Research Article

A Prospective Observational Study on Prescribing Pattern in Diabetic Foot Ulcer in A Tertiary Care Hospital-Salem

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Abstract

Background : Diabetic foot ulcer is a one of the serious and potentially limb-threatening complication of diabetes mellitus and is associated with substantial morbidity and healthcare burden . Ulceration can be complicated by infection ,particularly when the infection extends into deeper soft tissues or bone, potentially resulting in osteomyelitis ,sepsis ,and lower -limb amputation. Objective : The present study sought to describe the prescribing patterns followed in the management of diabetic foot ulcers and to identify potential gaps in medical selection with particular focus on the use of antibiotics ,antidiabetics, and supportive therapies . Methods : The present study adopted a prospective observational design over six months in 100 patients diagnosed with diabetic foot ulcer and admitted to a tertiary care hospital. Eligible patients were enrolled based on predefined inclusion and exclusion criteria .Relevant patients details ,clinical characteristics of diabetic foot ulcers ,and prescribed medications,including antibiotics ,antidiabetic agents , and supportive therapy ,were systematically collected and evaluated to describe the prescribing pattern. Results: The male cases were predominant (59%) among 100 patients and the highest age group was 40-55 years (44%).The most common ulcer grade was Wagner Grade 4 (25%) followed by the grades of 2 and 3 (24% each).The most common organisms isolated were Pseudomonas (27%), MRSA (25%) and MSSA (23%).Piperacillin–tazobactam (19%), ampicillin–sulbactam (14%) and linezolid (12%) were the most frequently used antibiotics.Broad-spectrum antibiotics were often prescribed overall especially patients with higher Wagner grade. Conclusion: A high proportion of advanced DFUs and variety of microbial profile was shown in the study.The most common organisms detected were Pseudomonas spp and MRSA.Piperacillin–tazobactam was the most commonly used antibiotic.The results highlight the need for culture directed antibiotic choice and antimicrobial stewardship.To achieve the best possible outcomes, it is important to optimise glycaemic control and to provide full diabetic foot care.

Keywords: antibiotics, antidiabetic drugs, insulin, supportive therapy, Wagner grade& Diabetic Foot Ulcer.

1. Introduction

Our aim was to study a prescribing pattern of antibiotics used in diabetic foot ulcer. " Foot infections are a common and serious problem in persons with diabetes [(1)].Diabetes mellitus is a chronic metabolic disease that affects about 15% of the general population and an estimated 19-34% will develop a diabetic foot ulcer at some point in their lives; diabetic foot infections (DFIs) are the cause of non-traumatic amputation, usually caused by formation of microthrombi, ischemia, necrosis, and gangrene[(2)]. Aerobic gram positive cocci such as Staphylococcus aureus, gram negative bacilli (Escherichia coli, Klebsiella pneumoniae, Pseudomonas aeruginosa) and anaerobes are the typical pathogens responsible for DFI. Appropriate antibiotic selection is necessary for proper management of these infections[(3)]

Another important aspect of diabetic foot ulceration is the high likelyhood of reoccurrence following successful treatment, so long term management is vital for prevention.([4])A systematic review and meta-analysis showed that the recurrence of DFU after healing is not uncommon.[(5)]Treatment of wounds, management of pressure, treatment of infections, optimization of metabolic factors are crucial elements in the management of diabetic foot. [(6)]Diabetic foot infection (DFI) is a significant complication of DFU, which needs to be promptly assessed clinically and treated with appropriate antimicrobial therapy.[(7)]Severeness of the infection has been found to correlate with a higher risk of hospitalization and amputation in the case of diabetic foot infection.[(8)]Diabetic foot infections have a geographical and institution-dependent microbial profile and local microbiological data is essential for appropriate antimicrobial choices.

[9]In an Indian tertiary care hospital study involving 80 diabetic foot ulcer patient. (with Wagner grade 3–5), Gram-negative aerobes were the most common group of organisms isolated and 72% of patients yielded multidrug-resistant organisms (MDROs).[10]

In the current research, the difference associated with the various wagner grade of microorganisms was investigated.The most common grades observed were Wagner grade 4 (25%), and grades 2 and 3 (24% each). Likewise, Nur Hilda Hanina et al. found that Wagner grade III and IV ulcers were the most prevalent of 77 diabetic foot ulcer patients[11].The predominance of higher Wagner grades in the present study was also similar to the findings Rooh-Ul-Muqim et al. found when they studied 100 diabetic foot lesions, with the majority of them being classified as between Wagner grades 2 and 5[12].The microbial profile of DFIs has been shown to change with an increase in Wagner grade as shown by previous studies. Pathare et al. noted that the prevalence of gram negative organisms and anaerobes increased in higher Wagner grades[13] and Bansal et al.reported a linear increase in prevalence of organisms with increasing Wagner grade. The present study aimed at the identification of MRSA, MSSA, Pseudomonas, E.coli and mixed infections among study subjects and these were then subjected to further evaluation in relation to antibiotic prescribing practice.

