

# Comparative Study of Soft Tissue Infections of Upper Limb in Diabetics and Non Diabetics

Soft Tissue Infections  
in Diabetics and non  
Diabetics

Muhammad Qasim Butt<sup>1</sup>, Muhammad Abdul Hannan<sup>2</sup>, Mehwish<sup>3</sup> and Komal Hussain<sup>4</sup>

## ABSTRACT

**Objective:** Comparative study of Soft tissue infections of upper limb infections in diabetics and non-diabetics.

**Study Design:** A prospective observational study

**Place and Duration of Study:** This study was conducted at the Department of Surgery and Orthopedics, Khawaja Muhammad Safdar Medical College, Sialkot and Jinnah Hospital Lahore from January 2016 to December 2018.

**Materials and Methods:** Ethical review committee permission was sought and informed consent were obtained from patients. All diabetic patients were enrolled through Outpatient Department & Emergency of Surgery and Orthopedics; in group A. Control was made up of nondiabetics with soft tissue upper limb infections due to trauma and were enrolled in Group B. Both groups were randomized for Age, gender, BMI, Duration of diabetes and type of diabetes. Infections were defined as dry, gas, and wet gangrene; necrotizing fasciitis or cellulitis; acute extensive osteomyelitis; involving the hand.

**Results:** In our study there were 250 patients in Group A (Diabetics with upper limb infections) and Group B (Non-Diabetic with upper limb infections) contained 220 patients. In group A (250) there were 72% (180) female and 28% (70) were male. In group B (220) there were 57% (125) male and 43% (95) female. Highest number of cases in Group A were cellulitis in female followed by wet gangrene of hand and hand abscess, similarly Group B had highest number of cases of cellulitis both in males and females, followed by hand abscess and necrotizing fasciitis.

**Conclusion:** Higher number of cases in diabetics and severe consequences of soft tissue infections is clearly evident in our study. Therefore, it is recommended that in diabetics even absence of trauma, professional advice from endocrinologist and surgeon should be sought to maintain optimal glycemic control and to avert any limb or life-threatening medical situation.

**Key Words:** Diabetes Mellitus, Soft tissue infection, Nephropathy, Wet gangrene, Necrotizing fasciitis

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## INTRODUCTION

Diabetes is a widely prevalent condition all over the world<sup>1</sup>. There are number of complication attributable to poor glycemic control, including Diabetic nephropathy, vasculopathy, arteriopathy neuropathy; to name a few. There has been extensive research to mitigate adverse consequences of Diabetes Mellitus but few have bornfruits.

<sup>1</sup>. Department of Surgery / Orthopedics<sup>2</sup>, Khawaja Muhammad Safdar Medical College Sialkot.

<sup>3</sup>. Department of Surgery, Allama Iqbal Memorial Teaching Hospital Sialkot.

<sup>4</sup>. Women Medical Officer, Jinnah Hospital Lahore.

Correspondence: Dr. Muhammad Qasim Butt, Assistant Professor of Surgery Khawaja Muhammad Safdar Medical College Sialkot.

Contact No: 03006140472

Email: drmqasim2013@yahoo.com

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A lot has been accomplished since first case of diabetes to Pancreatic islet transplant but we have stills miles to go before achieving ideal of euglycemia and life without complications of Diabetes and adverse effects of therapies directed at achieving normoglycemia.

The General Surgery caters to more ominous complications of diabetes ranging from Flexor tenosynovitis, Dupuytren's Contracture, trigger finger to soft tissue infections<sup>2</sup>. There is proof that these afflictions more common in patients with DM, may also dependent upon chronicity and poor compliance resulting in microangiopathy<sup>2-5</sup>. With reported burden of disease more than 240 million globally which is projected to cross more than 380 million by 2025, and almost 80% of affected are present in low to middle socioeconomic strata<sup>6</sup>. Pakistan is expected to reach from its 7<sup>th</sup> position in Diabetic populace to 4<sup>th</sup> in the world, in few years<sup>7,8</sup>. Soft tissue infections are rare but life or limb threatening and can result in amputation; affecting occupation as well as quality of life. Soft tissue infections of Diabetics with upper limb infections in diabetics range from flexor tenosynovitis, wet gangrene, gas gangrene and osteomyelitis in carpal bones of hand<sup>9-10</sup>.

