



ANTIMICROBIAL PATTERN FOR THE TREATMENT OF DIABETIC FOOT INFECTIONS AT SHADAN HOSPITAL.

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ABSTRACT

Introduction: Foot infections are among the most common bacterial infections encountered in diabetic patients in clinical practice. These infections and their sequelae such as gangrene, Ischemic ulcers, Neuropathic ulcers, etc., are the common cause of disability and the reason for most hospital admissions among diabetics. **Aims & Objectives:** To study the pattern of use of antimicrobials in the treatment of infected diabetic foot for the better management of the ailment. **Materials & Methods:** It is a prospective study of 6 months, conducted at Shadan Hospital, Hyderabad, Telangana. 70 diabetic patients of age group between 30-80 years of either gender were enrolled. Relevant data was collected from infected diabetic foot patients. Empirical Antimicrobials administered were listed down. The prescription pattern of these patients was noted down and specimens were sent to the lab for culture and sensitivity tests. Data was analyzed by using SPSS software. **Results:** The majority of the patients were from the age group of 61-70 years (28.6%) with a male predominance (61.4%) and the duration of diabetes mellitus was >10 years (66%) in the study participants. Ischemic Ulcer and Neuroischemic Ulcers were in the majority (27.1%) of the patients. In the Gram-negative bacilli, E. coli was isolated high in percentage (n=23), and in the Gram-positive cocci, S. aureus was isolated in majority (n=13), respectively. The Gram-negative bacilli (Proteus species), were highly sensitive to Amikacin (98%). The Gram-positive cocci (Streptococci), were highly sensitive to Chloramphenicol (98%). **Conclusion:** By studying the antimicrobial pattern in patients with infected diabetic foot a better picture of the antimicrobial sensitivity pattern can be observed, which in turn helps in the better treatment and management of the disease.

KEYWORDS : Antimicrobials, Diabetic foot, Diabetes Mellitus**INTRODUCTION**

Diabetic foot ulcers are one of the major public health problems leading to a socioeconomic burden for the suffering individuals.¹ The diabetic foot may be defined as a group of syndromes in which neuropathy, ischemia, and infection lead to tissue breakdown, resulting in morbidity and possible amputation.²

Foot ulcer infections usually spread rapidly on account of polymicrobial growth, predominantly consisting of aerobic, Gram-positive, and Gram-negative organisms.³ Foot infections are among the most common bacterial infections encountered in diabetic patients in clinical practice. These infections and their sequelae such as gangrene, Ischemic ulcers, Neuropathic ulcers, etc., are the common cause of disability and the reason for most hospital admissions among diabetics.

Antimicrobial therapy choice is influenced by efficacy, organism susceptibility, and side effect profile. The optimum duration of antimicrobial treatment is of significant clinical importance. Adequate management of these infections needs appropriate antibiotic selection based on culture and susceptibility test reports.⁴

Therefore, from the above consideration and facts it is necessary to conduct a “study on the antimicrobial pattern for the treatment of diabetic foot”.

MATERIALS & METHODS

This is a prospective, observational study of 6 months, conducted at Shadan Hospital, Hyderabad. A total of 70 diabetic patients suffering from diabetic foot infections, of either gender were included in the study. An institutional Ethical committee approval letter was taken before the commencement of the study,

Relevant data was collected from infected diabetic foot patients. Empirical Antimicrobials administered were listed down. The prescription pattern of these patients was noted down and specimens

were sent to the lab for culture and sensitivity tests.

Selection Criteria**Inclusion Criteria**

- Age- 30 to 80 years
- Gender- Male & Female
- Diabetes Mellitus patients
- Diabetic foot infection patients

Exclusion Criteria

- Age- >30 to >80 years
- Pregnant and lactating women
- Non-diabetic foot infection patients

Statistical Analysis

The data was systematically arranged with the help of MS Office software. The data obtained were subjected to descriptive statistical analysis and by using SPSS software (Version 20). The data is stated as Frequencies (n), and Percentages (%) in tabulated and graphs form.

RESULTS

In the present study, the majority of the patients were from the age group of 61 to 70 years (28.6%) with a male predominance (n=43, 61.4%). (Figure 1 & 2)

Most of the diabetic patients had a duration of diabetes mellitus of >10 years (n=46, 66%) in the study. (Figure 3)

Types of diabetic foot ulcers diagnosed were Neuropathic ulcer (n=14, 20%), Ischemic Ulcer (n=19, 27.1%), Neuroischemic Ulcer (n=19, 27.1%), and Gangrene (n=18, 25.7%), respectively. Ischemic Ulcers and Neuroischemic Ulcers were in the higher percentage (27.1%) of the patients. (Table 1)

Antimicrobials were administered as monotherapy as well as through

combination therapy. (Table 2)

Amikacin (n=12, 10%) and Imipenem (n=07, 17%) were administered as monotherapy. Amoxicillin + Clavulanic acid (n=13, 19%), Ceftriaxone + Metronidazole (n=31, 44%), and Ciprofloxacin + Metronidazole (n=07, 10%) were administered as combination therapy. The most common pattern observed was the combination of Ceftriaxone + Metronidazole (n=31, 44%), next was Amoxicillin + Clavulanic acid (n=13, 19%). Similarly, the most common monotherapy used was Imipenem (n=07, 17 %) which covered gram-positive, gram-negative, and anaerobic bacteria.

