

## Common Pathogens in Diabetic foot Infection - A study of 120 cases

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### ABSTRACT

**Objective:** To identify the most common pathogens in diabetic foot patients presenting with different grades of infection.

**Design:** A descriptive study

Place and duration of study: surgical unit , Department of Surgery at DHQ Teaching Hospital D G Khan for a periods of eighteen months from August 2011 to Feb 2013.

**Patients and methods:** A total of 120 diabetic patients with different severity of foot infections who presented in causality and surgical outpatient department DHQ Teaching hospital D G Khan, where included in this study. Patients included in this study were above age of twelve years and were of both sexes. A detailed history was taken followed by the clinical examination. Routine investigations including complete blood examinations, complete urine examination, renal parameters, X-ray foot, CXR, ECG and pus for culture and sensitivity were recorded. Lesions were graded according to Wagner classification and appropriate medical and surgical treatment carried out.

**Results:** This study was carried out on 120 diabetic patients, out of which ninety six (80.0%) were male and twenty four (20%) were female. Male to female ratio was 4:1. Majority of the patients (n=66) were between the age group of 50 to 60 years. In majority of these patients fore foot was involved, mostly big or little toe. Patients were grouped into five grades according to the severity of infection and wegners classification of diabetic foot infection.

**Conclusion:** Most common pathogen obtained after culture was found to be staphylococcus aureus, followed by pseudomonas aurogenosa and proteus

**Keywords:** Diabetic foot disease, infection, complication, diabetic foot pathogens

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### INTRODUCTION

Diabetic foot is the most common and serious problem in diabetic patients<sup>1</sup>. Gangrenous foot infections have been described as early as 1000 A.D and diabetic foot infections are associated with substantial morbidity and mortality<sup>2</sup>. The lifetime risk of a foot ulcer for patients with diabetes (type 1 or 2) may be as high as 25%<sup>3</sup>. With the availability of insulin therapy since early 1900's, diabetes is no longer fatal disease and with the increased expectancy of life in diabetic patient s long term complications have become more common. Most patients are older, but increasing number of young patients also develop diabetic foot ulcer and about one third of the patients are under 50 years of age<sup>4</sup>. Diabetic foot is most common complication of diabetes mellitus presenting for surgical management. Before the development of effective antibiotics the severity of diabetic foot infection almost always needed amputation regardless of peripheral circulation. Foot amputations may be

required although many of these are preventable with early recognition of complications and therapy<sup>5</sup>. A better understanding of pathophysiology of diabetic foot disease, development of new anti-microbial drugs and more sophisticated method of vascular diagnosis and reconstruction as well as better technique in wound care, have all resulted in higher rate of control of these infections together with a higher incidence of foot salvage. Most diabetic foot infections are polymicrobial, with up to five or seven different specific organisms involved. The microbiology of diabetic foot wounds is variable depending on the extent of involvement<sup>6</sup>. Diabetic foot infection is graded according to Maggit-Wenger classification<sup>7</sup>. This study was performed to evaluate the common pathogens of diabetic foot disease presenting with varying severity of infections.

### MATERIAL AND METHODS

This descriptive study was carried out in surgical unit, DHQ Teaching Hospital D G Khan for a period of Eighteen months from August2011 to Feb 2013. One hundred and twenty patients having long standing diabetes mellitus with foot complications presenting with different severity of infections, were included in

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this study. Fifty-six (46.6%) patients were admitted through casualty department due to septic lesion or gangrene of the foot while sixty-four (53.3%) patients were admitted through surgical out patient department. Data was collected by taking a detailed history and clinical examination. Description of the wound or ulcer on the foot was noted. These patients were thoroughly examined for any other systemic complication of diabetes mellitus and were investigated for any such problem. Investigations done included complete blood examination, complete urine examination, blood sugar profile, renal parameters, X-ray foot, CXR, ECG, Plain insulin was started according to the blood sugar level and urine sugar reports. Pus from the ulcer and tissue pieces from floor of ulcer was sent for culture and sensitivity. Patients were evaluated and managed by grading their disease according to Wegner's classification, considering the severity of infection at the time of presentation. The management was planned according to the grade of infection. Data was collected and frequencies were compiled.

**RESULTS**

In this study 120 patients with diabetes mellitus having foot infections were included. 96 patients (80%) were male, while 24(20%) were female. Male to female ratio was 4:1. Majority of the patients (n=66) were between the age of 50-60 years. The age distribution of these patients is shown in table II. After thorough physical examination and investigations these patients were grouped into five grades according to Maggit-Wegner classification shown in table I. Staphylococcus aureus was the most common organism isolated from the wound of 79 patients (65.8%) followed by pseudomonas in 10(8.3%) patients and proteus in 8(6.6%) patients as shown in table III.

Table I: Maggit-Wegner classification of Diabetic foot ulcer

Grade of Ulcer	Characteristics
0	High risk foot with no ulceration
I	Skin involvement
II	Skin & soft tissue involvement
III	Skin, soft tissue and bone involvement
IV	Localized gangrene (forefoot, heel or toes)
V	Gangrene of entire foot

Table II: Age Distribution (n=120)

Age (in years)	=n	%age
<40	9	7.51
40---50	34	28.3
50-60	66	55
Above 60	11	9.1

Table III: Organisms Cultured (n=120)

Infective agent	=n	%age
Staphylococcus aureus	79	65.8
Pseudomonas aeruginosa	10	8.3
Proteus vulgaris	8	6.6
Others (Stapylococcus agalactae, Staphylococcus epidermidids)	23	19.1

**DISCUSSION**

Long standing diabetes mellitus leads to many multi-system complications. Foot ulcers develop in 20-30% of such patients<sup>8</sup> as reported in a study conducted in U.S.A, one out of every four diabetic patient will develop some kind of foot problem during life time<sup>9</sup>. Diabetic foot infections can develop as a result of neuropathic or ischemic ulcers, cracks, or defects in the skin of the foot or nail beds (paronychia)<sup>10</sup>. However in our population the major problem is gross infection in patients with diabetic foot. Major contributing factors for late presentation include bare foot gait, attempts at home surgery, trust in quacks and un skilled personals and undetected diabetes<sup>11</sup>. It is more common in males, which form 80% of our patients with diabetic foot and 20% female, with male to female ratio of 4:1. A study done by Munawar J showed that patients who develop foot ulcers are most frequently males having diabetic mellitus for long duration and usually have non palpable pedal pulses and reduced joint mobility<sup>12</sup>. In another local study 66.6% were male and 33.3% were female<sup>13</sup>. In our study 21.6% patients with superficial ulceration and erythema, 10.8% had deep ulceration with bad granulation tissue, 40.9% had osteomyelitis, 8.3% had gangrenous patches on pressure areas while 18.3% patients had gangrene of foot. In a local study common presentations were patients with ulcers 21% abscess in 31% and gangrene in 12.5%<sup>13</sup>. As patients come with advanced disease to surgeons so for this reason patients with grade III to V are in majority in our study.

Diabetic foot infection is usually polymicrobial in nature consisting of gram +ve and gram -ve aerobes as well as anaerobes. However the most common micro-organism isolated is Staphylococcus aureus followed by streptococcus and pseudomonas<sup>14</sup>. In this study Staphylococcus aureus was isolated from culture of pus in 65.8%, where as Staphylococcus aureus was isolated in 54% of cases in a study done by Zafar A<sup>13</sup>, Wounds with extensive local inflammation, necrosis, or gangrene with signs of systemic toxicity should be presumed to have anaerobic organisms in addition to the above pathogens. Potential pathogens include anaerobic streptococci, Bacteroides species, and Clostridium species<sup>15</sup>.

Depending upon extent of foot infection, lesions are graded into five groups as in Maggit-Wegner classification. For grade I and II disease broad spectrum antibiotics such as clindamycin along with gentamicin or amoxicillin plus clavulenic acid are usually prescribed for at least 2-4 weeks<sup>16</sup>. However ciprofloxacin and metronidazole have also been found useful. Superficial diabetic foot infections require local wound care including relief of pressure on the ulcer, wound cleansing, and debridement of callus and necrotic tissue<sup>17</sup>. In our study 21.6% patients were treated with antibiotics and debridements. Fusidic Acid (Fucidin) 250 mg twice a day was used in our patients having long standing non healing superficial ulcers of the foot with good results. Patients having grade III grade V disease needed some form of amputations for their management and comprise a bulk of patients. In our study 76.5% patients were in these grades unlike other local study where only 36% needed amputations<sup>13</sup>. In our study 10.8% patients needed skin grafting. In our study 9.1 percent patients develop wound infection, 4% patients developed septicemia and 1.6% patients had gas gangrene.

Diabetic foot complications are the most common cause of non traumatic lower extremity amputations in the industrialized world. The risk of lower extremity amputation is 15 to 46 times higher in diabetic than in non diabetics<sup>18</sup>. Furthermore, foot complications are the most frequent reason for the hospitalization in patients with diabetes, accounting for up to 25% of all diabetic admissions in the United States and Great Britain. Repeated debridement and incision drainage of abscess along with wound toilet with hydrogen peroxide is needed frequently in such patients<sup>19</sup>.

## CONCLUSION

Diabetic foot infection being the most common complication of diabetic mellitus reporting to surgeons requires multi-disciplinary approach for its management. Thorough and repeated examinations and necessary investigations to assess the grades of infection at the time of presentation are very essential. Some time there is underlying osteomyelitis of the foot bones in patients presenting only with small superficial ulcer. If causative pathogen is identified then proper antimicrobial therapy can be started and much better results can be obtained than empirical antibiotic therapy.

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