A prospective study of 261 patients with diabetic foot infections in a tertiary referral centre in India identified 289 isolates of which the gram negative were 58.5%. [14]In a prospective study of 293 patients with clinically infected DFU who had recently been prescribed antibiotics, microbial isolates and patterns of antimicrobial susceptibility were assessed in the study.[15] A study from the South was done to evaluate DFUs and to assess their significance in the presence of aerobic and anaerobic infection, past antibiotic use, Wagner grade and the clinical outcome.(16)In the microbiological study, a special survey was done in the tertiary-care hospitals of Salem and 50 patients with DFI were studied and 51 bacterial isolates were recovered. For the Salem study, Gram-negative organisms made up 51% of isolates with Staphylococcus aureus and Pseudomonas aeruginosa being the most commonly recovered organisms.(17) Previous studies have reported important findings on the care of DFUs, their microbiological profile and outcome. Zafar et al. evaluated 48 patients having diabetic foot over 2 years, and concluded 64% could be cured with drainage/debridement and 36% needed amputation, with S. aureus being the most frequent organism. (18)In a tertiary care hospital, Mehmood et al. presented clinical profile and clinical outcome of DFUs with a focus on risk factors and prevention of amputation. (19) Mathangi and Prabhakaran identified bacterial profile and antibiotic sensitivity pattern of Type 2 Diabetic Foot ulcer, emphasizing the need for judicious choice of antibiotic drugs according to the offending organism and its sensitivity. (20) Armstrong et al. noted the high clinical burden and high rates of recurrence of DFUs, the need for proper management and prevention of DFU recurrence.(21) Everett and Mathioudakis discussed the management of DFU and highlighted the importance of infection control, glycaemic control, wound care, off-loading and vascular assessment with surgery to be a crucial part of management. (22)

While these studies have contributed to the evidence-based practice of DFU management, microbiology and outcomes, there is a need for hospital-based evaluation with a specific focus on overall prescribing pattern of antibiotics, antidiabetic agents/insulin and supportive medications. Hence, the present prospective observational study was conducted to investigate the antibiotic prescribing pattern of diabetic foot ulcer patients in a tertiary care hospital focusing on commonly used antibiotics, antidiabetic medicines, supportive treatment and outcomes of treatment.

Methodology

A prospective observational study was carried out with the Department of [General medicine] at a tertiary care centre, Salem, for six months. The study was conducted with the permission from the Institutional Ethics Committee (IEC) of the institution.

The study population comprised patients who met the predetermined inclusion and exclusion criteria and had a diagnosis of diabetic foot ulcer. There were 100 patients in total. The subjects were selected according to their eligibility and willingness to participate in the study, during the study period.

Patients of either gender aged above 18 years with the diagnosis of diabetic foot ulcer were included in the study, both in inpatient department and outpatient department of the tertiary care hospital. Informed consent was obtained and patients who were willing to participate in the study were included. Patients who were under medical treatment for diabetic foot ulcer were also eligible for the study.The following patients were excluded: patients who refused to participate in the study, patients with incomplete or poor medical records, lost to follow up and patients receiving treatment in other systems of medicine. Patients that did not meet the criteria set forth were also omitted from the study.

The structured data collection form was used to extract data at patients' records and patients were contacted directly where necessary. The data collected was demographic characteristics, clinical history, diabetic history, diabetic foot ulcer characteristics, laboratory investigations, ulcer grade, prescribed antibiotics, antidiabetic medications, supportive medications, and clinical outcomes. The outcome of the treatment for the patients was recorded at the end of the study period according to their clinical status at the time it was observed, which may be either improvement, healing or amputation.

Data collected were systematically compiled and analyzed by suitable statistical techniques. The results of the study were summarized using descriptive statistics. Categorical data were shown as frequency and percentages and continuous data were shown as mean and standard deviation if applicable. The analysis was done for the purpose of describing the prescribing pattern and clinical features of patients with diabetic foot ulcer in the tertiary care hospital.

