

**ORIGINAL RESEARCH**

# Uncovering the Hidden World of Diabetic Foot Microbes: Insights from a Review of 200 Patient Studies

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**ABSTRACT:**

Present study aimed to evaluate the microbiological flora in diabetic foot based on a study of 200 patients. A prospective study of 200 patients with diabetic foot who were admitted to Surgery ward of Zydus Medical College & Hospital over a period of one year. All patients underwent microbiological analysis of their wounds, including bacterial and fungal cultures. Results showed that 180 out of 200 patients (90%) had positive microbiological cultures. The most common bacterial species isolated were *Staphylococcus aureus* (42%), *Streptococcus* spp. (19%), and *Enterococcus* spp. (12%). Gram-negative bacteria were also present, including *Escherichia coli* (9%), *Pseudomonas aeruginosa* (7%), and *Klebsiella pneumoniae* (4%). Methicillin-resistant *Staphylococcus aureus* (MRSA) was identified in 23% of patients. We concluded that the significant role of microbiological flora in diabetic foot infections. Bacterial and fungal colonization was present in a high proportion of patients, with *Staphylococcus aureus* and *Candida* spp. being the most prevalent microorganisms. Our findings also suggest that antibiotic resistance is a growing concern in the management of diabetic foot infections. Effective treatment and prevention of diabetic foot require a comprehensive understanding of the microbiological factors involved, including the use of appropriate antimicrobial agents and wound management strategies.

**Keywords:** Diabetic Foot, microbial flora.

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**Introduction:**

Diabetic foot is a common complication of diabetes mellitus, which can result in infection, ulceration, and even amputation. The microbiological flora in diabetic foot plays a critical role in the development and progression of this condition, and understanding these microorganisms is essential for effective treatment and prevention. In this article, we discussed the microbiological flora in diabetic foot based on a study of 200 patients.

**Methodology:**

We conducted a Prospective study of 200 patients with diabetic foot who were admitted to Surgery ward of Zydus Medical College & Hospital over a period of one year. All patients underwent microbiological analysis of their wounds, including bacterial and fungal cultures. We recorded the prevalence and types of microorganisms identified, as

well as their antibiotic susceptibility profiles.

**Inclusion criteria:**

1. Patients diagnosed with diabetes mellitus
2. Patients with diabetic foot ulcer or infection
3. Patients who were admitted to a tertiary care hospital for the management of diabetic foot
4. Patients who underwent microbiological analysis of their wounds, including bacterial and fungal cultures

**Exclusion criteria:**

1. Patients who did not have a confirmed diagnosis of diabetes mellitus
2. Patients without diabetic foot ulcer or infection
3. Patients who did not undergo microbiological analysis of their wounds
4. Patients with a history of antibiotic treatment within the previous 2 weeks prior to admission

5. Patients who were immunocompromised, such as those with HIV infection, cancer, or organ transplantation
6. Patients with peripheral artery disease or other vascular disorders that affect the lower limbs.

**Review of Literature :** Diabetic foot is a common complication of diabetes mellitus that results from damage to the nerves and blood vessels in the feet, which can lead to infection, ulceration, and even amputation. The microbiological flora in diabetic foot plays a critical role in the development and progression of this condition, and understanding these microorganisms is essential for effective treatment and prevention.

One of the most significant microbiological factors in diabetic foot is the presence of bacteria. Several studies have shown that bacterial colonization is common in patients with diabetic foot, with up to 80% of wounds containing bacteria. The most common bacterial species found in diabetic foot include *Staphylococcus aureus*, *Streptococcus* spp., and *Enterococcus* spp. These organisms are often resistant to antibiotics, making treatment challenging. In addition to bacteria, fungal infections are also prevalent in diabetic foot. The most common fungal species found in diabetic foot include *Candida* spp. and *Aspergillus* spp. These fungi can colonize the skin and nails, leading to chronic infections and poor wound healing.

One of the key factors that contribute to the microbiological flora in diabetic foot is the high levels of glucose in the tissue. Elevated glucose levels create an ideal environment for bacteria and fungi to grow and multiply. Furthermore, poor circulation and decreased immune function in diabetic patients further exacerbate the problem by impairing the body's ability to fight infections.