Duration of antimicrobials administered was highest for Neuroischemic Ulcer (n=19, 27.1%) i.e. for 13 days, followed by Ischemic Ulcer (n=19, 27.1%) i.e. 12 days, respectively. (Table 3)

Antimicrobials administered empirically as monotherapy were Amoxicillin, Imipenem, Ciprofloxacin, Amikacin, Cephalexin, Chloramphenicol & Gentamicin, respectively. Antimicrobials administered as combination therapy were Ciprofloxacin + Amikacin, Amikacin + Metronidazole, Imipenem+ Metronidazole and Ciprofloxacin + Metronidazole+ Amikacin, respectively. (Table 4)

Gram-negative bacilli isolated are E. coli (n=23), P. vulgaris (n=08), Klebsiella species (n=12), and Pseudomonas species (n=11). Gram-positive cocci isolated are S. epidermis (n=12), S. aureus (n=13), Enterococci (n=09), and Streptococci (n=06). (Table 5)

In the Antibigram responses obtained were, (Table 6)

Gram-negative bacilli

E. coli - Amikacin (87%), Chloramphenicol (46%), Gentamicin (37%)
Proteus species - Amikacin (98%), Ciprofloxacin (67%), Chloramphenicol (89%)

Klebsiella species - Amikacin (73%), Gentamycin (46%)

Pseudomonas species - Imipenem (69%), Amikacin (53%), Ciprofloxacin (16%)

Gram-positive cocci

S. epidermis - Amikacin (93%), Chloramphenicol (56%)

S. aureus - Amikacin (60%), Chloramphenicol (48%)
Enterococci - Amikacin (39%), Chloramphenicol (65%), Gentamicin (46%)

Streptococci - Chloramphenicol (98%), Gentamicin (47%)

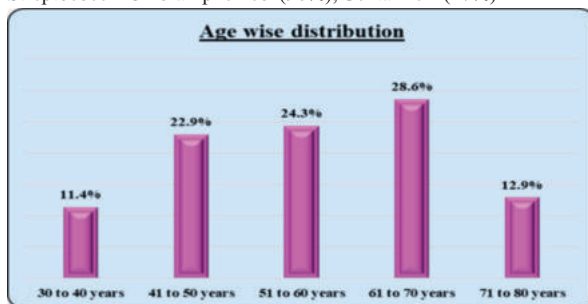


Figure 1: Age-wise distribution

Table 2: Gender-wise Distribution

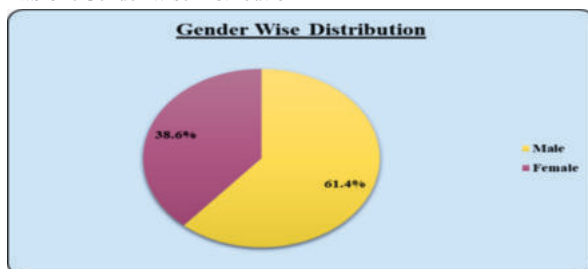


Figure 2: Gender-wise Distribution

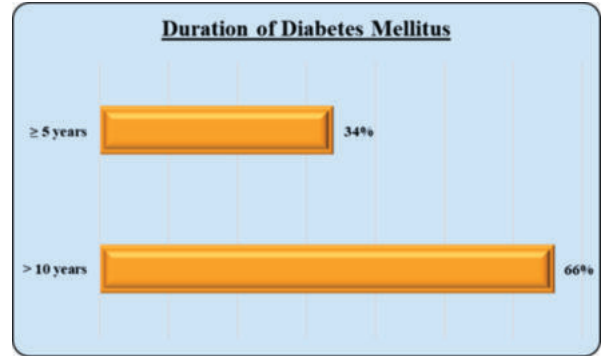


Figure 3: Duration Of Diabetes Mellitus

Table 1: Diagnosis Of Diabetic Foot Ulcers

Diagnosis	Number of patients n=70 (%)
Neuropathic Ulcer	14 (20%)
Ischemic Ulcer	19 (27.1%)
Neuroischemic Ulcer	19 (27.1%)
Gangrene	18 (25.7%)

Table 2: Treatment Given

Antimicrobials administered	Frequency (n=70)	Percentage (%)
Amikacin	12	10%
Amoxicillin + Clavulanic acid	13	19%
Ceftriaxone + Metronidazole	31	44%
Ciprofloxacin + Metronidazole	07	10%
Imipenem	07	17%
Total	70	100%

Table 3: Diagnosis, Duration Of Antimicrobial Therapy And Wound Healing

Diagnosis	Number of patients n=70 (%)	Duration of antimicrobials administered (days)	Duration of wound healing (days)
Neuropathic Ulcer	14 (20%)	13 days	22 days
Ischemic Ulcer	19 (27.1%)	13 days	34 days
Neuroischemic Ulcer	19 (27.1%)	12 days	19 days
Gangrene	18 (25.7%)	11 days	26 days