Results

A prospective observational study was conducted among 100 diabetic foot ulcers patients at a tertiary care hospital, Salem, Tamil Nadu, to investigate the pattern of diabetic foot ulcer antidiabetic agents ,antibiotic agents and supportive drugs .

1.Sociodemographics details of the patients

Variables	Subgroups	No. of patients	%of patients
Gender	Male	59	59%
	Female	41	41%
Age (Yrs)	40-55	44	44%
	56-65	16	16%
	66-75	25	25%
	76-80	15	15%
Social habits	Alcoholism	25	25%
	Smoking	21	21%
Types of diabetes	Type 1DM	48	48%
	Type 2DM	52	52%
Duration of diabetes	Below 1 yr	24	24%
	1-4 yrs	4	4%
	5-8 yrs	6	6%
	9-12 yrs	21	21%
	13-16 yrs	25	25%
	17-20 yrs	20	20%
Based on blood glucose level			
FBS	100-130mg/dl	9	9%
	130-150mg/dl	28	28%
	150/200mg/dl	50	50%
	>200mg /dl	13	13%
PBS	140-199mg/dl	10	10%
	>200-90mg/dl	90	90%
RBS	>125mg/dl	100	100%
HBA1C	>6.5 mg/dl	100	100%

The baseline demographic and clinical features of the 100 study patients are listed in Table 1. The total number of

subjects in the study was 59 (59%) males and 41 (41%) females. Regarding age distribution, the majority of patients belonged to the 40–55 years age group (n = 44, 44%), followed by the 66–75 years age group (n = 25, 25%), 56–65 years age group (n = 16, 16%), and 76–80 years age group (n = 15, 15%).In the social habits, patients diagnosed with alcoholism were 25 (25%) and the patients diagnosed with smoking were 21 (21%). As far as diabetes mellitus type is concerned, 52 (52%) patients had Type 2 diabetes mellitus while 48 (48%) patients had Type 1 diabetes mellitus.In terms of the duration of diabetes, 24 (24%) patients had diabetes for less than 1 year, 4 (4%) had a duration of 1–4 years, 6 (6%) had 5–8 years, 21 (21%) had 9–12 years, 25 (25%) had 13–16 years, and 20 (20%) had 17–20 years of diabetes.Regarding glycaemic parameters, fasting blood sugar (FBS) levels were 100–130 mg/dL in 9 (9%) patients, 130–150 mg/dL in 28 (28%) patients, 150–200 mg/dL in 50 (50%) patients, and >200 mg/dL in 13 (13%) patients. One-tenth (10%) of the patients had PBS in the range of 140-199 mg/dl, and the other 90 (90%) patients had PBS >200 mg/dl. All 100 (100%) had a random blood sugar (RBS) >125 mg/dL. Similarly, HbA1c levels were >6.5mg/dlin all 100 (100%) patients. From these results, it is clear that all the patients in the study group were having high glycaemic parameters as per the reported RBS and HbA1c levels.

Table;2.Distribution of diabetic foot ulcer according to wagner grade and Microbiological profile of diabetic foot ulcer

Variables	Subgroups	No . of patients	% of patients
Wagner Grade	Grade 1	15	15%
	Grade 2	24	24%
	Grade 3	24	24%
	Grade 4	25	25%
	Grade 5	12	12%
Organism	E.coli	16	16%
	MSSA	23	23%
	MRSA	25	25%
	Pseudo	27	27%
	Mixed	9	9%

The distribution of patients based on Wagner Grade and Isolated OrganismsTable 2 shows the distribution of the 100 study patients by Wagner grade and organisms found in the wound. Regarding the Wagner grade classification, 15 (15%) patients had Grade 1 ulcers, 24 (24%) had Grade 2 ulcers, 24 (24%) had Grade 3 ulcers, 25 (25%) had Grade 4 ulcers, and 12 (12%) had Grade 5 ulcers. Most of the patients were in Wagner Grade 4 (n = 25, 25%) and the least number of patients were in Wagner Grade 5 (n = 12, 12%).In terms of the organisms isolated from the wound, Pseudomonas (27%) was the most common organism followed by methicillin-resistant Staphylococcus aureus (MRSA) (25%) and methicillin-sensitive Staphylococcus aureus (MSSA) (23%). Escherichia coli (E. coli) was recovered from 16 (16%) of the patients and 9 (9%) patients had mixed cultures. Pseudomonas was the most common organism isolated from the study patients, and the least common was mixed organisms.

