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Research Article

Microbiological profile of diabetic foot ulcers and its antibiotic susceptibility pattern in a teaching hospital, Gujarat

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ABSTRACT

Background: Diabetic foot lesions are a major medical, social and economic problem and are the leading cause of hospitalization for patients with diabetes worldwide. Infection sometimes leads to amputation of the infected foot if not treated promptly. The present study was conducted to isolate and identify the bacterial pathogens associated with diabetic foot ulcer and to find out its antibiotic susceptibility pattern to reduce the risk of complications.
Methods: Total 100 pus samples were collected from patients having diabetic foot ulcer, during July to October 2012. Samples were processed as per standard guidelines.
Results: Out of 100 pus samples, 73 (73%) yielded growth of organisms making total of 92 isolates. Out of 92 bacterial isolates, 72 were gram negative and 20 were gram positive. *Pseudomonas aeruginosa* 25 (27%) was most common isolate causing diabetic foot infections followed by 20 (22%) *Klebsiella sp.*, 17 (19%) *E. coli*, 15 (17%) *S. aureus*, 6 (7%) *Proteus sp.* and 4(3%) *Enterococc*i, 2 (2%) *Acinetobacter sp.* and 2(2%) CONS and 1(1%) *Providencia*. Out of 72 GNB, 50 (69.4%) were extended spectrum β lactamase (ESBL) producer. Most gram negative isolates were resistant to levofloxacin, gentamicin, ampicillin-sulbactam and gatifloxacin. All GNB were sensitive to imipenem. Out of 15 S. aureus, 9 (60%) were Methicillin Resistant *Staphylococcus aureus* (MRSA) and were sensitive to vancomycin and linezolid.
Conclusions: *Pseudomonas sp*. was the most common cause of infections. Most isolates were multi drug resistance.

Keywords: Diabetic foot ulcer, Polymicrobial infection, Bacterial isolates, Antibiotic susceptibility pattern

INTRODUCTION

Diabetes is a metabolic disorder of the endocrine system which plagues approximately 17 million people nationwide. Each year over 700,000 new cases are diagnosed; 12,000 to 14,000 of which are children, teenagers and young adults, while this life threatening disease can be controlled. Diabetes is often accompanied by serious complications, and still today there is no cure.[1]

Foot ulceration and infection in diabetic patients is one of the major causes of morbidity, hospitalization and foot amputation.[2] This complication accounts for approximately 20% of hospital admissions in diabetic patients.[3] Diabetic foot infections include cellulitis, abscess, necrotizing fasciitis, septic arthritis, tendonitis and osteomyelitis.[4]

Infections are often polymicrobial, Multi drug resistant and associated with inadequate glycemic control. There is a need for continuous surveillance of resistant bacteria to provide the basis for empirical therapy and reduce the risk of complications.

Aims and objectives

- To isolate and identify the bacterial pathogens associated with Diabetic foot infections.
- To find out its antibiotic susceptibility pattern.

METHODS

The present study was conducted in the Department of Microbiology, Surendranagar during the period of July to October, 2012.

Sample collection

100 Pus samples were collected from patients having Diabetic foot infections, using a sterile disposable swab. Care was taken to avoid contamination of specimen. After collection samples were transported to the Microbiology department. Samples were processed as per standard guidelines.

Isolation and Identification

Samples were subjected to Gram stain to screen for presence of bacterial pathogen. Samples were inoculated on Blood agar, Mac Conkey agar and Nutrient agar. Isolates were identified and confirmed by biochemical reaction.

Antibiotic susceptibility testing

Antibiotic susceptibility testing was performed by Kirby Bauer Disk Diffusion method as per CLSI guidelines.[5] Gram positive isolates were tested for Linezolid, vancomycin, tetracycline, gentamicin, Co-trimoxazole, ampicillin-sulbactam, penicillin, amoxicillin, erythromycin, clindamycin and neomycin. Gram negative isolates were tested for ciprofloxacin, gentamicin, amikacin, piperacillin-tazobactam, ampicillin-sulbactam, amoxicillin-clavulanic acid cotrimoxazole, chloramphenicol, gatifloxacin, imipenem and polymyxin B.

