

BACTERIOLOGICAL STUDY OF DIABETIC FOOT INFECTION ON THE ANTIBIOTIC AND TOPICAL OINTMENT THERAPY

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ABSTRACT

The diabetic foot infected sample were isolated the predominant organisms or prevalent organism were present in the foot infection sample. People at greatest risk of ulceration can easily be identified by careful clinical examination of the feet: education and frequent follow-up. Infection when complicates a foot ulcer, combination can be limb or life-threatening, and infection is defined clinically, but wound cultures assist in identifying the causative pathogens. Tissue specimens

are strongly preferred to wound swabs for wound cultures. Antimicrobial therapy should be guided by culture results, and although such therapy may cure the infection, it does not heal the wound antiseptic or topical ointment therapy are also used for the foot infection to study the responsible of the organisms in particular ointment therapy.

Keywords: diabetic foot infection, Pathogens, Antimicrobial, Foot Ulcer, Ointment therapy.

INTRODUCTION

Foot infection results from the inoculation of harmful micro-organisms inside the tissues of the foot. These microorganisms feed on the tissue and multiply to many numbers. The body's defence system starts to wage a war against these organisms. The outcome of this war is pain,

redness, swelling and a rise in the temperature. Most DFIs are polymicrobial, with aerobic Gram positive cocci (GPC), and especially *staphylococci*, the most common causative organisms. Aerobic Gram negative bacilli are frequently copathogens in ischemic or necrotic wounds. Diabetes mellitus nerves may not work as well as normal because even a slightly high blood sugar level can, over time, damage some of your nerves. This is a complication of diabetes, called peripheral neuropathy of diabetes. The nerves that take messages of sensation and pain from the feet are commonly affected. If you lose sensation in parts of your feet, you may not know if you damage your feet. For example, if you tread on something sharp or develop a blister due to a tight shoe. This means that you are also more prone to problems such as minor cuts, bruises or blisters. Also, if you cannot feel pain so well from the foot, you do not protect these small wounds by not walking on them. Therefore, they can quickly become worse and develop into ulcers. The arteries in the legs are quite commonly affected. This can cause a reduced blood supply (poor circulation) to the feet. Skin with a poor blood supply does not heal as well as normal and is more likely to be damaged. Therefore, if get a minor cut or injury, it may take longer to heal and be prone to becoming worse and developing into a ulcer. Pain, that can be moderate to severe or throbbing type if pus is present, swelling, redness of the skin, fever and a local increase in temperature at the site infection are the symptoms. If reduced sensation to your feet. The risk of this occurring increase the longer diabetes and the older. Also, if your diabetics poorly controlled. This is one of the reasons why it is very important to keep your blood sugar level as normal as possible.

MATERIALS AND METHODS

More than 10 sample were collected from diabetes mellitus patients who were collected from private hospital, vellore district (NOTE: Foot ulcer sample was collected in sterile swab as Pus aspirates and lesion). A Gram stained direct smear of the specimen was examined. The specimens were cultured on blood agar, macconkey agar, nutrient agar, cetrinide agar mannitol salt agar media were used. The bacterial isolates were identified by conventional biochemical tests. Antimicrobial susceptibility testing was performed by Kirby Bauer's disc diffusion method according to National Committee for Clinical Laboratory Standards (NCCLS) guidelines. The patients were treated with antibacterial agents according to culture and antibacterial susceptibility pattern and antiseptic or topical ointment therapy as povidone iodine, silver nanoparticle and honey were used for the treating the bacterial agents.

RESULT

A total of 12 foot infected samples were collected for this study. Among the samples, the patients were taken for further bacteriological examination because these sample were shows as high concentration of lesion or redness of the skin, that indicates the foot infection. The foot infection sample were found as the various microorganisms and the foot infections culture revealed *Staphylococcus aureus* and *Bacillus* were the most common organisms (70%) causing foot infection in diabetic mellitus patients. Next to *Staphylococcus aureus* and *Bacillus*, *Pseudomonas* (25%) was isolated from samples, it was followed as *Klebsiella* and *Streptococcus* (5%). These isolates were further processed in antibiotic sensitivity test as individual process. *S.aureus* was highly sensitive to ofloxacin and other drugs are showed resistant. *Bacillus* was highly sensitive to Chloramphenicol, gentamycin and tetracycline and other drugs as ofloxacin showed intermediate. *Pseudomonas* was highly resistant to clindamycin, cloxacillin, amoxicillin and vancomycin. *Klebsiella* was highly sensitive to Chloramphenicol, and gentamycin and other drugs showed intermediate as tetracycline and amoxycline showed as resistant. *Streptococcus* was highly sensitive to chloramphenicol, ofloxacin and tetracycline and other drugs showed resistant as clindamycin and also topical ointment therapy result showed on table.

Table 1: Antibiotic sensitivity test for *S.aureus*.

Organisms	Antibiotics	Zone of inhibition	Interpretation
<i>S.aureus</i>	Clindamycin	6 mm	Resistant
	Methicillin	6 mm	Resistant
	Penicillin G	6 mm	Resistant
	Ofloxacin	25 mm	Sensitive

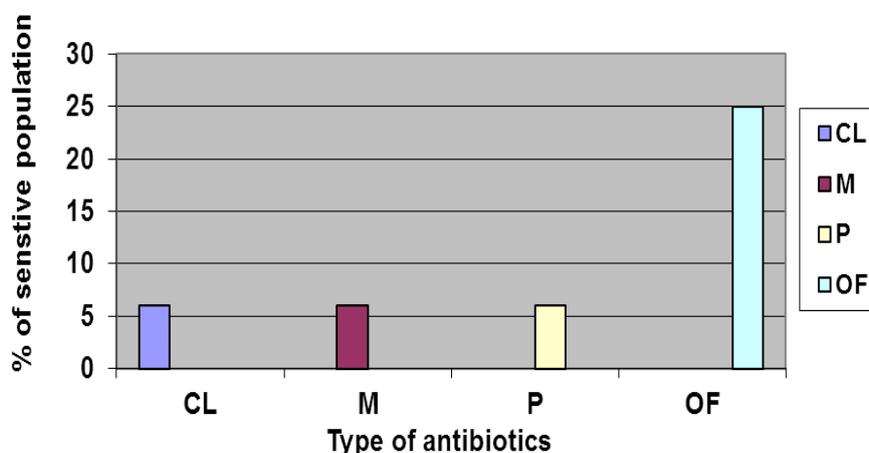
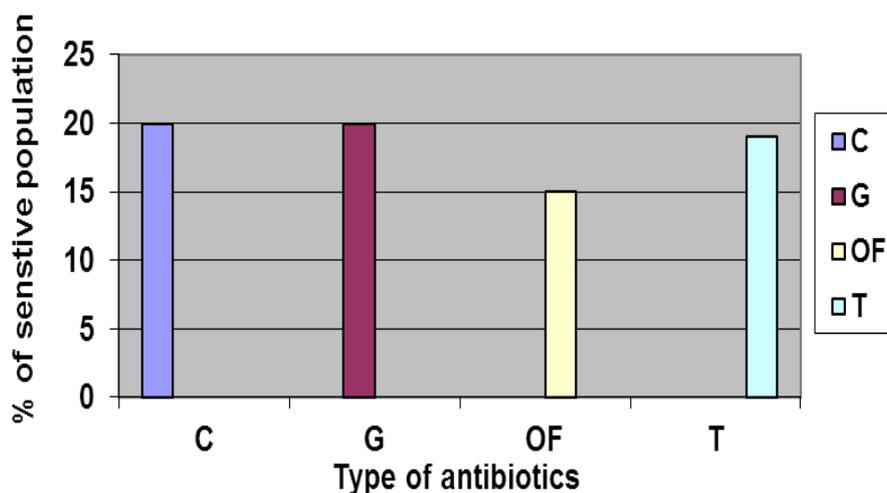


Figure 1: Antibiotic sensitivity test for *S.aureus*.