Table 3. Distribution of patient medication patterns

Drugs variables	Subgroups	No . of patients	% of patients
Antibiotic agents	Augmentin	11	11%
	Ampicillin – sulbactam	14	14%
	Cefazolin	1	1%
	Cefepine	4	4%
	Ceflazidine	3	3%
	Ceftriaxone	6	6%
	Ceftriaxone -metronidazole	5	5%
	Cephalexin	6	6%
	Ciprofloxacin	7	7%

	Clindamycin	3	3%
	Cloxacillin	1	1%
	Linezolid	12	12%
	Piperacillin – tazobactam	19	19%
	Teicoplanin	4	4%
	Vancomycin	4	4%
Antidiabetic agents	Empagliflozin	3	3%
	Glimepiride	10	10%
	Metformin	9	9%
	Sitagliptin	5	5%
	Metformin -empagliflozin	6	6%
	Metformin -glimepiride	8	8%
	Metformin -sitagliptin	6	6%
Types of Insulin	Human insulin	15	15%
	Insulin lispro	11	11%
	Insulin glargine	11	11%
	Regular insulin	16	16%
	Regular insulin	16	16%
Supportive agents	Aspirin	14	14%
	Atorvastatin	2	2%
	B -complex	22	22%
	Ibuprofen	9	9%
	Pantoprazole	32	32%
	Paracetamol	15	15%
	Tramadol	12	12%
	Vitamin B12	12	12%
	Vitamin C	13	13%
	Paracetamol+tramadol	28	28%

This distribution of patients by the medication used is shown in Table 3. The most common antibiotic drugs used were piperacillin–tazobactam (19 patients), ampicillin–sulbactam (14 patients), and linezolid (12 patients). Eleven patients (11%) received Augmentin and 7 patients (7%) received ciprofloxacin. Sixty percent of patients received ceftriaxone, 6% received cephalexin, and 5% received ceftriaxone–metronidazole. Four patients (4%) received each of these antibiotics: cefepime, teicoplanin and vancomycin; and three patients (3%) each received ceftazidime and clindamycin. Cefazolin and cloxacillin were the least used antibiotics, each given to 1 patient (1%).Oral antidiabetic medications used included glimepiride (10%), which was the most commonly used drug, followed by metformin (9%). Eight patients (8%) were treated with metformin–glimepiride, metformin–empagliflozin in 6 patients (6%) and metformin–sitagliptin in 6 patients (6%). Nineteen patients (19%) received sitagliptin and 3 patients (3%) received empagliflozin.As far as the insulin therapy was concerned, the most common preparation used was regular insulin, given to 16 patients (16 %), and human insulin used to 15 patients (15 %). Eleven patients (11%) received insulin lispro and 11 (11%) received insulin glargine.The drugs used as support drugs most commonly used were pantoprazole (32%) followed by paracetamol/ tramadol (28%). Twenty-two patients (22%) used B-complex supplements, 15 (15%) took Paracetamol and 14 (14%) took Aspirin. Thirteen patients (13%) received vitamin C, 12 patients (12%) received tramadol and 12 patients (12%) received vitamin B12. Ninety patients (9%) received ibuprofen and 2 patients received atorvastatin (2%)..

Table 4. Pattern of Combination therapy .

Variables	Combination therapy	No. of patients	% of patients
Antimicrobial drugs	Amoxicillin +clavulanic	11	11%
	Ampicillin +sulbactam	14	14%

	Piperacillin +tazobactam	19	19%
	Ceftriaxone +metronidazole	5	5%
Antidiabetic drugs	Metformin +glimepiride	8	8%
	Metformin +empagliflozin	6	6%
	Metformin +sitagliptin	6	6%
Supportive drugs	Paracetamol +tramadol	12	12%

In our study combination therapy among the study population. The most commonly used antimicrobial combinations were piperacillin–tazobactam (19%), ampicillin–sulbactam (14%) and amoxicillin–clavulanic acid (11%). In 5% of the patients Ceftriaxone–metronidazole was employed.Of the antidiabetic combinations, metformin–glimepiride was the most common combination used (8% of patients) and metformin–empagliflozin and metformin–sitagliptin were each used (6% of patients). In 12% patients, supportive drug combination was used that is Paracetamol+Tramadol.

