

## Clinical patterns of bacterial and fungal infections in diabetic patients

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### Abstract

**Objectives:** To study and evaluate the prevalence of different skin and soft tissue infections caused by bacterial and fungal microorganisms in diabetic patients.

**Study design:** Cross-section study

**Place and duration of study:** This observational study was conducted in out patients department (OPD) of Dermatology unit, Hayat Abad Medical Complex, Peshawar from May 2018 to October 2018.

**Material and Methods:** Total of 100 patients with type-II diabetes was included in this study. Detailed history, dermatological examination and relevant investigations were done.

**Results:** Out of 100 patients, 58% were males and 42% were females, age of patients ranged from 40 years and above. Out of 100 patients 48% had fungal and 29 had bacterial infections of skin and soft tissues. Among fungal infections candida infections was common affecting 21% patients. Among bacterial infections frunculosis was more prevalent affecting 8% patients. Staphylococcus aureus was the most common pathogen affecting 11% patients.

**Conclusion:** Skin and soft tissue infections are very common among patients of type-II diabetes leading to significant morbidity and mortality.

**Keywords:** Type-II diabetes mellitus, skin and soft tissue infections, immunity, staphylococcus aureus, candidiasis

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### Introduction:

Diabetes Mellitus is a metabolic syndrome characterized by relative or absolute deficiency of insulin leading to deranged metabolism of carbohydrates causing elevated blood glucose levels. According to WHO the estimated rise of diabetic patients at the end of 2025 will be 299 million and 366 million by the end of 2030.<sup>1,2</sup> According to studies on prevalence of Diabetes in Pakistan there are 11.7% people who are suffering from type-II Diabetes with higher ratio in male gender and urban population.<sup>3</sup> The Diabetic patients are more prone to different infections including blood stream infections, urinary tract and skin and soft tissue infections.<sup>4,5</sup> Latest studies showed that increased susceptibility of diabetic patients to various infections is due to weak host immune response and hy-

perglycemia.<sup>4,6</sup> The increased incidence of skin and soft tissue infections in diabetic patients is secondary to micro angiopathy with decreased neutro-philic migration, sensory neuropathy and colonization with staphylococcus aureus.<sup>7</sup> Evaluation of different skin and soft tissue infections in diabetic patients will create awareness leading to prophylaxis and prompt management of these infections reducing both morbidity and mortality among diabetic patients.

### Materials and Methods:

This study includes 100 patients of type II diabetes mellitus. The study was concluded in OPD of Dermatology unit, Hayat Abad Medical Complex from May 2018 to October 2018. All the patients were subjected to complete history, systemic and dermatological examination

Table-1: Demographic Characteristics of 100 with type II Diabetes Mellitus (n=100)

Total Patients	N= 100
Male	58
Female	42
Age	40 years and above
Mean fasting blood sugar	138
Mean Random blood sugar	224

Table-2: Type of skin and soft tissue infection among Diabetes(n=100)

Type of infection	Number of Patients	Percentage (%)
Different fungal infections	48	48%
Different bacterial infections	29	29%
Non infected skin and soft tissue wound	23	23%

Table-3: Clinical patterns of fungal infections among diabetics (n=48)

Clinical patterns of fungal infections	Number of patients	Percentage (%)
Candidial infections	21	43.75
Oral Candidiasis	4	8.33
Vaginal	6	12.5
Toe webs	8	16.66
intertrigo	3	6.25
Onychomycosis	16	33.33
Dermatophytosis	11	22.91

Table-4: Clinical patterns of bacterial infections among diabetic patients (n=29)

Clinical patterns of bacterial infections	Total number of patients	Percentage (%)
Furunculosis	8	27.6
Cellulitis	4	13.8
abscess	6	20.7
Carbuncle	4	13.8
Folliculitis	5	17.24
Ecthyma	2	6.9

Table-5: Types of microorganisms isolated from bacterial infections among Diabetic patients n=29

Bacterial organisms isolated	Frequency	Percentage (%)
Staph aureus	11	37.93
Methicillin Sensitivity Staph aureus (MSSA)	7	24.13
Methicillin resistant Staph aureus (MRSA)	4	13.8
Pseudomonas spp	7	24.13
Streptococcus species	5	17.24
Proteous spp	2	6.9
E. Coli	4	13.8

and relevant investigations including random and fasting blood sugar, pus and swab specimen

for culture sensitivity and fungal scraping were done. A pre-designed proforma including gender, age, duration of diabetes and type and distribution of skin infection (involvement of toe web, nails, soles, mouth and vagina in females) designed. Approval of study from hospital ethical and research committee was taken.

