

Original Research Article

Prognostic Factors Determining the Out Come of Necrotizing Fasciitis
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Received: 22-10-2021 / Revised: 22-11-2021 / Accepted: 28-12-2021

Abstract

Introduction: Necrotizing Fasciitis is a rapidly progressive and destructive soft tissue infections involving the superficial fascia and muscle, respectively, with high mortality and long term morbidity. Early clinical suspension of necrotizing fasciitis/myositis is crucial because patient survival is inversely related to the time interval between onset of infection and initiation of appropriate therapy. In addition to early diagnosis and treatment, several risk factors have been discussed to influence morbidity and mortality of necrotizing soft tissue infections. **Materials and Methods:** The data for the study was obtained from patients (in patient basis) who were provisionally diagnosed to have necrotizing fasciitis by clinical evaluation, admitted in CG hospital and Bapuji hospital attached to JJM Medical college, Davangere from September 2017 to September 2019. All patients were studied and clinically analysed, necessary investigations done and appropriate treatment was given. All cases were followed up to discharge subsequently for a follow up on one month. **Results:** A number of 90 patients were studied in this series between the age groups ranging from 5-75 years. The maximum incidence of Necrotizing Fasciitis was seen in the age group of 41-60 years (63.3 %). The youngest patient was 8 years old and the oldest was 75 year old. In this series of 90 patients with NF, the lower limbs (63.3%) were the commonest site of involvement, Right leg (33.3%) affected more commonly. The next most common site of involvement is the Perineum and Genitalia (15.5%), which is also referred to as Fourniers gangrene. The least common site of involvement being back and the trunk. **Conclusion:** We conclude that NF incidence and outcome is strongly influenced by the presence of various known co-morbid conditions which compromise immunity, particularly in the elderly males. Findings from this study suggest that high risk groups identified here should be the focus of attention. Patients over 50 years of age with important predisposing conditions (Diabetes, Renal failure, Liver failure, obesity, PVD) should be alerted to this risk.

Keywords: Necrotizing Fasciitis, Septicaemia, Wound debridement, Split Thickness Skin Grafting, Amputations.

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Introduction

Necrotizing Fasciitis is a rapidly progressive and destructive soft tissue infections involving the superficial fascia and muscle, respectively, with high mortality and long term morbidity. Early clinical suspension of necrotizing fasciitis/myositis is crucial because patient survival is inversely related to the time interval between onset of infection and initiation of appropriate therapy. In addition to early diagnosis and treatment, several risk factors have been discussed to influence morbidity and mortality of necrotizing soft tissue infections[1].

Necrotizing soft tissue infections occurs predominantly in patients predisposed by immune compromise, diabetes mellitus or vascular insufficiency and mortality from necrotizing soft tissue infections can be reduced by expeditious diagnosis and adequate early debridement[2].

Blister and Bullae formation is the important diagnostic clue. Blistering and bullae formation are rarely seen in erysipelas or cellulitis and should raise the suspicion of Necrotizing soft tissue infection[3]. An apparent cellulitis with ecchymosis, bullae, any dermal gangrene, extensive edema or crepitus suggests an underlying

infection and mandates operative exploration to confirm the diagnosis and definitively treat the infection[4]. Polymicrobial infection tend to be more common finding in necrotizing infections than a single organism[5]. Broad spectrum antibiotics, aggressive surgical debridement and intensive care unit support are essential[6]. Here we intend to study the various modes of clinical presentation of necrotizing fasciitis in our hospital. Also to study the various co-morbid conditions associated with it and use the available treatment and surgical option in our set up for the management of necrotizing fasciitis. To study the residual morbidity and mortality after effective management.

Objectives of the Study

- To study the etiopathogenesis and clinical presentation of Necrotizing Fasciitis.
- To study the factors which will change the treatment outcome of Necrotizing Fasciitis
- To study the mortality and morbidity associated with Necrotizing Fasciitis.

Material and Methods

The data for the study will be obtained from in patients with a provisional diagnosis of necrotizing fasciitis on clinical evaluation and who are admitted in cg hospital and Bapuji hospital attached to JJM Medical college. Patients presenting with signs and symptoms of Necrotizing Fasciitis and Myonecrosis admitted during September 2017 to September 2019 at CG Hospital and Bapuji Hospital, JJM Medical College, were counseled for investigation and treatment of Necrotizing Fasciitis and its complication. 90 patients were treated in

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the above hospitals over the period of 2 years. All the patients were studied and clinical findings were recorded as per proforma case sheet. Necessary investigations were done and analyzed for predisposing factors, precipitating factors, complications. And also studied, analyzed and discussed about the treatment and sequel.

