Establishing the Efficaciousness of Legionella-X-Viral Scrub Against Pseudomonas Aeruginosa, Escherichia Coli, Staphylococcus Aureus and Proteus Vulgaris Bacteria Using Modified Kelsey Sykes Capacity Test

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Abstract

This article relates the test method used to establish the efficaciousness of Legionella-X-Viral-Scrub Floor Disinfectant against gram-negative and gram-positive bacteria, some of these included; Escherichia Coli, Proteus Vulgaris, Pseudomonas Aeruginosa and Staphylococcus Aureus bacteria using the Modified Kelsey Sykes Capacity Test Option for Hospital Grade Disinfectant under dirty conditions.

Keywords:

Disinfectant, Pseudomonas Aeruginosa, Escherichia Coli, Proteus Vulgaris and Staphylococcus Pathogenicity, Modified Kelsey Sykes Test

Introduction

A number of diseases that impact humans are caused by bacteria. Bacteria that caused disease are called pathogenic bacteria, and they do so by producing poisonous substances called endotoxins and exotoxins [1]. These substances are responsible for the symptoms that occur with bacteria related diseases. The symptoms may range from mild to serious, and some can be deadly. Endotoxins are mostly found in the outer membrane of Gram-negative bacteria. Endotoxins are part of the outer membrane of the cell wall of Gram-negative bacteria. Although the term "endotoxin" is occasionally used to refer to any cell-associated bacterial toxin, in bacteriology it is properly reserved to refer to the lipopolysaccharide complex associated with the outer membrane of Gram-negative

pathogens such as Escherichia coli, Salmonella, Shigella, Pseudomonas, Neisseria, Haemophilus influenzae, Bordetella pertussis and Vibrio cholerae. [2]

Necrotizing fasciitis is a serious infection most often caused by Streptococcus pyogenes bacteria (S. pyogenes). Other types of bacteria that can also cause necrotizing fasciitis include Escherichia Coli and Staphylococcus aureus.

Bacteria, viruses and parasites can all cause meningitis. Bacterial meningitis can be caused by a number of bacteria. In newborns, the most common causes of bacterial meningitis are Group B Streptococcus, Escherichia coli, and Listeria monocytogenes.

Pseudomonas aeruginosa has emerged as an important pathogen during the past two decades. It causes between 10% and 20% of infections in most hospitals [3]. It causes urinary tract infections, dermatitis, soft tissue infections, bacteremia, bone and joint infections, gastrointestinal infections, and a variety of systemic infections, particularly in patients with severe burns and in cancer [4]. Pseudomonas aeruginosa is an opportunistic pathogen commonly found in the environment mainly in soil and water but is also regularly found on plants and sometimes on animals, including humans and widely in the environment. Pseudomonas aeruginosa can be a dangerous bacterium. It is one of the main causes of serious hospital-acquired infection in the UK. It is also a leading cause of death among people with cystic fibrosis[5].

The sensitivity and resistance to the following antibiotics were tested against Pseudomonas aeruginosa, piperacillin, tazobactam, cefepime, ceftazidime, imipenem, meropenem, ciprofloxacin, levofloxacin, gentamicin, tobramycin, amikacin, Fosfomycin and colistin.

Pseudomonas aeruginosa is a common cause of community-acquired and nosocomial-acquired pneumonia[6]. The development of resistance of P. aeruginosa to antibiotics is increasing globally due to the overuse of antibiotics[7].

Staphylococcus Aureus can cause a range of illnesses, from minor skin infections, such as pimples, impetigo, boils, cellulitis, folliculitis, carbuncles, scalded skin syndrome and abscesses to life threatening diseases such as pneumonia, meningitis, osteomyelitis, endocarditis, toxic shock syndrome, bacteremia, and sepsis Aureus.[8]

E. coli are a large and diverse group of bacteria. One of the most frequent causes of many bacterial infections, including cholecystitis, bacteremia and cholangitis. Although most strains of E. coli are harmless, others can make you sick. Some kinds of E. coli can cause diarrhea, while others cause urinary tract infections, respiratory illness and pneumonia, and other illnesses[9].

Proteus vulgaris is an aerobic, rod-shaped, Gram-negative bacterium in the Enterobacteriaceae family. In recent years, the resistances to many antibiotic classes (also

beta-lactams) has significantly increased. The main transmission path is direct or indirect contact with contaminated persons or objects. It is a frequent cause of nosocomial infections such as pneumonia, urinary tract infections (UTIs), and bacteremia. The most common infection involving Proteus mirabilis occurs when the bacteria moves to the urethra and urinary bladder. Although Proteus mirabilis mostly known to cause urinary tract infections, the majority of urinary tract infections are due to E. coli [10].

The method and test procedures are herein described.

The Modified Kelsey Sykes Capacity Test Option for Hospital Grade Disinfectant under dirty conditions was adopted.

1) Four test organisms, Escherichia Coli NCTC 8196, Proteus Vulgaris NCTC 4635, Pseudomonas aeruginosa NCTC 6749 and Staphylococcus NCTC 4163 were used.
2) The inoculum size of each of the test organisms was not less than 2×10^8 or more than 2×10^9 organisms introduced into the individual test samples of the Legionella-X Viral Off disinfectant solution. The disinfectant sample was tested neat.
3) The method is essentially that given by Kelsey & Maurer (Kelsey, J.C and Maurer Isobel, M. Pharmaceutical Journal (UK) 213:528-230, (1974). The said disinfectant is tested at the use-concentration.
4) The test consists of challenging the waterless Legionella-X Viral-Off disinfectant with bacterial inoculum, withdrawing a sample after a given time (8 minutes) and culturing the sample in a suitable recovery culture medium.
5) After this sampling, the mixture is again challenged by a second inoculum and after a second interval (18 minutes) is again samples for culturing.
6) The sample is passed or failed according to the extent of growth shown in the two cultures sampled.

Appended below are the observation parameter and test result based on the Modified Kelsey Sykes Capacity Test Option for Hospital Grade Disinfectant under dirty condition [11].

Observation Parameter and Test Result of Legionella-X Viral Scrub

Escherichia Coli NCTC 8196				
Incubation Time	Positive/Negative Controls	Sampling/Exposure Time		Remarks
		8 minutes	18 minutes	
24 Hours	++/--	----------	----------	
48 Hours	++/--	----------	----------	Pass
Proteus Vulgaris NCTC 4635				
Incubation Time	Positive/Negative Controls	Sampling/Exposure Time		Remarks
		8 minutes	18 minutes	
24 Hours	++/--	----------	----------	
48 Hours	++/--	----------	----------	Pass
Pseudomonas Aeruginosa NCTC 6749				
Incubation Time	Positive/Negative Controls	Sampling/Exposure Time		Remarks
		8 minutes	18 minutes	
24 Hours	++/--	----------	----------	
48 Hours	++/--	----------	----------	Pass
Staphylococcus Aureus NCTC 4163				
Incubation Time	Positive/Negative Controls	Sampling/Exposure Time		Remarks
		8 minutes	18 minutes	
24 Hours	++/--	----------	----------	
48 Hours	++/--	----------	----------	Pass

Note +: Growth in one tube of recovery broth
- : No growth in one tube of recovery broth.

Conclusion

Based on the observation parameter and result of the Modified Kelsey Sykes Test Capacity Test Option, it can be ascertained that Legionella-X Viral-Scrub Pine Floor Disinfectant effectively disinfects Escherichia Coli, Proteus Vulgaris, Pseudomonas Aeruginosa and Staphylococcus Aureus bacteria.

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