RESULTS

Out of 100 pus samples obtained, 73 (73%) yielded growth of organisms making total of 92 isolates. Out of 92 bacterial isolates, 72 were Gram negative and 20 were Gram positive.

Pseudomonas aeruginosa 25 (27%) was most common isolate causing diabetic foot infections followed by 20 (22%) *Klebsiella sp.*, 17 (19%) *E. coli*, 15 (17%) *S. aureus*, 6 (7%) *Proteus sp.* and 4 (3%) *Enterococci*, 2 (2%) *Acinetobacter sp.* and 2 (2%) CONS and 1 (1%) *providencia* (Figure 1).

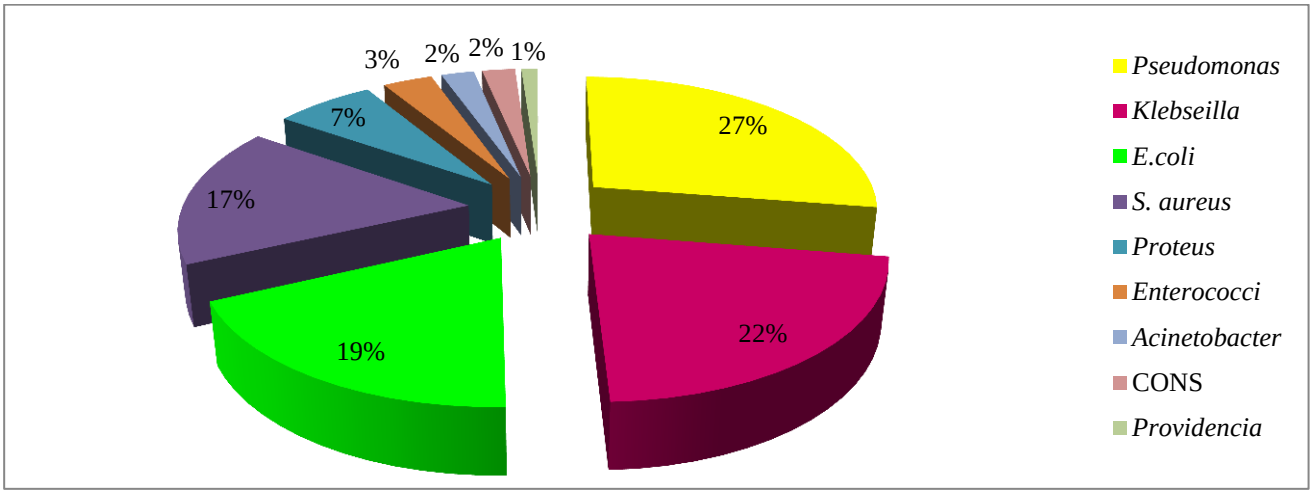

Figure 1: Distribution of various bacterial isolates.

Out of 72 Gram negative isolates, 50 (69.4%) were extended spectrum β lactamase (ESBL) producer. Out of 15 *S. aureus*, 9 (60%) were Methicillin Resistance *Staphylococcus aureus* (MRSA) (Figure 2). Gram negative isolates were found to be susceptible to imipenem (100%) followed by polymyxin b (88%), piperacillin/ tazobactam (38%), amikacin (38%), gatifloxacin (38%), ampicillin/ sulbactam (25%) and gentamicin (25%) (Figure 3). Gram positive isolates were found to be susceptible to vancomycin (100%), linezolid (100%) followed by tetracycline (90%), ampicillin/sulbactam (70%) and neomycin (70%), amoxicillin (40%), cotrimoxazole (40%) (Figure 4).