Name, Age, Occupation, socioeconomic status, residence were recorded in the proforma case sheet. The presenting complaints and details were recorded in chronological order.

Detailed physical examination including nutritional status built, status of vascular system and neurological system were recorded. Detailed local examination of involved part done.

Investigations Includes

- Routine blood investigations: Hemoglobin, Total leucocyte count, differential count, ESR
- FBS, PPBS, HbA1C
- Urine analysis: Albumin, sugars, ketone bodies and microscopy
- Blood urea and Creatinine
- Lipid profile
- Radiograph of affected site
- Discharge from wound for culture and sensitivity
- Arterial and venous Doppler study

Common mode of presentation was with pain and swelling over the affected part. On examination, blebs and blisters, erythema and pain over the affected part. After admitting the patient, general and medical treatment given with surgical debridement, later managed by regular dressing and sensitive antibiotics, and supportive therapy for

patient who is critically ill. once wound become healthy and granulated split thickness skin grafting or secondary suturing done according to the case, some cases' healed by secondary intension, for some cases under went amputation of affected limb.

Diabetic patient managed by strict glycemic control by oral hypoglycemic drugs and insulin's. Patients developed renal complications managed by salt restrictions and done dialysis according to indication. Patients who developed septicemia given ICU care ventilator support under anesthetist guidance.

Post discharge patients were follow up to one month regularly on outpatient basis for dressing, further management of diabetes and hypertension and also to review liver and renal parameters.

Major amputation patients were advised for clutches and artificial prosthesis 4 weeks after surgery.

In this study about Necrotizing fasciitis, we studied the mode of presentation, common site of involvement, predisposing factors, progression, co-morbid condition and complications and its management were analyzed and discussed. Mortality rate was also studied and factors that contributed to it were analyzed.

Results

Age Wise Distribution

A number of 90 patients were studied in this series between the age groups ranging from 5-75 years. The maximum incidence of Necrotizing Fasciitis was seen in the age group of 41-60 years (63.3%). The youngest patient was 8 years old and the oldest was 75 year old.

Table 1: Agewise distribution

Age in Years	Number of Cases	Percentage
≤20	3	3%
21-40	15	16%
41-60	57	63.3%
>60	15	16.6%
TOTAL	90	100

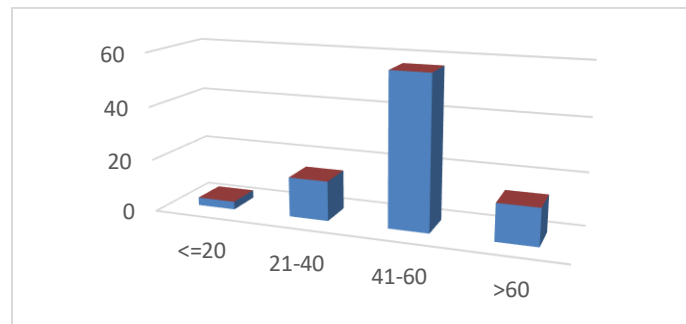


Fig 1: Agewise distribution

Sex Wise Distribution

A number of 90 patients were studied in this series out of which 59 were males 31 were females.

Table 2: Sex Wise Distribution

Sex	Number of Cases	Percentage
Male	59	65.55
Female	31	34.44

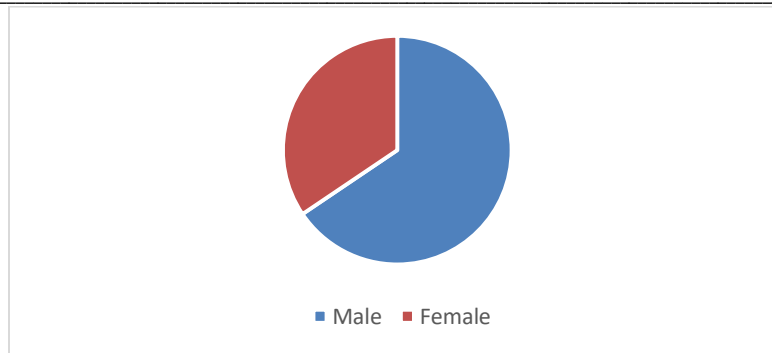


Fig 2: Sexwise distribution

Site of Lesion

In this series of 90 patients with NF, the lower limbs (63.3%) were the commonest site of involvement, Right leg (33.3%) affected more commonly. The next most common site of involvement is the

Perineum and Genitalia (15.5%), which is also referred to as Fourniers gangrene. The least common site of involvement being back and the trunk.

