
Diabetic foot infections and management: A Rural Indian Perspective

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Abstract

Aim and objective: This study was carried out to study demographic features of patients suffering from diabetic foot infections and also to know microorganism causing infections and its management.

Study design: It is a hospital based cohort study.

Place and duration of study: Department of General Surgery, K.I.M.S, Andhra Pradesh, from Jan 2007 to December 2009.

Material and methods: The study was conducted at tertiary care teaching hospital in Andhra Pradesh from 2007 to 2009. The patients of both gender and all age groups who presented with diabetic foot infections comprised the study. The history of diabetic foot was obtained and thorough clinical examination was carried out after written informed consent from patient. The Subject underwent routine and specialized investigations like swab for culture and sensitivity, radiographs of foot. The patients were managed with insulin or oral anti diabetic agents, debridement, drainage, skin grafting. The severe infection cases required amputations to save life of patients. All patients followed until discharge or death.

Results: Out of 60 cases 40 were male and 20 female patients. Diabetic foot ulcers were more common in age group of 45-54 (33.33%). Diabetic foot infections were observed more in patients having diabetes for duration of more than years (75.00%). More than 60 % of cases were in Wagner's grade III to V. Most common organisms responsible for diabetic foot infection were gram positive organisms, 43.33% of cases whereas 16.67% had poly microbial infection. The present study revealed that ceftriaxone was found to be effective in 33.33% of cases of infections followed by amikacin in 25% of cases. Amputations were done in 43.33% cases due to severe life threatening spreading, uncontrolled infections.

Conclusion: As the diabetic mellitus cases are increasing globally, it is becoming the public health problem. There is huge burden on economy, health system and on society. It is affecting the quality of life of citizens which requires orchestrated efforts from all stake holders to prevent and minimise the foot infections and reduce the number of amputations.

Keywords: diabetic foot, infections, foot ulcers, amputations

1. Introduction

The incidence of diabetes is increasing globally. Patients with diabetes mellitus has 15-25% life time risk of developing foot ulcers.^[1] Foot ulcers have become major and rapidly increasing public health problem.^[1,2] The morbidity, impairment of quality of life and the involved cost for management have tremendous impact health system and society. Of all the potential medical problems faced by the diabetic patient, approximately 20% of hospital admissions are related to the foot complications. This is substantiated by the fact that 15% of all diabetics will suffer from foot ulceration in their life time.^[1] The center for disease control estimate that 50% of these diabetic foot problems and subsequent amputations can be eliminated with the help and

proper foot care measures by the people at risk.^[1,2] Diabetic foot complications like ulcers, infections and gangrene are associated with increased frequency and length of hospitalization and risk of loss of limb or life. Foot ulceration and infection are leading risk factors for amputation.^[1- 3]

1.1 Aim and objectives

This study was carried out to study demographic features of patients suffering from diabetic foot infections from the rural part of the country. It was also necessary to know microorganism causing infections in diabetic foot ulcers and their antibiotics sensitivity to treat the diabetic foot infections.

2. Material and methods

Present study was conducted at tertiary care teaching hospital in the rural area of south India. It was hospital based study of diabetic patients suffering from diabetic foot ulcer infections. It was a cohort study conducted from October 2007 to September 2009. It was comprised of total 60 diabetic foot ulcer patients from indoor as well as outdoor departments. Age of patient was in range of 18 to 74 years. Non diabetic foot ulcer cases were excluded from the study. Initially the written and informed consent was obtained from all the cases for the inclusion in the study group. Detailed history was obtained from all the patients, regarding duration of diabetes, treatment of diabetes and its complications especially diabetic foot ulcer and infections. It was followed by thorough physical examination as well as local examination of diabetic foot ulcer in all cases. After thorough local examination, diabetic foot ulcers were graded according to Meggitt- Wagner grading system. Discharge from all ulcer cases were sent for culture and sensitivity and whenever necessary curettage from ulcer was also sent for culture and sensitivity. All patients were managed with local care of the ulcer in the form of dressings, antibiotics and insulin or oral anti diabetic agents. All cases were entered in the predesigned pro-forma.

3. Results

Present study constituted total 60 patients out of which 40 were male and 20 female patients.

Table 1: Reveals the age group wise distribution of the study subjects.

Age group (year)	No. of patients	Percentage
18-24	4	6.66
25-34	7	11.66
35-44	9	15.00
45-54	20	33.33
55-64	15	25.00
65-74	5	8.33

Diabetic foot ulcers were more common in age group of 45-54 (33.33%).

Table 2: Shows distribution of cases as per the duration of diabetes mellitus

Duration(years)	No. of cases	Percentage
>5	15	25.00
5-10	25	41.66
>10	20	33.33

Diabetic foot infections are more common in patients having diabetes for 5-10 years (41.66%).

Table 3: Shows Distribution of ulcer cases according to Meggitt-Wagner Grading system

Grades of ulcer	Grade-I	Grade-II	Grade-III	Grade-IV	Grade-V
No. of patients (%)	6 (10)	15 (25)	25 (41.60)	10 (16.60)	4 (6.60)

More than 60 % of cases were in grade III to V.

Table 4: Reveals the micro-organisms isolated from the infected diabetic foot ulcers.

Micro- organisms isolated	No. of cases	Percentage
Gram positive (<i>Staphylococcus aureus</i> & <i>Streptococci</i>)	26	43.33
Gram negative (<i>E.coli</i> & <i>Pseudomonas</i> etc.)	19	31.67
Polymicrobial	10	16.67
No Growth	5	8.33

Most common organisms responsible for diabetic foot infection were gram positive in 43.33% of cases.

The present study revealed that the most common organisms isolated were gram positive cocci i.e. *Staphylococcus aureus* and streptococci. *Staphylococcus aureus* was sensitive to ampicillin, sulbactam, amoxicillin, clavulanate, ceftriaxone whereas Streptococci were sensitive to amoxicillin, clavulanate, ceftriaxone and piperacillin.

Table 5: Shows antibiotics used to treat foot infections

Antibiotic	No. of cases	Percentage
Ceftriaxone	20	33.33
Amikacin	15	25.00
Piperacillin	10	16.66
Amoxicillin & Clavulanate	5	8.33
Piperacillin & tazobactam	2	3.33
Ciprofolxacin	8	13.33

The present study revealed that ceftriaxone was effective in 33.33% of cases.

Table 6: reveals the various modalities used to treat the diabetic foot infections

Type of care	No. of cases	Percentage
Drainage and debridement	14	23.33
Fasciotomy and debridement	5	8.33
Split thickness skin graft	15	25.00
Amputations	26	43.00

In the present study amputations were performed in 43.33% cases, fasciotomy was done in 8.33% of cases followed by split skin grafting in 25% of cases.

Table 7: Shows the various amputations performed to treat the severe cases of diabetic foot infections.

Minor amputation- No. of cases (%)	Major amputation - No. of cases (%)
Ray amputation-9	Above knee amputation- 1
Trans-metatarsal amputation- 6	Below knee amputation-5
Tarso-metatarsal amputation- 5	Hind quarter amputations- nil

In the present study 20 were minor amputations performed whereas in 6cases major amputations need to perform for spreading uncontrolled infections.

Table 8: reveals the hospital stay of patients suffering from diabetic foot infections

Duration of hospital stay (weeks)	No. of patients (n)	Percentage
<4	10	16.67
4-8	6	10.00
>8-12	24	40.00
>12	20	33.33

In the present study 40% cases required hospital stay for 8-12 weeks.

4. Discussion

Diabetic foot infection (DFI) is the major health problem worldwide having huge socioeconomic burgeon on health care system and society. DFI is the leading cause of non-traumatic lower limb amputations.[4-7] The main aim was to study the DFI which is responsible for increased morbidity, amputations and even mortality in diabetic patients.[8-10] Diabetic foot infections were more common (33.33%) in age group of 45-54 years whereas P.C Leung reported 75% infections occurred above the age of 50 years. The male patients showed 66.67% of foot infections which is double than female population this is self-explanatory as out of 60 subjects males were 40 in number. The present series comprised of 83.33% of cases as indoor patients almost of cases were from remote villages without access to basic healthcare facilities and many cases had advanced diabetic foot infections. Majority of cases (66.67%) had grade-II & III ulcers that required daily diabetic foot ulcer care in the form of debridement, daily dressings and proper glycemic control. Mehra and Thawait study revealed that 68.75% of cases had grade II-III ulcers.

The presentation with higher grades of ulcer can be minimized with the diabetic foot care and health care awareness and counseling of diabetic patients in the community.[8-10] The foot problems are observed in 25 cases (40.66 %) having DM for the duration of 5-10 years which in accordance with findings reported by Singh and Chawla.[10,11] The 90% (54 out of 60) of cases of type II diabetes had developed foot infections which is comparable with

finding which is comparable with the reviewed literature. The present study revealed 43.33 % infections are caused by gram positive organisms, *Staphylococcus aureus* and *Streptococcus* whereas Aamir et al from Pakistan reported 46 % of DFI caused by *staphylococcus aureus*. [8]

Ceftriaxone was found to be effective in 33.33% of cases. Indications for limb amputations were limb threatening infections, gangrene and spreading cellulitis. Present study revealed that 43.33 % patients required amputations in addition to glycemic control, antibiotics and local ulcer care as many patients had advanced and more serious foot infection or spreading cellulitis or gangrene. This is most disturbing part of diabetic foot complications. Forty percent patient remained in the hospital for 8-12 weeks whereas more than 30 % required admission for more than 12 weeks which itself speaks about amount the cost and health care burden caused by diabetic foot infections.

5. Conclusion

As the diabetes mellitus cases are increasing globally and it is rapidly becoming the public health problem. There is huge burden on economy, health system and on society to manage the diabetic foot problems. It is taking toll on the quality of life of citizens which can be talked with well-orchestrated efforts from all stake holders. At present one limb is lost every 30 seconds due to the diabetic foot complications. Hence there is pressing need to prevent and minimise the diabetic foot infections to reduce the number of lower extremity amputations. This is possible with the help of foot care education to patients and health care workers. All need to put the foot first and care for it like hands.

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