Table 4: Antimicrobials Administered Empirically

Antimicrobials administered	
Monotherapy	Combination therapy
Amoxicillin	Ciprofloxacin + Amikacin
Imipenem	Amikacin + Metronidazole
Ciprofloxacin	Imipenem+ Metronidazole
Amikacin	Ciprofloxacin + Metronidazole+ Amikacin
Cephalexin	
Chloramphenicol	
Gentamicin	

Table 5: Organisms Isolated

Gram-negative bacilli	n	Gram-positive cocci	n
E. coli	23	S. epidermis	12
P. vulgaris	08	S. aureus	13
Klebsiella species	12	Enterococci	09
Pseudomonas species	11	Streptococci	06

Table 6: Antibigram

Gram-negative bacilli	Response obtained	Gram-positive cocci	Response obtained
E. coli	Amikacin (87%) Chloramphenicol (46%) Gentamicin (37%)	S. epidermis	Amikacin (93%) Chloramphenicol (56%)
Proteus species	Amikacin (98%) Ciprofloxacin (67%) Chloramphenicol (89%)	S. aureus	Amikacin (60%) Chloramphenicol (48%)

Klebsiella species	Amikacin (73%) Gentamycin (46%)	Enterococci	Amikacin (39%) Chloramphenicol (65%) Gentamicin (46%)
Pseudomonas species	Imipenem (69%) Amikacin (53%) Ciprofloxacin (16%)	Streptococci	Chloramphenicol (98%) Gentamicin (47%)

DISCUSSION

In the present study, the majority of the patients were from the age group of 61 to 70 years (28.6%) with a male predominance (n=43, 61.4%).^{5,6} Most of the diabetic patients had a duration of diabetes mellitus of >10 years (n=46, 66%) in the study.⁷

Types of diabetic foot ulcers diagnosed were Neuropathic ulcer (n=14, 20%), Ischemic Ulcer (n=19, 27.1%), Neuroischemic Ulcer (n=19, 27.1%), and Gangrene (n=18, 25.7%), respectively. Ischemic Ulcers and Neuroischemic Ulcers were in the higher percentage (27.1%) of the patients.⁸

Antimicrobials were administered as monotherapy as well as through combination therapy. Amikacin (n=12, 10%) and Imipenem (n=07, 17%) were administered as monotherapy. Amoxicillin + Clavulanic acid (n=13, 19%), Ceftriaxone + Metronidazole (n=31, 44%), and Ciprofloxacin + Metronidazole (n=07, 10%) were administered as combination therapy.⁹

The most common pattern observed was the combination of Ceftriaxone + Metronidazole (n=31, 44%), next was Amoxicillin + Clavulanic acid (n=13, 19%). Similarly, the most common monotherapy used was Imipenem (n=07, 17 %) which covered gram-positive, gram-negative, and anaerobic bacteria.¹⁰

Duration of antimicrobials administered was highest for Neuroischemic Ulcer (n=19, 27.1%) i.e. for 13 days, followed by Ischemic Ulcer (n=19, 27.1%) i.e. 12 days, respectively.¹¹

Antimicrobials administered empirically as monotherapy were Amoxicillin, Imipenem, Ciprofloxacin, Amikacin, Cephalexin, Chloramphenicol & Gentamicin, respectively. Antimicrobials administered as combination therapy were Ciprofloxacin + Amikacin, Amikacin + Metronidazole, Imipenem+ Metronidazole and Ciprofloxacin + Metronidazole+ Amikacin, respectively.¹²

Gram-negative bacilli isolated are *E. coli* (n=23), *P. vulgaris* (n=08), *Klebsiella* species (n=12), and *Pseudomonas* species (n=11). Gram-positive cocci isolated are *S. epidermidis* (n=12), *S. aureus* (n=13), *Enterococci* (n=09), and *Streptococci* (n=06).¹³

In The Antibigram Responses Obtained Were, Gram-negative bacilli¹⁴ *E. coli* - Amikacin (87%), Chloramphenicol (46%), Gentamicin (37%) *roteus* species - Amikacin (98%), Ciprofloxacin (67%), Chloramphenicol (89%) *Klebsiella* species - Amikacin (73%), Gentamycin (46%) *Pseudomonas* species - Imipenem (69%), Amikacin (53%), Ciprofloxacin (16%) Gram-positive cocci¹⁵

S. epidermidis - Amikacin (93%), Chloramphenicol (56%)

S. aureus - Amikacin (60%), Chloramphenicol (48%)

Enterococci - Amikacin (39%), Chloramphenicol (65%), Gentamicin (46%)

Streptococci - Chloramphenicol (98%), Gentamicin (47%)

CONCLUSION

In our study, we conclude that with the help of studying the antimicrobial pattern in the patients with infected diabetic foot a better picture of antimicrobial sensitivity pattern can be observed, which in turn helps in the better treatment and management of the disease.

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Conflict Of Interest: NONE

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