Table 2: Antibiotic sensitivity test for *Bacillus sp.*

Organisms	Antibiotics	Zone of inhibition	Interpretation
<i>Bacillus sp.</i> ,	Chloramphenicol	20 mm	Sensitive
	Gentamycin	20 mm	Sensitive
	Ofloxacin	15 mm	Intermediate
	Tetracycline	19 mm	Sensitive

Figure 2: Antibiotic sensitivity test for *Bacillus sp.*Table 3: Antibiotic sensitivity test for *pseudomonas sp.*

Organisms	Antibiotics	Zone of inhibition	Interpretation
<i>Pseudomonas sp.</i> ,	Clindamycin	6 mm	Resistant
	Cloxacillin	17 mm	Resistant
	Amoxycline	6 mm	Resistant
	Vancomycin	10 mm	Intermediate or resistant

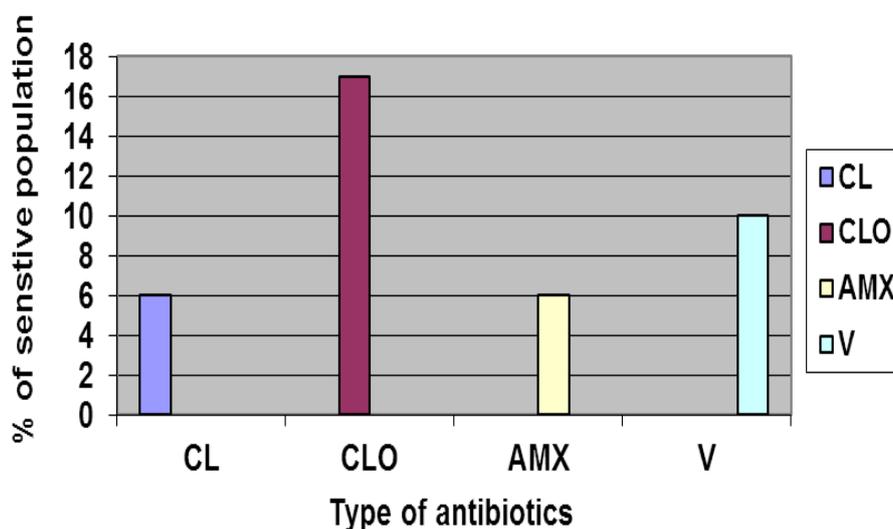
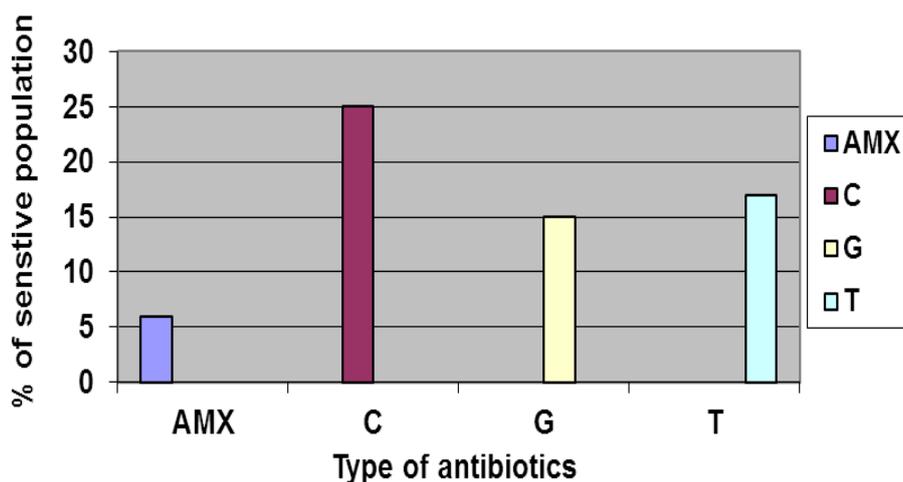
Figure 3: Antibiotic sensitivity test for *pseudomonas sp.*

Table 4: Antibiotic sensitivity test for *Klebsiella sp.*

Organisms	Antibiotics	Zone of inhibition	Interpretation
<i>Klebsiella sp.</i> ,	Amoxicillin	6 mm	Resistant
	Chloramphenicol	25 mm	Sensitive
	Gentamycin	15 mm	Sensitive
	Tetracycline	17 mm	Intermediate

Figure 4: Antibiotic sensitivity test for *Klebsiella sp.*,Table 5: Antibiotic sensitivity test for *Streptococcus sp.*,