Poor glycemic control, trauma to hand and reluctance to present to healthcare facility are one of the few factors in poor outcomes<sup>10</sup>. Poor glycemic control over a prolonged duration results in glycosylation of collagen, this in turn causes accumulation of collagen as it becomes resistant to collagenases giving rise to architectural change in extracellular matrix and decreased fibroblast viability<sup>11</sup>. A number of studies have been conducted in Europe, Australia and Americas but few have been specific enough to give idea of prevalence of soft tissue infection in diabetics<sup>12,13</sup>. To study frequency of soft tissue infections in diabetic affecting upper limb, especially in low and middle socioeconomic group, a study was needed.

## MATERIALS AND METHODS

A prospective observational study was designed at the Department of Surgery and Orthopedics, Khawaja Muhammad Safdar Medical College, Sialkot and Jinnah Hospital Lahore from January 2016 to December 2018. Ethical review committee permission was sought and informed consent were obtained from patients.

All diabetic patients with soft tissue upper limb infection were enrolled through Outpatient Department Emergency of Surgery & Orthopedics; in group A.

Control was made up of nondiabetics with soft tissue upper limb infections due to trauma and were enrolled in Group B.

Both groups were randomized for Age, gender, BMI, Duration of diabetes. Infections were defined as dry, gas, and wet gangrene; necrotizing fasciitis or cellulitis; acute extensive osteomyelitis; involving the upper limb. In total 250 patients in Group A were enrolled and were analyzed against 220 controls. Case definitions were obtained from Bailey and Love text book of Surgery 27<sup>th</sup> edition. Treatment end points included healing following debridement or minor amputation, major amputation, or death. Data was collected and analyzed via SPSS 16. Comparison between diabetic and control groups was performed using Chi square test for categorical data and t-test for the continuous variables.

**Inclusion Criteria:** Type 2 Diabetics with soft tissue infection of Diabetics with upper limb infections irrespective of etiology, were included in the study

**Exclusion criteria** included Type 1 Diabetes, chronic liver disease, hypothyroidism, Factitious diabetes, Cushing's disease, Surgical site infections and history of alcoholism.

## RESULTS

In our study there were 250 patients in Group A (Diabetics with upper limb infections) and Group B (Non-Diabetic) contained 220 patients. In group A (250) there were 72% (180) female and 28%(70) were male. In group B (220) there were 57%(125) male and 43%(95) female as shown in Table 1.

The greatest number of patients in group A were in age bracket of 51-60 year both males and females whereas smallest number was in elderly above 70. The group B had similar distribution of highest cases with soft tissue infections in age bracket of 41-50 (50)40% male and (43)45.2%. lowest number of cases in group B were 71 and above Table 2.

**Table No.1 Gender Distribution**

	Group An 250	Group B n220
Male	70(28%)	125(57%)
Female	180(72%)	95(43%)
Total	250(100%)	220(100%)

**Table No.2: Age Distribution**

Age (yrs)	Group A(n=250)		Group B (n=220)	
	Male n70 (100%)	Female n180 (100%)	Male n125	Female n95
30-40	3 (4.2%)	0	15 (12%)	12 (12.6%)
41-50	2 (2.8%)	5 (2.7%)	50 (40%)	43 (45.2%)
51-60	22 (31.4%)	89 (49.4%)	33 (26.4%)	22 (23.8%)
61-70	35 (50%)	72 (40%)	11 (8.8%)	10 (10.5%)
71-80	7 (10%)	12 (6%)	9 (7.2%)	4 (4.2%)
>80	1 (1.4%)	2 (1.1%)	7 (5.6%)	4 (4.2%)

**Table No.3: Comparison of Soft tissue infection of upper limb in Diabetics (Group A) and control / non-diabetics (Group B)**

	Group A			Group B		
	Male(n70)	Female(n180)	Total 250	Male (n125)	Female(n95)	Total (220)
Cellulitis	22 (8.8%)	67(26.8%)	89(35.6%)	89(40.4%)	55(25%)	144(65%)
Gas Gangrene	7(2.8%)	15(6%)	22(8.8%)	6(2.7%)	3(1.3%)	9(4%)
Wet gangrene	12(4.8%)	56(22.4%)	68(27.2%)	5(2%)	7(3.1%)	12(5.1%)
Acute Osteomyelitis	6(2.4%)	7(2.8%)	13(5.2%)	1(0.4%)	0	1(0.4%)
Necrotizing fasciitis	12(4.8%)	13(5.2%)	25(10%)	4(1.8%)	17(7%)	21(8.8%)
Abscess	11(4.4%)	22(8.8%)	33(13.2%)	20(9%)	13(5.9%)	33(15%)

Highest number of cases in Group A were cellulitis (26.8%) in female followed by wet gangrene of hand (22.4%) and hand abscess (8.8%), similarly Group B had highest number of cases of cellulitis (65%) both in males and females, followed by hand abscess (8.8%) and necrotizing fasciitis (14.9%) [p- value <0.001] Table 3.

In both groups cellulitis was the most common diagnosis.

## DISCUSSION

The number of ominous complications of Diabetics with upper limb infections infection, in our study irrespective of the etiology was proven to be higher in group A. this finding has been supported by numerous other studies<sup>9</sup> and is understandable as clinic-pathologic course of the disease is congruent with poor immunity, humoral response and suboptimal perfusion of extremities<sup>11-12</sup>. The number of cases in group B were higher in males as industrial or occupational trauma was common cause of soft tissue infections.

Another important finding in our study was, highest number of diabetics were female and who also developed severe complications of soft tissue infections as compared to males; this was probably due to increased frailty of females and neglect or reluctance of elderly females to present to healthcare facility<sup>13-15</sup>. Lesser number of cases in Group A in both extremes of age distribution is due to near optimal glycemic control and lesser diabetics surviving to >80years in our socioeconomic strata, due to neglect and accumulation of organ damage with prolonged Diabetes mellitus<sup>16-18</sup>. Furthermore, cellulitis was the most common diagnosis in both groups among males and females. Wet gangrene, osteomyelitis and dry gangrene were more common in diabetics as compared to non-diabetics<sup>20</sup>.

Hand abscess was the second most common diagnosis in nondiabetics and osteomyelitis was rare and in few extremely neglected cases developed wet gangrene<sup>20,21</sup>. In group B 2<sup>nd</sup> most common cause of Soft tissue infection in males was abscess whereas in females it was due to necrotizing fasciitis, as necrotizing fasciitis was frequently caused by polymicrobial infection.

Osteomyelitis was uncommon; even in diabetics as mostly patients reported to healthcare facility when infection was limited to soft tissue<sup>19</sup>.

There is significant association between diabetes and poorer immunity and higher number of complications especially among females<sup>22</sup>. Any emergency surgical intervention on Diabetics with upper limb infections for soft tissue infection is bound to impair the functionality and quality of life of individuals.<sup>23</sup>

## CONCLUSION

Higher number of cases in diabetics and severe consequences of soft tissue infections is clearly evident in our study. Therefore, it is recommended that in

diabetics even absence of trauma, professional advice from endocrinologist and surgeon should be sought to maintain optimal glycemic control and to avert any limb or life-threatening medical situation.

As ours is an already burdened healthcare system which is not able to cope with consequences of complicated disease. So early treatment of soft tissue infections and active monitoring with HB<sub>A1c</sub> levels in diabetics is of utmost importance.

### Author's Contribution:

Concept & Design of Study: Muhammad Qasim Butt  
Drafting: Muhammad Abdul Hannan

Data Analysis: Mehwish, Komal Hussain

Revisiting Critically: Muhammad Qasim Butt, Muhammad Abdul Hannan

Final Approval of version: Muhammad Qasim Butt

**Conflict of Interest:** The study has no conflict of interest to declare by any author.

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