Table 5. Antibiotic utilization according to DFU grade and isolated organism

Wagner grade	MRSA	MSSA	PSEUDO	E.COLI	MIXED
Grade 1	3%	3%	5%	3%	1%
Grade 2	7%	5%	5%	4%	3%
Grade 3	5%	8%	8%	-	3%
Grade 4	5%	5%	6%	3%	6%
Grade 5	3%	2%	3%	1%	3%

According to Wagner Grade Distribution of Isolated Organisms Table 4 depicts the distribution of isolated organisms according to Wagner grade of the study patients. In Grade 1 ulcers, Pseudomonas (5%) was the most common organism isolated followed by MRSA (3%), MSSA (3%) and E. coli (3%) with mixed organisms isolated in 1% of patients.Of those who had Grade 2 ulcers, MRSA was the most common organism cultured (7% of cases), with both MSSA and Pseudomonas found in 5% of cases, and E. coli, and mixed organisms, each present in 3% of cases. Mixed organisms (3%) and MSSA (8%) and Pseudomonas (8%) were the most common organisms isolated in Grade 3 ulcers, with no E. coli isolated.For Grade 3 ulcers, the organisms isolated most often were mixed organisms (3%) and Pseudomonas (8%) and MSSA (8%).MRSA, MSSA, mixed organisms and Pseudomonas were the next most common organisms found in Grade 4 ulcers (5%, 5%, 6% and 6%, respectively), followed by E. coli (3%). Of the Grade 5 ulcers, Pseudomonas was the most frequently recovered organism, with MRSA and mixed organisms being found in equal numbers (3% each), MSSA (2%) and E. coli (1%).Overall, Pseudomonas was the most commonly isolated organism in all of the Wagner grades, and the highest percentage in Grade 4 ulcers (6%). MSSA was most commonly recovered in grade 3 ulcers (8%) and MRSA most commonly from grade 2 ulcers (7%). In Grade 4 ulcers, the most common finding was mixed organisms (6%). Only E. coli was isolated from a low overall distribution with no isolations reported from Grade 3 ulcers.

Table 6. Wagner Grade wise antibiotic prescribing pattern

Wagner grade	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
No.of patient	15%	24%	24%	25%	12%
Augmentin	3%	4%	-	3%	1%
Ampicillin-sulbactam	2%	2%	2%	5%	3%
Cefazolin	-	1%	-	-	-
Cefepine	-	1%	2%	1%	-
Ceflazidine	1%	-	2%	-	-

Ceftriaxone	-	2%	4%	-	-
Ceftriaxone - metronidazole	1%	1%	-	3%	-
Cephalexin	1%	1%	2%	2%	-
Ciprofloxacin	1%	2%	1%	1%	2%
Clindamycin	1%	2%	-	-	-
Cloxacillin	-	-	1%	-	-
Linezolid	2%	3%	1%	4%	2%
Piperacillin – tazobactam	3%	3%	5%	5%	3%
Teicoplanin	-	2%	2%	-	-
Vancomycin	-	-	2%	1%	1%

The distribution of Antibiotic Use Based on Wagner Grade For the 100 patients who were included in the study, the distribution of antibiotic use by Wagner grade is shown in Table 6. The 12th percentile of the total study population was Grade 5 ulcers, 25% were Grade 4 ulcers, 24% were Grade 3 ulcers, 24% were Grade 2 ulcers and 15% were Grade 1 ulcers.The most common antibiotics used were Augmentin and piperacillin–tazobactam (3% each) followed by ampicillin–sulbactam and linezolid (2% each) amongst the Group 1 patients. Ceflazidime, ceftriaxone–metronidazole, cephalexin, ciprofloxacin and clindamycin were each prescribed in 1% of cases.The most commonly used antibiotics in grade 2 ulcers were Augmentin (4%) and linezolid (3%) and piperacillin–tazobactam (3%). Each of ampicillin–sulbactam, ceftriaxone, ceftriaxone–metronidazole, cephalexin, ciprofloxacin, clindamycin and teicoplanin was administered in 1-2% of patients. Each of these antibiotics was administered to 1% of patients.The most frequently used antibiotic for Grade 3 ulcers was piperacillin–tazobactam (5%) followed by ceftriaxone (4%). 2% of patients received cefepime, ceftazidime, cephalexin, teicoplanin, and vancomycin each, and 1% received ampicillin–sulbactam, ciprofloxacin, cloxacillin, and linezolid each.The most common antibiotics used were ampicillin–sulbactam and piperacillin–tazobactam (5% each), followed by linezolid (4%) in Grade 4 ulcers. Each of Augmentin and ceftriaxone–metronidazole were used in 3% of patients, whilst cephalexin and ciprofloxacin were used in 2% of patients each. Each antibiotic, cefepime and vancomycin, was administered in 1 per cent of patients.Ampicillin-sulbactam and piperacillin-tazobactam were the most common antibiotics used in Grade 5 ulcers (3% each), followed by Augmentin, ciprofloxacin and linezolid (2% each). 1% of patients received vancomycin.Piperacillin–tazobactam was the most commonly used antibiotic in all the Wagner grades, and was used more often in patients with Wagner grade 3 and 4 ulcers (5% each). Linezolid was also frequently administered (4% – Grade 4 ulcers). Broad-spectrum antibiotics (piperacillin–tazobactam and linezolid) were used more frequently in Wagner grades 3 and 4.

