A Study of Diabetic Foot Ulcers in Relation to Depth, Location of the Ulcer and Patient's, Age and Sex.

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ABSTRACT:
BACKGROUND:
Over a nine months period, extending from October, 2002 through July 2003, microorganisms were isolated and identified from foot ulcer infections of diabetic patients. The foot ulcers were clinically identified as superficial (dry, wet) or deep. The depth of both superficial (wet, dry) and deep foot ulcers in relation to location, patient age and sex were studied from 60 patients of surgical wards.

METHODS:
The depth of different diabetic foot ulcers were measured by sterile cotton tip applicator inserted from the surface to the deepest point of the ulcer base.

RESULTS:
It was demonstrated that the superficial ulcers were mostly wet, the site of the ulcers were mainly in the right foot more than in left foot, mostly the toes. The incidence of deep ulcers were mostly in males, while the prevalence of both superficial and deep ulcers increase with advancing age.

CONCLUSION:
The present study showed a different classification of foot ulcers (superficial & deep) from past literature studies.

KEY WORDS: diabetic foot ulcers, deep and superficial.

INTRODUCTION:
The diabetic foot can be defined as a condition that includes infection, ulceration and destruction of superficial and deep tissues associated with neurological abnormalities and peripheral vascular disease in lower limbs. There are three main factors that lead to ulceration and necrosis in the diabetic foot, namely ischemia, neuropathy, and infection. Ischemia resulted from atherosclerosis of the leg vessels, in which the diabetic foot patient is often bilateral, multi-segmental and distal involving the popliteal, the tibial, and the peroneal arteries. Foot ulcers may be classified as superficial or deep. (Grayson) classified foot ulcers infections based on clinical severity, into mild, moderate ”potentially limb threatening”, and severe. ”potentially life threatening”. (Armstrong) used diabetic wound classification system based on assessment of wound depth, sensory neuropathy, vascular insufficiency and infection. Infected foot ulcer constitutes grades 2 and 3 of the modified Wagner classification. The deep infections of the bone and soft tissues (grade 3) are particularly important as they often threaten the limb.

PATIENTS AND METHODS:
The present study consisted of sixty diabetic foot patients (31 female, 29 male) of different ages, weights and marital status. The patients age ranged between 20-29 years. The depth of the ulcer was measured by the skin to the deepest point of the ulcer by cotton tip applicator. The description of depth of both superficial (wet & dry) and deep foot ulcers in relation to location, patients age and sex were studied according to the clinical examination for the patient and compared that with previous research.

RESULTS:
The results of this study were obtained from sixty patients with diabetic foot ulcers, 25 (41.6 %) with superficial ulcers and 35 (58.3%) with deep ulcers. The mean depth of superficial ulcers was 0.74 ± 0.7cm, ranged between 0.4-1.5cm & for deep ulcer was 2.2±0.5cm, which range from 2.0-3.0cm. The data obtained from this study were analyzed using descriptive statistical method. Table (1) demonstrates the description of depth & location of dry and wet – superficial foot – ulcers with patients age and sex. According to types of superficial ulcers, out of (25) cases, 10 patients(40%) were dry ulcers & 15 cases (60%) were with wet ulcers. The mean depth of superficial ulcers was 0.74 ± 0.7cm ranged between 0.4-1.5cm. The sites of superficial ulcers were 20 of them (80%) were in the right foot which were distributed in the following parts of the foot, 9 cases (45%) in the toes, 6 cases (30%) in the dorsum, 3 cases (15%) in the lateral side, one case (5%) in venetral & one case (5%) in the heel of the right foot. Five cases (20%) of superficial ulcers were in the left foot.
4 cases (80%) in the toes & one case (20%) in the dorsum of the left foot. According to the age groups there were 10 cases (40%) out of 25 patients at age group (50-59) years, followed by 7 cases (28%) at age group (60-69) years & 4 cases (16%) at age group (40-49) years. For the other age groups there was a single case (4%) for each of them. Concerning the patients sex, there were (17) females patients while (8) males with superficial foot ulcers.

Table (1) Description of depth & location of wet and dry superficial diabetic foot ulcers with patients age & sex.

