practice, routine cleaning and disinfection of animal shed, clinics and operation theatre is of sublime importance. This practice keeps the microbial count to minimum limit. Water is primary basic need of the animals and human beings. Proper sanitization and disinfection of water will resist the flare and growth of opportunistic pathogens.

Disinfection of water can be either physical or chemical.

a) Physical methods: It includes boiling, filtration and ultraviolet irradiation.

b) Chemical methods: It includes the addition of chlorine releasing compounds, such as sodium hypochlorite solution, chloramine T powder, or sodium dichloroisocyanurate (NaDCC) powder. Chlorine should be used carefully as it is highly corrosive in action and may cause damage to ocular tissues and also lead to burns.

Examples of commonly used disinfectants and their description such as:

1. Chloroxylenol: The chlorinated Phenolic compound is effective against a wide range of Gram-positive bacteria. It is less effective against staphylococci and Gram-negative bacteria and ineffective against *Pseudomonas* spp. and bacterial spores.

2. Glutaraldehyde: The aldehyde bactericidal disinfectant is strongly active against both

Gram-positive and Gram-negative bacteria. It is also effective against the tubercle bacilli, fungi such as *Candida albicans*, and viruses such as HIV and hepatitis B.

Utility: A 2% w/v aqueous alkaline (buffered to pH 8) glutaral solution can be used to sterilize heat-sensitive pre-cleansed instruments and other equipment.

Conclusive Remarks

With the little database, we can ensure the disinfection and antisepsis conditions for our research and managemental practices. It should be ensure in laboratory and operation theatres that all animate and inanimate articles must have gone through these common sterilising methods for reduced microbial load.

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