Organisms	Antibiotics	Zone of inhibition	Interpretation
<i>Streptococcus sp.</i> ,	Clindamycin	10 mm	Resistant
	Chloramphenicol	30 mm	Sensitive
	Ofloxacin	18 mm	Sensitive
	Tetracycline	30 mm	Sensitive

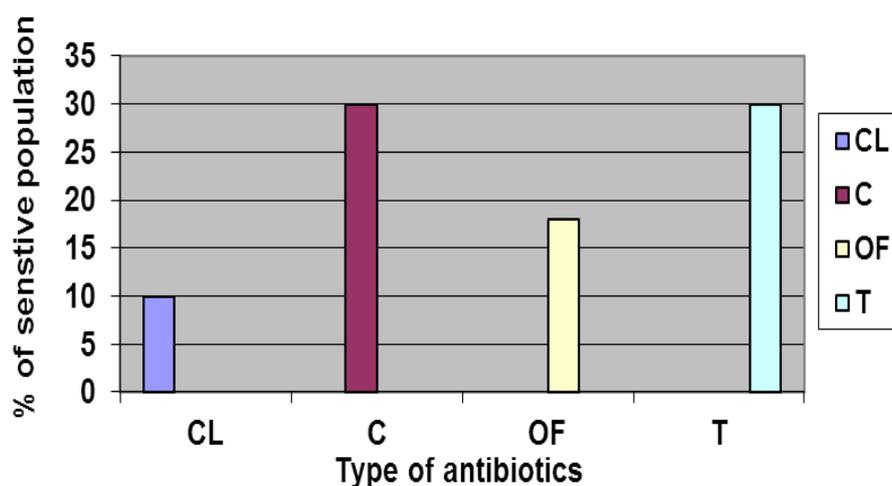
Figure 5: Antibiotic sensitivity test for *Streptococcus sp.*,

Table 6: Result on the Topical Ointment Therapy.

Organisms	Povidine iodine	Silver nanoparticle	Honey
<i>S.aureus</i>	zone formation	-	zone formation
<i>Streptococcus</i>	zone formation	-	-
<i>Pseudomonas</i>	zone formation	-	-
<i>Bacillus</i>	zone formation	-	zone formation
<i>Klebsiella</i>	-	-	-

DISCUSSION

This study tried to determine whether there are difference in the microbiological pathogens of foot infection and the antibiotic sensitivity patterns and topical ointment therapy of pathogens causing foot infection in diabetes mellitus patients. The bacteria were that commonly causing foot infection in diabetics mellitus patients are *Staphylococcus aureus* and *Bacillus*. These the most commonly present or involved in the foot infection. Next to the *S.aureus* and *Bacillus* was that commonly causing foot infection in diabetes mellitus patients is *Pseudomonas* and it is also most commonly found in the foot infection. It is found that increased glucose concentration of diabetes mellitus patients then only prolong exponential growth and give rise to higher bacterial population and may favours for the development of infection, due to present of bacteria or severe of bacteria in foot infection to prolonged for curing of infection. Gram negative aerobes were the most frequently isolated bacteria constituting 162 isolates (66%), followed by gram- positive aerobes 78 isolates (32%). Enterobacteriaceae group and *P. aeruginosa* strains were largely susceptible to imipenem (100%), piperacillin-tazobactam, ceftazidime, aminoglycosides, and ciprofloxacin. More than 70% of *staphylococcus aureus* was sensitive to methicillin. Cefoperazone + sulbactam showed about 67% sensitivity, while ciprofloxacin and amikacin were only 23% and 44% sensitive.(G.S. Banashankari¹ et al., 2012).

Management of infection can be further complicated in patients with dysvascularity as the reduced peripheral perfusion impairs the delivery of antibiotic to the infection site.⁵¹ Antimicrobial dressings containing silver, honey or iodine may have a role to play, in conjunction with systemic antibiotic therapy, in the management of infection in the diabetic foot(R. White, C. McIntosh, 2008).

CONCLUSION

In conclusion, the most of the foot infection sample were found to causing the microorganism as *staphylococcus aureus* and *Bacillus*. Patients were highly sensitive to chloramphenicol and

were highly respond to povidone iodine for dressings or topical ointment or antiseptic used for the infected foot.

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