### Results:

Total 100 patients aged 40 years and above were included in the study. Out of 100 patients 58 were male and 42 were females showing that type-II Diabetes is more prevalent in male gender as shown in table-1.

Out of 100 patients 77 had different skin and soft tissue infections. Among 77 patients 48 had various fungal infections 29 had bacterial infections of skin and soft tissues. This shows that fungal infections are more prevalent among diabetics. Those patients having resistant and recurrent fungal infections should be screened for type-II diabetes mellitus as shown in table-2.

Out of 48 patients showing various fungal infections prevalence of candidial infection was higher manifesting as oral, vaginal, recurrent intertrigo and infection of toe webs. That was followed by onycho-mycosis secondary to mixed candidial and dermatophytes followed by Dermatophytes infection of different body sites as shown in table-3.

Out of 100 patients 29 patients had different bacterial infections of skin and soft tissues. Among various clinical patterns furunculosis was more common among diabetics. Staphylococcus Aureus was the most common micro-organism responsible for skin and soft tissue infections among diabetics as shown by results of pus culture and sensitivity as shown in table 4 and 5.

### Discussion:

Diabetes mellitus is a metabolic disorder causing various complications including systemic and various skin and soft tissue infections. There are many studies showing strong association of infections with uncontrolled Diabetes due to impaired immunity status. Skin and soft tis-

sue infections are a major cause of morbidity and mortality in diabetic patients.<sup>8</sup> Our study was conducted in department of dermatology, Hayatabad Medical Complex in collaboration with microbiology section of Khyber Teaching Hospital.

In this study we observed that poor control of blood sugar in terms of raised values of fasting and random blood sugar were associated with increased incidence of skin and soft tissue infections. Similar results were shown by Magliano et al.<sup>9</sup>

It was observed that the ratio of fungal infection in skin and soft tissues was significantly high as compared to bacterial infections. Diabetic patients are susceptible to fungal infections including yeast, mould and dermatophytes because of raised blood glucose levels favoring fungal growth.<sup>10</sup> Different national and international studies also reflect the above mentioned observations.<sup>2,5,10</sup>

In our study we observed that candidial colonization was more prevalent among diabetics. This was in concordance with study of Rodrigues et al.<sup>11</sup> The candidial colonization is favored by high glucose levels as it needs high carbohydrate energy source for potential bio-film formation. In our study among bacterial pathogens the ratio of gram positive organisms (Staph aureus species) was significantly high as shown by results of pus culture and sensitivity results. This finding is supported by different studies.<sup>6,7,12</sup>

### Conclusion:

The candidial colonization was more prevalent among diabetics. The candidial colonization is favored by high glucose levels as it needs high carbohydrate energy. We conclude that among bacterial pathogens the ratio of gram positive organisms (Staph aureus species) was significantly high as shown by results of pus culture and sensitivity results. The strong association of staph species colonization among diabetic patients leads to increased morbidity and mortality among diabetics secondary to skin and soft tissue infections.

**Conflict of interest:** None

**Funding source:** None

### Role and contribution of authors:

Dr Naheed Asghar collected the data and references and wrote the initial writeup.

Dr Muhammad Asghar, collected the data and helped in introduction writing.

Dr Muhammad Naeem, collected the references and helped in methodology writing.

Dr Nimat Ullah, collected the references and helped in tabulation of results

Dr Amjid Shahzad, collected the references and helped in discussion writing.

Dr Noor Rehman, collected the references and critically review the article.

Dr Waleed Mabood, critically review the article and made the final changes.

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