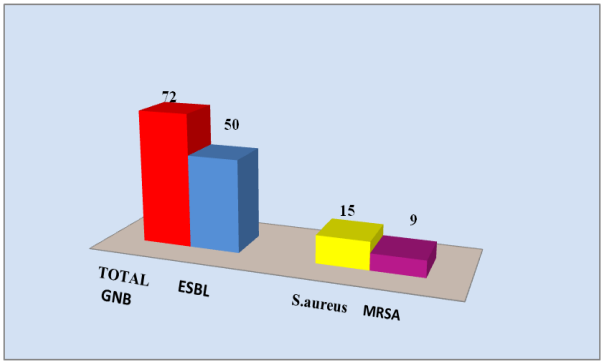

Figure 2: Special resistance pattern of GNB and *S. aureus*.

ESBL: Extended spectrum β lactamase.
Resistant to all Penicillins and Cephalosporins.
MRSA: Methicillin Resistant Staphylococcus aureus

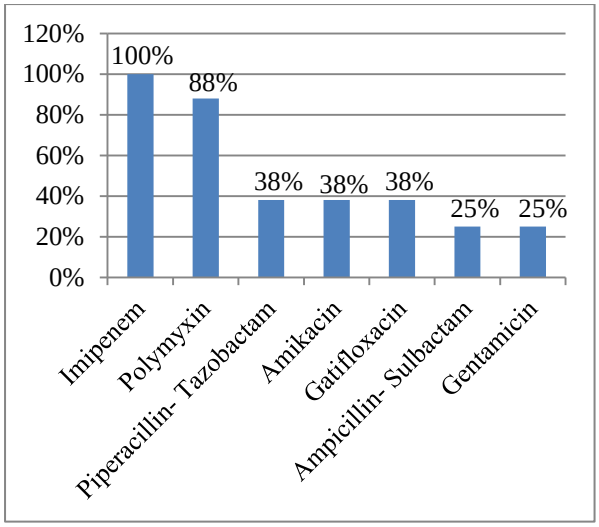

Figure 3: Antibiotic sensitivity pattern of gram negative isolates.

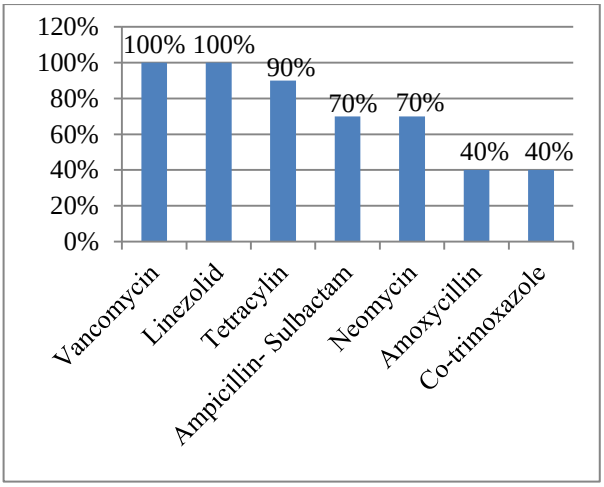

Figure 4: Antibiotic sensitivity pattern of gram positive isolates.

Table 1: Comparison of various bacterial isolates.

Study	*Pseudomonas sp.*	*Klebsiella sp.*	*E. coli*	*Proteus sp.*	*S. aureus*	*Acinetobacter sp.*	*Enterococci*
Ozer et al	18.90%	36.50%	36.50%	-	10.80%	2.70%	14.90%
Asha et al	23%	17%	12.00%	17%	21%	6%	0
J Viliam et al	24.30%	9%	15.30%	0	42.30%	0.00%	0.00%
Present study	34.70%	27.70%	23.60%	8.33%	75%	2.77%	15%

DISCUSSION

Various authors have reported different bacterial isolates associated with diabetic foot ulcer (Table 1). *Pseudomonas sp.* was the most common cause of diabetic foot infections. Most isolates were multi drug resistance.

Various factors like age, sex, type of diabetes, smoking, immunocompromised status, duration of diabetes, injury to the foot, duration of ulcer, neuropathy, peripheral vascular disease and resistance to ongoing treatment are responsible for aggravation of diabetic foot ulcer. Proper treatment of diabetes, Proper care of foot, and rigorous adherence to the principles of asepsis is the foundation of ulceration site infection prevention.

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Ethical approval: Approval was taken from the institutional ethical committee

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