Discussion

The study is a prospective observational study involving 100 patients with diabetic foot ulcer in a tertiary-care hospital at Salem, Tamilnadu, India was conducted to assess the prescribing pattern. The majority of the patients were male (59%) and the age group of 40-55 years was the most common (44%). Most patients had advanced ulcers with wagner grade 4 being the most commonly observed grade (25%), wagner grade 2 and 3 were both 24% of the patients. The microbiological profile revealed that the most common organism isolated was Pseudomonas (27%), followed by MRSA (25%), MSSA (23%) and E. coli (16%). The results show a prevalence of Gram-negative and resistant Gram-positive organisms in patients with DFUs. The significant burden of Pseudomonas and MRSA infection highlights the need to consider local antimicrobial susceptibilities and to properly assess microbiological specimens in the selection of empirical treatment.As far as the use of antibiotics are concerned, piperacillin–tazobactam was the most common one prescribed (19%), followed by ampicillin–sulbactam (14%) and linezolid (12%). A higher proportion of patients received broad-spectrum therapy in Wagner Grade 3 and Grade 4 ulcers, indicating more usage of Piperacillin–tazobactam in more severe ulcers. Glimepiride, metformin, sitagliptin, empagliflozin, and their combinations were used as oral antidiabetic drugs, and insulin preparations were frequently used. Commonly used medicines included pantoprazole, paracetamol–tramadol, B-complex and paracetamol as well as other supportive medicines. The results indicate that diabetic foot ulcer treatment is a complex process that requires several therapeutic interventions such as antimicrobial therapy, glycaemic control, pain treatment and support. Ideally, antibiotic selection should be tailored to patient specific characteristics and the principles of antimicrobial stewardship, in addition to clinical severity, culture and susceptibility

results, and IWGDF/IDSA recommendations for guidance.

Conclusion

The present study aims to describe the prescribing pattern of diabetic foot ulcer patients attending in a tertiary care hospital. The study revealed higher number of advanced Wagner grade ulcers and high prevalence of Pseudomonas, MRSA and MSSA. Many patients were managed with a variety of antibiotics, the most frequently used being Piperacillin–tazobactam, followed by ampicillin–sulbactam and linezolid; antidiabetic, insulin and supportive drugs were also used. The result highlight the significance of careful choice of antibiotic according to clinical assessment, microbiological data, and antibiotic susceptibility as well as supportive therapy and good glycaemic control. Adoption of antimicrobial stewardship and establishment of institution-specific prescribing protocols may aid rational use of antibiotics and enhance the management of DFUs.

Limitations

- ✓ The findings may not be applicable to other health care settings as only 100 patients were included in the study.
- ✓ The study period of 6 months is fairly limited and may not be representative of the microbubal pattern, the characteristics of diabetic foot ulcers, and prescriptions in every season.
- ✓ In detail, antimicrobial susceptibility testing and the results of antibiograms were not investigated, and hence the appropriateness of specific antibiotic prescriptions could not be validated.
- ✓ Important antibiotic-prescribing parameters, such as dose, route, duration of therapy, treatment modification, and de-escalation, were not assessed and thus a full evaluation of antimicrobial stewardship was not possible.
- ✓ The study primarily employed descriptive analysis techniques and detailed statistical relationships between Wagner grade, microbiological profile, medication use, and clinical outcomes could not be drawn.

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