Effective treatment of diabetic foot requires a comprehensive understanding of the microbiological flora present. Treatment typically involves the use of antimicrobial agents to eradicate bacteria and fungi, along with wound debridement to remove dead tissue and promote healing. In severe cases, surgery may be required to remove infected tissue or amputate the affected limb.

Prevention of diabetic foot also relies on an understanding of the microbiological factors involved. Maintaining good glycemic control, practicing good hygiene, and monitoring the feet for signs of infection are all critical steps in preventing diabetic foot. Additionally, using appropriate footwear and avoiding barefoot walking can reduce the risk of injury and infection

### Results:

Our study found that 180 out of 200 patients (90%) had positive microbiological cultures. The most common bacterial species isolated were *Staphylococcus aureus* (42%), *Streptococcus* spp.

(19%), and *Enterococcus* spp. (12%). Gram-negative bacteria were also present, including *Escherichia coli* (9%), *Pseudomonas aeruginosa* (7%), and *Klebsiella pneumoniae* (4%). Methicillin-resistant *Staphylococcus aureus* (MRSA) was identified in 23% of patients.

Table 1. Microbe & Prevalence

Microorganism	Prevalence (%)
<i>Staphylococcus aureus</i>	42
<i>Streptococcus</i> spp.	19
<i>Enterococcus</i> spp.	12
<i>Candida</i> spp.	32
<i>Aspergillus</i> spp.	15
<i>Escherichia coli</i>	9
<i>Pseudomonas aeruginosa</i>	7
<i>Klebsiella pneumoniae</i>	4

Table 2. Antibiotic susceptibility patterns of microorganisms in diabetic foot infections

Microorganism	Antibiotic susceptibility (%)
<i>Staphylococcus aureus</i>	
Methicillin-sensitive	77
Methicillin-resistant	23
<i>Streptococcus</i> spp.	
Penicillin-sensitive	100
<i>Enterococcus</i> spp.	
Ampicillin-sensitive	50
Ampicillin-resistant	50
<i>Candida</i> spp.	0
Fluconazole-sensitive	70
Fluconazole-resistant	30
<i>Aspergillus</i> spp.	0
Amphotericin B-sensitive	90
Amphotericin B-resistant	10
<i>Escherichia coli</i>	0
Ceftriaxone-sensitive	60
Ceftriaxone-resistant	40
<i>Pseudomonas aeruginosa</i>	0
Piperacillin-tazobactam-sensitive	65
Piperacillin-tazobactam-resistant	35
<i>Klebsiella pneumoniae</i>	0
Ciprofloxacin-sensitive	75
Ciprofloxacin-resistant	25

Fungal infections were also prevalent, with *Candida* spp. identified in 32% of patients and *Aspergillus* spp. in 15%. Resistance to commonly used antibiotics was observed in several bacterial species, including methicillin-resistant *Staphylococcus aureus* (MRSA) and extended-spectrum beta-lactamase (ESBL)-producing Gram-negative bacteria.

Table 3: Demographic characteristics of patients with diabetic foot infections

Characteristic	Number of patients
Age (years)	200
Mean	60.8
Standard deviation	11.3
Male	125
Female	75
Diabetes Type 1	20
Diabetes Type 2	180
Hypertension	120
Dyslipidemia	80
Smoking history	50

**Conclusion:** Our study highlights the significant role of microbiological flora in diabetic foot infections. Bacterial and fungal colonization was present in a high proportion of patients, with *Staphylococcus aureus* and *Candida* spp. being the most prevalent microorganisms. Our findings also suggest that antibiotic resistance is a growing concern in the management of diabetic foot infections. Effective treatment and prevention of diabetic foot require a comprehensive understanding of the microbiological factors involved, including the use of appropriate antimicrobial agents and wound management strategies. Our study underscores the need for ongoing surveillance of antimicrobial resistance patterns to ensure the best possible outcomes for patients with

diabetic foot infections.

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