<table>
<thead>
<tr>
<th>Ages Group (years)</th>
<th>Sex</th>
<th>Type of ulcer</th>
<th>Depth (cm)</th>
<th>Site of foot ulcers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Dry</td>
<td>Wet</td>
</tr>
<tr>
<td>20-29</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0.6*</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>0.5-0.8*</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>3</td>
<td>3</td>
<td>0.4</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>1.5*</td>
</tr>
<tr>
<td>70-79</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0.7</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>1</td>
<td>0.6*</td>
<td>All toes of left foot</td>
</tr>
<tr>
<td>90-99</td>
<td>1</td>
<td>1</td>
<td>0.8</td>
<td>Base of 1st toes of right foot.</td>
</tr>
<tr>
<td>Total</td>
<td>8</td>
<td>17</td>
<td>10</td>
<td>15</td>
</tr>
</tbody>
</table>

* Represent the depth of the dry ulcers.

Table (2) shows the relation between location & depth of the deep ulcers with patient age & sex. According to the sex, there were 21 patients (60%) male, 14 cases (40%) females, out of the total 35 patients. Ranged the sites of the ulcers there were 23 patients (65.7%) their deep ulcers were in the right foot, which were distributed as followed, 10 cases (43.5%) in the toes, 5 cases (21.7%) in the dorsum, 4 cases (17.4%) in the metatarsal, 2 cases (8.7%) in the ventral side & 2 cases (8.7%) in the lateral side of the right foot. Twelve (34.3%) out of 35 cases of deep ulcers were in the left foot which were distributed as followed 7 patients (58.4%) in the toes, 3 cases (25%) in the heel, one case (8.3%) in the ventral side & one case (8.3%) in the dorsal side of the left foot. The mean depth of the deep ulcers was 2.2 ±0.5cm, which range from 2.0-3.0cm According to the age there were 10 cases (28.6%) at age group (60-69) years followed by 7 cases (20%) at age group (50-59) years , 6 cases (17.2%) at age group (40-49) years , 5 cases (14.3%) at age group (70-79) years , 3 cases (8.6%) at age group (30-39) years &2 cases (5.7%) for the other age groups.
The encomical, social and personal costs of foot infections in diabetic patients are considerable. The increased susceptibility to foot infection was attributed to several factors among these factors are immune dysfunction, neuropathy and vascular insufficiency. The most typical sites of involvement are the metatarsal heads and the proximal portion of the proximal phalanges. Caputo explained that the non-limb threatening infections generally are superficial extending from less than 2cm from an ulcer, and have no evidence of necrotizing infection or systemic toxicity. Limb – threatening infections generally present with one or more of the following features, more than 2cm of cellulitis, full thickness ulceration, systemic toxicity, gangrenous soft tissue, gas in the tissue and abscess formation. In the present study and in an effort to evaluate the depth and location of diabetic foot ulcers with patients age & sex. It was demonstrated that the superficial ulcers were, mostly wet, the site of the ulcers were mainly in the right foot, more than left foot, mostly in the toes and the incidence of ulcers were mostly in females & increasing with advancing age. These findings is in agreement with the findings of other studies. The mean depth of superficial ulcers was 0.74±0.7cm. ranged between (0.4 – 1.5cm) , these finding are in agreement with that reported by other study, but disagree with other studies by whom they considered that the depth of superficial ulcers is >2cm. The result of present study shows that the incidence of deep ulcers are mostly in males than females of the tested population & mainly in the right foot and the incidence of both deep & superficial ulcers increase with advancing patients age. The majority of the deep ulcers are locted in the right foot & mostly in the toes of right & left foot these findings are in agreement with other studies by carried out.
The mean depth for deep ulcers was 2.2±0.5cm, which ranged between 2.0-3.0cm, these findings are in agreement with that reported by other\[4,11\]. According to modified Wager classification it was considered grade – 1, superficial ulcer, clinically non infected, while according to the previous study, it was observed that no ulcer remain uninfected, and this should be noted in our classification of foot ulcers( Ryath et al un published data).

CONCLUSION:
The conclusion and classification of foot ulcers of diabetic patients which were followed in this present work were according to resembling study\[13\] . We suggest that less 0.5cm depth of non-limb threatening ulcer infection which has no evidence of necrotizing infection or systemic toxicity generally should be considered as superficial ulcer. While limb-threatening infection deep ulcer should not be limited by depth only but generally more than 0.5cm with one or more of the following features : full thickness ulceration rapid progression over hours or days, systemic toxicity, gangrenous soft tissue, gas in tissue and abscess formation, generally should be considered as deep ulcer. It can be concluded that the types, sites and causes of ulcers are related to outcome and must be considered when treatment strategies are chosen\[1\].

REFERENCE: