

**Prognostic Indicators of Mortality and Morbidity in Patients with Diabetic Soft Tissue Infection****V Shyam<sup>1</sup>, Deepak Jadhav Maloth<sup>2</sup>, Kyasa Shiva Kumar<sup>3</sup>, Bushigampala Anil Kumar<sup>4\*</sup>**<sup>1,2,3,4</sup>Assistant Professor, Department of General Surgery, Government Medical College, Siddipet, Telangana State

Received: 18-09-2023 / Revised: 21-10-2023 / Accepted: 26-11-2023

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Conflict of interest: Nil

**Abstract:****Introduction:** Soft tissue skin infections (SSTI's) were first described in the Hippocratic era. Despite this well accepted management approach, the mortality rate remains between 16 – 34% in most major published series. Over the last decade, there has been an interest in understanding SSTIs better.**Aim and Objectives:** To determine the factors which increase the morbidity and mortality of a patient with diabetic soft tissue infection.**Materials and Method:** This was a Retrospective study conducted in department of General surgery, Chalmeda Anand Rao Institute of Medical Sciences, Karimnagar, for the duration of two years, in which total 160 patients were included after following inclusion and exclusion criteria, and approval institutional ethical committee and also after getting consent form the patients.**Results:** Of the 160 patients admitted, more than 80% of the patients were form the age group of 31 - 60 years, majority of the patients were male, and 58.1% of the patients had duration less than or equal to 5 years and others had duration more than 5 years. in the multivariate analysis for this worse outcome like mortality and amputation, age(Years), duration of disease, comorbid condition, presence of sepsis, Glasgow coma scale, body surface area and depth of involvement found influencing factor and statistically significant (P-value<0.01).**Conclusion:** Age (Years), duration of disease, comorbid condition, presence of sepsis, Glasgow coma scale, body surface area and depth of involvement found influencing factor for worse outcome like mortality and amputation.**Keywords:** Soft tissue skin infections, Sepsis, Diabetes Mellitus, Necrotising soft tissue infection.This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.**Introduction**

Soft tissue infection refers to an infection that involves the skin and the underlying soft tissues such as muscles, tendons and connective tissue. These infections can be caused by various microorganisms, including bacteria, viruses, and fungi. The severity of soft tissue infection can range from mild to severe and prompt treatment is essential to prevent complication. Soft tissue skin infections (SSTI's) were first described in the Hippocratic era. In time various surgeons described the disease process in details.

The most well documented among these is the work of Joseph Jones a confederate army surgeon, who reported 2,642 cases of "hospital gangrene" with a mortality rate of 46%. Since then, multiple reports and classification systems have been published in an attempt to define this disease better and achieve lower mortality rates with better outcomes. The principles of management, including early diagnosis with prompt and repeated

surgical debridement, aggressive resuscitation and physiological support, broad spectrum antimicrobial drugs, and nutritional support, have been well documented.

Despite this well accepted management approach, the mortality rate remains between 16 – 34% in most major published series. Over the last decade, there has been an interest in understanding SSTIs better. Some investigators have focused on methods that aid in early diagnosis so that surgical debridement can be accomplished promptly, whereas other researchers have focused on identifying patients at higher risk of death. Although several predictors of death have been identified, differences in patients across series limit their broad applicability. Keeping this in mind we have undertaken this study to determine the factors which increase the morbidity and mortality of a patient with diabetic soft tissue infection as determined by no. of days of hospital stay or limb

loss or death of the patient in our tertiary care setup.

### Materials and Method

This was a Retrospective study conducted in department of General surgery, Chalmeda Anand Rao Institute of Medical Sciences, Karimnagar, for the duration of two years, in which total 160 patients were included after following inclusion and exclusion criteria, and approval institutional ethical committee and also after getting consent from the patients.

#### Inclusion Criteria:

- Soft tissue infections of the lower limbs including cellulitis, abscesses, necrotising fasciitis.
- Patients ready to participate in the study.
- Patients with diabetes

#### Exclusion Criteria:

- Patients who were non-diabetics.
- Patients whose X-rays showed osteomyelitic changes.
- Patients who had prior surgeries for the same problem elsewhere

#### Method

All the patients included in the study were examined on the basis of clinical data and laboratory data, after admission of the patients. The selected parameters were age in years, duration of symptoms prior to admission in days, co-morbid conditions, Glasgow coma scale at admission, presence of sepsis as determined by the presence of two or more of the following - fever/ hypothermia,

raise/fall of total leukocyte count, tachycardia and tachypnea, requirement of ventilator support at admission, requirement of inotropic support at admission, surface area of body involved, haemoglobin in gm% at admission, depth of involvement.

Above all variables were evaluated and compared among outcomes, like survivors and non survivors and also between those who underwent a limb salvaging procedure or an amputation.

**Statistical Analysis:** Collected data were entered in the Microsoft Excel 2016, for further statistical analysis. Categorical data were expressed in the form of frequency and percentages, while quantitative data were expressed in terms of mean and standard deviation. Because of the large number of potentially interdependent parameters examined in this retrospective analysis, it was believed that a more suitable test for significance would reside in a multivariate analysis, using a model of logistic regression analysis. P-value<0.05 were considered as statistically significant at 5% level of Significance.

#### Observation and Results

A total of 160 cases which satisfied the inclusion criteria admitted during a study period and analysed retrospectively. Demographic profile of the data shown given below, found that more than 80% of the patients were form the age group of 31 - 60 years, majority of the patients were male, and 58.1% of the patients had duration less than or equal to 5 years and others had duration more than 5 years shown in bellow table 1.

