Diabetic Foot Infection (Types of Aerobic Bacteria in Iraqi Patients)

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SUMMARY:

OBJECTIVE:

The aim of the study is to find the types of aerobic bacteria in diabetic foot infection in iraqi patients.

METHODS:

(100) Patients with infected foot, 69 male, 31 female with mean age (45) years, attends the diabetic foot clinic at the special center for endocrinology and diabetes for the period(August 2000 to February 2002).

Clinical examination and foot evaluation for infection was done for all patients and swab was taken for culture and sensitivity study.

All data were documented in special computer form for analysis and study.

RESULT:

Male affected more than female. Type two DM (diabetes mellitus) is more susceptible for foot infection than type one DM. polymicrobial infection is commoner than single type bacterial infection. Gram negative bacteria are more common than gram positive bacteria. Staph aureus is the commonest bacteria found.

CONCLUSION:

Isolation and identification and understanding the bacteriology of diabetic foot infection help in selecting the antibiotics and planning the proper management for diabetic foot infection.

KEYWORD: diabetic foot, infection, type of aerobic bacteria

INTRODUCTION:

Diabetes mellitus is a major health problem [1]

Infection in a diabetic foot is a limb-threatening condition and has been claimed to be the immediate cause for amputation in 25-50% of diabetic patients' [2].

Severe foot infection in diabetic patients may end up with limb amputation or even death [2, 3].

Microorganisms on the skin are more common in the diabetic than in general population [4].

It has been suggested that the more severe causes of foot infection in diabetes are consequences of defect inflammatory response, metabolic abnormalities, neuropathy, oedema, and vascular disease [2, 5,6].

So by isolation and identification of bacteria found in diabetic foot and understanding the bacteriology of diabetic foot infection will help in antibiotic selection and proper treatment of this condition.

PATIENT AND METHODS:

(100) Diabetic patients with foot infection attending the diabetic foot clinic at Special Center for Endocrinology and Diabetes from Aug 2000 to Feb 2002 were studied prospectively.

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Clinical examination (interview and physical examination) was done for all patients which include:

1- Neurological evaluation of the foot.
2- Vascular evaluation of the foot.
3- Foot lesion assessment especially for foot infection.

Foot infection than divided into three groups according to severity of infection (depending on clinical criteria):

1- Minor infection.
2- Moderate infection.
3- Severe infection.

Patients were send for general investigations (CBP& ESR, biochemical test, urine test), and special investigations if needed (as X-ray foot, Doppler, MRI, CT scan.)

Swab was taken from the wound and sends for culture and sensitivity. The isolate were cultured directly on the enrichment and selective media and were identified by using different microscopical, cultural characteristics and biochemical tests.

All these data were documented for each patient, in special form, and entered in specially designed computer program, for evaluation, follow up and study of each patient.

RESULT:

100 patients with diabetic foot were swabbed.

Male patients were found to be affected and develop foot infection more than the female (table 1).

Table 1:The percentage of male and female

	Male	Female
%	69	31

Non-insulin dependent type of diabetes mellitus (type 2) shows more susceptibility for infection than insulin dependent type(type 1) (table2).

Table 2: The number of insulin and non-insulin dependent patients

	Insulin dependent	Non-insulin dependent
Total NO.	17	83

100 patients were swabbed and bacteria were found in 95 foot, while in 5 swab no bacteria was isolated (table3).

Table 3: The number of swabs with and without bacteria isolation

NO. of the swab	Bacteria present	Bacteria absent
100	95	5

Single type of bacteria was found in some foot, but polymicrobial infection (i.e.infection with different type of bacteria) was found in larger number (table4).

Table 4: The number of bacteria isolated

Type of infection	Total number of feet
Single type of bacteria	41
polymicrobial	59

Gram stain shows the predominant of gram negative bacteria over gram positive bacteria (table5).

Table 5: The percentage of gram stain types of bacteria

	Gram negative	Gram positive
%	56.1	43. 9

Type of bacteria isolated shows that staphylococcus aureus was found to be the most common bacteria, the second common bacteria was Pseudomonas aeruginosa and Escherichia coli (table6).

Table 6: The type of bacteria isolated

Type of bacteria	%
1-gram positive bacteria	
S.aureus	36
S.epidermidis	7.9
2-gram negative bacteria	
Pseudomonas aeruginosa	23
Escherichia coli	18
Klebsiella Pneumoniae	10. 9
Enterobacter cloacae	4. 2

DISCUSSION:

Foot infection in patients with diabetes mellitus are among the most common bacterial infection encountered in clinical practice. Unfortunately, this infection and their sequels are also the most common cause of disability and the reason for most hospital admission among diabetic patients [3].

An understanding of the bacteriology of diabetic foot infection is important in guiding antibiotic selection and correlate culture result with appropriate definitive therapy [7].

Male diabetic patient is suffering more than female patient from diabetic foot problem and infection, possibly because he is subjected more to trauma, in addition to smoking and alcohol drinking which is seen more with male. In our study we found (69%) male and (31%) female affected . It goes with study of Boultan and Connor 1988,ICDF, 1999 [2,8,9].

Patients with type two (non-insulin dependent) show more foot problem and infection than type one (insulin dependent). In our study (83)of patients with foot infection were type two while only (17) were type one. This result goes with study of Benotmane *et al*, 2000 [8] and Bardin, 1997 [10].

Out of 100 patients we isolate bacteria from 95 patients and in 5 patients no bacteria was isolated, this could be due to the usage of antibiotics before taking the swab, or the use of local antiseptic during wound dressing. The same result was found with Mims *et al*., 1995 that antibiotics and local antiseptic could decrease the number of isolated bacteria [11].

Single type bacteria infection was found in 43% of patients, while polymicrobial was found in 57% of patients, this goes with most research Shea 1999 [3], Lipsky 1999 that many and different type of bacteria (2-4) type could be found [12].

Gram stain character of bacteria shows predominant of gram – negative stain 56.1% more than gram –positive stain 43.9%, this approximately the same result as Meshikhes *et al*., 1998 which show 61.9% for gram –negative and 38% for gram – positive bacteria [13].

The type of bacteria which is found in high percentage was S.aureus 36% while P.aeruginosa found in 23% and E. coli in 18%, and K.pneumonia in 10.9%. Lower percentage was found with S.epidermidis 7.9% and Enterobacter cloacae 4.2%, these finding is about to be similar to a study by Goldstien *et al* 1996 [14] and Boutoille *et al* 2000 [15] which shows that S. aureus is the most common type of bacteria seen in diabetic foot.

CONCLUSION:

In this prospective study we found that male diabetic patient is more prone to have diabetic foot infection than female and type two diabetes shows more susceptibility for foot infection.

Gram negative bacteria are more common than gram positive in foot infection. Polymicrobial infection (2-4 bacteria in the wound) is more than single type bacteria.

The most common type of bacteria found was staphylococcus aureus, and the lest common was Enterobacter cloacoa.

Their should be more study regarding aerobic and anaerobic bacteria, and a study considering the value of the different methods of bacteria isolation such as, swab from the wound, or aspirate from the lesion, or tissue biopsy in detecting the pathological bacteria in diabetic foot lesion, and this will help in selecting antibiotic and the proper therapy.

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