Table 3: Site of Lesion

Site of Involvement	Number of Patients	Percentage
Right Leg	30	33.3
LEFT Leg	27	30.0
Right upper limb	6	6.6
Left upper limb	6	6.6
Perineum & Genitalia	14	15.5
Abdomen	3	3.3
Gluteal Region	2	2.2
Back	2	2.2

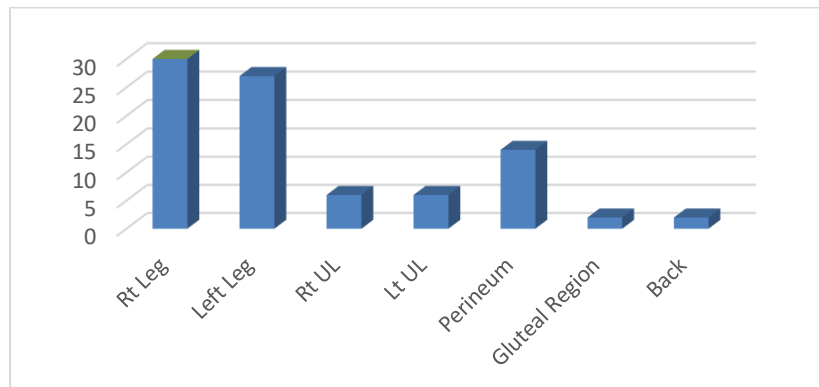


Fig 3: Site of lesion

Predisposing Factors

In this series of 90 patients, predominant predisposing factors for developing NF was minor trauma (60%) accounting for many cases especially lower limb and idiopathic cause for perineal NF.

Table 4: Predisposing factors

Predisposing Factors	Number of Patients	Percentage
Minor Trauma	54	60
Idiopathic	16	17.7
Snake bite	17	18.8
Abscess	3	3.3

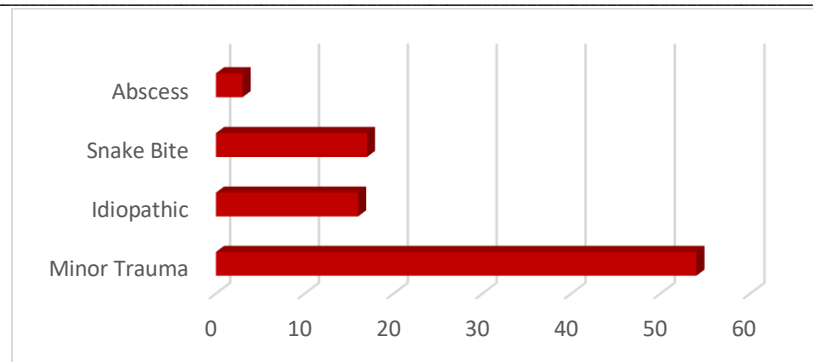


Fig 4: Predisposing factors

Time between Onset and Hospital Presentation

In this series of 90 patients, 38 patients (42.2%) came to hospital after 4-6 days from the onset of symptoms, 6 patients (6.6%) present

to hospital on the day of onset of symptom. The average Duration from the time of onset of symptoms to hospital presentation 5.8 days.

Table 5: Time between Onset and Hospital Presentation

Time Between Onset of Symptoms & Admission	Number of Cases	Percentage
1 Day	6	6.60
2-3 Days	11	12.2
4-6 Days	38	42.2
7-9 Days	24	26.6
≥10 Days	11	12.2