**Table 1: Demographic profile of study population**

Parameters	Frequency	Percentage
Age		
≤ 30 Years	19	11.9
31 - 40 Years	45	28.1
41 - 50 Years	19	11.9
51 - 60 Years	64	40
≥60 Years	13	8.1
Gender		
Male	109	68.1
Female	51	31.9
Other Comorbidity		
Yes	27	16.9
No	133	83.1
Duration of Disease		
≤5 Days	93	58.1
>5Days	67	41.9

**Table 2: Distribution of Condition parameters of study population**

Parameters	Frequency	Percentage
Presence of Sepsis		
Yes	99	61.9
No	61	38.1
Glasgow Coma Scale		
≤8	8	5
9-12	148	92.5
> 12	4	2.5
Requirement of Ventilator		
Yes	5	3.1
No	155	96.9
Body Surface Involved (%)		
< 10	126	78.8
10-30	30	18.8
> 30	4	2.4
Depth of Involvement		
Skin	85	53
Sub-Cutaneous Tissue	70	44
Muscle	5	3

**Table 3: Distribution of number of surgeries and outcome in study population**

Parameters	Frequency	Percentage
Number of Surgeries		
Nil	37	23.1
1	84	52.5
2	36	22.5
3	2	1.3
4	1	0.6
Outcome		
Amputation	30	18.8
Limb Saved	124	77.5
Expired	6	3.7

**Table 4: Multivariate analysis for predictors of outcome among study population**

Factors	Odds Ratio	Confidence Interval	P-value
Age (Years)	1.67	0.846-6.42	<0.001
Duration of Disease	1.46	0.943-4.76	<0.001
Other Comorbid Condition	1.27	0.813-5.97	0.06
Glasgow Coma Scale	1.64	0.959-6.81	<0.001
Sepsis	1.75	0.734-7.43	<0.001
Body Surface area	1.54	0.811-4.29	<0.001
Depth of Involvement	1.34	0.974-3.76	<0.001

## Discussion

The association of high morbidity and mortality in soft infection tissue patients urges the need for early diagnosis and identification of potential risk factors of worse outcomes.

Necrotising soft tissue infection is a fulminant life-threatening infection of the musculoskeletal soft tissues characterized with rapid progression that typically requires urgent surgical interventions [1, 2]. The classic and frequent manifestations associated with Necrotising soft tissue infection usually include a triad of pain, tender local swelling, and fever [3, 4].

Consistent with earlier reports, this triad was more frequently observed among survivors in the current series. Necrotizing soft tissue infections of the skin have been reported to have a high morbidity and mortality. In 1924, Meleney [5] noted a mortality rate of 20% out of 20 patients. The mortality rate of 3.7% in the present series is lower than the cumulative mortality of 34% as reported in the Mchenry et al. study [6]. Wong et al.[7], in their series of 89 patients, 70% involving lower limbs, have a mortality rate of 21.3%. Singh et al.,[8] in their series of 55 patients (31 involving lower limbs) reported a mortality of 27.2%.

In the current study, we studied various parameters which are considered risk factors for morbidity and

mortality by various authors. Several authors reported that patients above the age of 60 were associated with higher mortality. [9-11] our study showed that an age above 51 years increased the morbidity and mortality of the patients. Other confounding factors must be taken into consideration as elderly patients are predisposed to illnesses such as diabetes mellitus and renal failure and their immunological status is generally poorer, all of which may contribute to the higher mortality rate.

According to our study a duration of greater than five days duration between initial symptoms and surgical procedure is associated with a higher rate of morbidity and mortality similar to the results of Eckmann et al. [12], who that noted those with a duration of initial symptoms to surgical treatment of more than 5 days were associated with a higher mortality rate. The presence of sepsis at the time of admission was defined by the presence of two or more of the following, increase or decrease of body temperature, increase or decrease of total leukocyte count, tachycardia and tachypnoea. There was significant effect of temperature on admission on morbidity and mortality in the present study, similar to results published by Bosshardt et al. [13] in which high admission temperature was identified as a risk factor of mortality.

The presence of co-morbid condition apart from Diabetes mellitus was found to significantly contribute to the morbidity and mortality as was seen in the study by Brand et al. and Elliot et al. [12, 14]. The consciousness of the patient as assessed by the Glasgow coma scale at the time of admission showed that a GCS of less than 13 affected the morbidity and mortality adversely, more so if the GCS was less than 8.

This was similar to the results of Darke et al.[15] who showed that a GCS of less than 7 significantly affected the mortality. The surgical literature has been divided regarding the impact of extent of infection on survival; in this study, patients with less extensive infection, expressed in terms of body surface area involved (much as for burns), had a definite survival advantage, whereas such an association was not borne out in the study of 57 patients with Fournier's gangrene by Clayton et al.[16]. Similarly depth of infection adversely affected the mortality in our study.

In the present study amputation was done among 30 patients and 6 patients expired in our study, in the multivariate analysis for this worse outcome like mortality and amputation, age(Years), duration of disease, other comorbid condition, presence of sepsis, Glasgow coma scale, body surface area and depth of involvement found influencing factor and statistically significant (P-value<0.01).

According to the study by Hanghui Cen et al, revealed that higher age, low haemoglobin, and multiple wounds were strongly associated with a high amputation rate. Previous reports indicated that higher age was relevant to high mortality, especially for patients who had underlying diseases [17-19].

#### Conclusion:

From the above observation and after discussion with other studies we can conclude from our study that, the morbidity is in the form of prolonged hospital stay and limb loss. Our study does not show any change in the percentage of people undergoing an amputation, but it does show a decrease in hospital stay for the same patients, even though it is not statistically significant. Age (Years), duration of disease, comorbid condition, presence of sepsis, Glasgow coma scale, body surface area and depth of involvement found influencing factor for worse outcome like mortality and amputation.

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