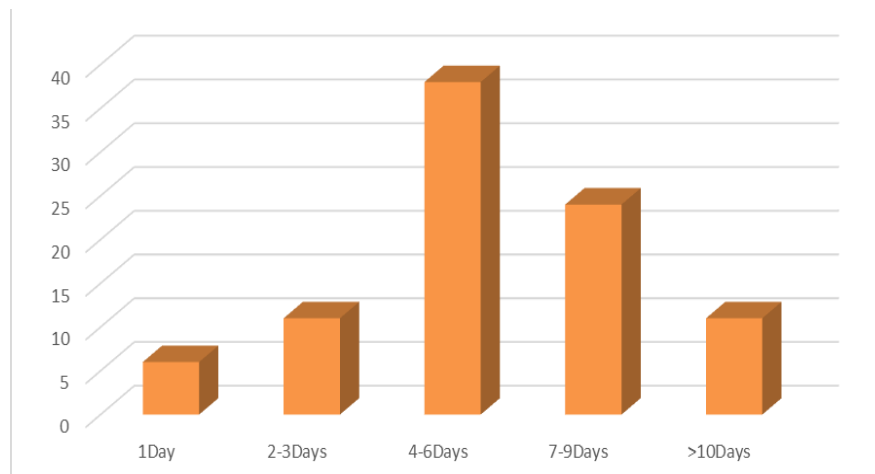


Fig 5: Time between Onset and Hospital Presentation

Time Between Onset Of Symptoms And First Surgery

In this series of patients, most patients that is 40 patients (44.4%) underwent first surgery-Wound debridement, after a time interval of

7-9 days from the time of onset of symptoms. The average duration from the time of onset of symptoms to first surgery was 8.22 days.

TABLE-6

Table 6: Time Between Onset Of Symptoms And First Surgery

Time Between Onset of Symptoms and First Surgery	Number of Cases	Percentage
1Day	0	0
2-3Days	4	4.4
4-6Days	20	22.2
7-9Days	40	44.4
≥10	26	28.8

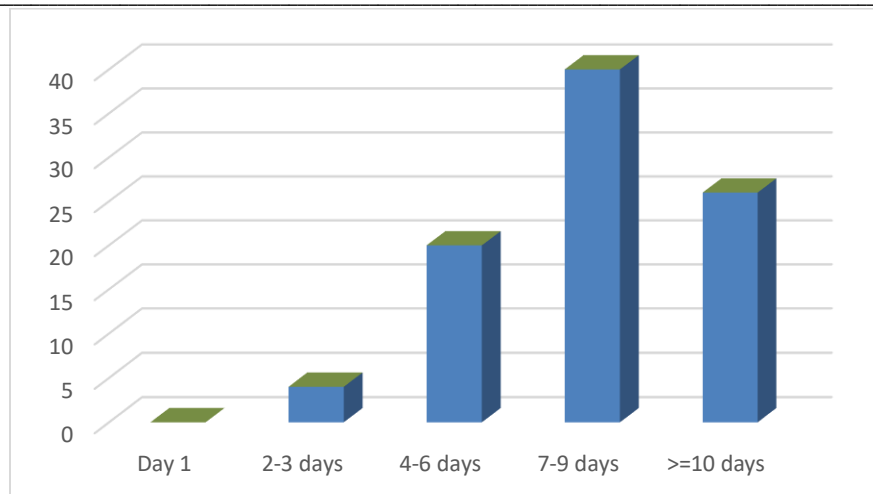


Fig 6: Time Between Onset Of Symptoms And First Surgery

Comorbid Conditions

In this series of 90 patients, the most common comorbid condition associated with Necrotizing Fasciitis was Diabetes mellitus type

2(38.8%) followed by Chronic Renal Disease (23.3%). Immunosuppression due HIV 12.2%, Drugs like Steroid intake 6 patients(6.6%) and chemotherapy 1 patient (1.1%).

Table 7: Comorbid Conditions

CO-Morbid Condition	Number of Patients	Percentage
Diabetes	35	38.8
Hypertension	13	14.4
Chronic Renal Failure	21	23.3
Chronic Liver Disease	17	18.8
Obesity	11	12.2
Immunosuppression	11	12.2
Peripheral Vascular Disease	11	12.2
Drug	7	7.7

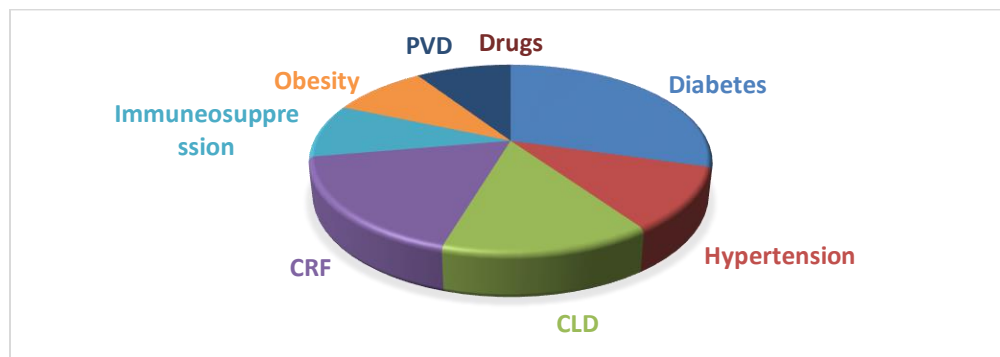


Fig 7:Co-morbid conditions

Organisms Grown in Culture

Most common organism grown on aerobic culture was staphylococcus coagulase positive 18 case followed by polymicrobial infection 14 case.

Table 8: Organisms Grown in Culture

Organisms	Number of Cases	Percentage
Staphylococcal coagulase +	18	20
Staphylococcal coagulase -ve	4	4.4
Streptococcus	13	14.4
E-coli	10	11.1
Klebsiella	12	13.3

Polymicrobial	14	15.5
Proteus	7	7.7
Pseudomonas	9	10
Citrobacter	3	3.3

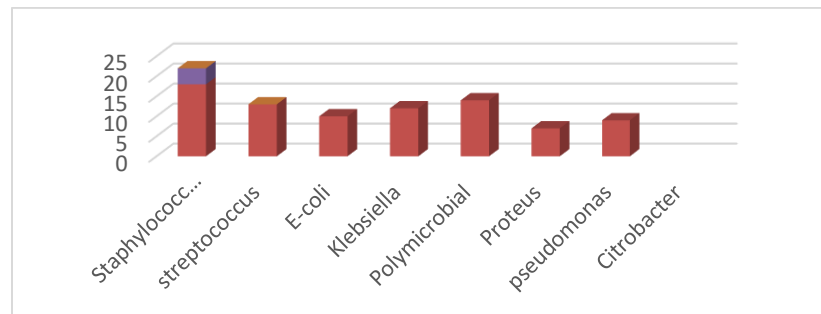


Fig 8: Organisms Grown in Culture

Antibiotic Sensitivity

Most common antibiotic found to be sensitive was Amikacin 19 cases (21.1) followed by Ceftriaxone in 13 cases (14.4). All patients given Anaerobic antibiotic coverage by Metrogyl.

Table 9: Antibiotic Sensitivity

Antibiotics	Number of Patients	Percentage
Amoxicillin	11	12.2
Ceftriaxone	13	14.4
Cefotaxime	8	8.8
Amikacin	19	21.1
Ciprofloxacin	3	3.3
Gentamycin	12	13.3
Piperacillin	12	13.3
Imipenem	9	10
Meropenem	3	3.3

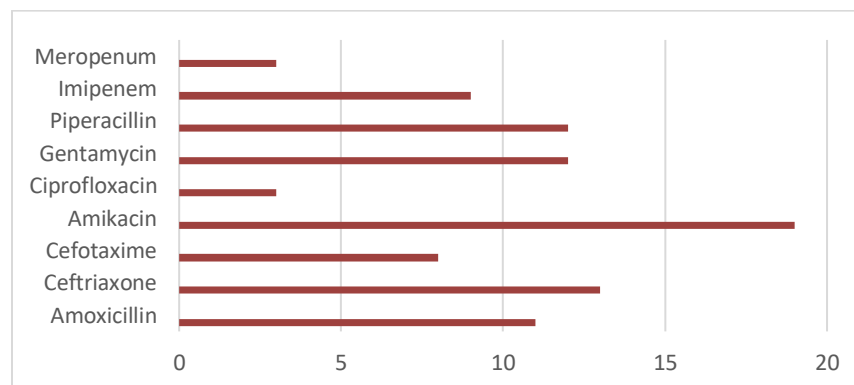


Fig 9: Antibiotic sensitive

Treatment

In this study, a total number of 90 patients were studied, all cases were treated in general with wound debridement as first procedure followed by regular dressings and antibiotics, 15.5% patients

underwent major amputations even after wound debridement. Split thickness skin grafting done as a final procedure in 22 patients. Out of 14 cases of Fournier's gangrene 8 cases healed by secondary intention 6 cases done secondary suturing.

Table 10: Treatment

Final Procedure	Number of Patients	Percentage
Split Thickness Skin Grafting (STSG)	22	24.4
Secondary Intention(SI)	38	42.2
Secondary Suturing(SS)	16	17.7
Amputation	BK 10	15.5
	AK 4	

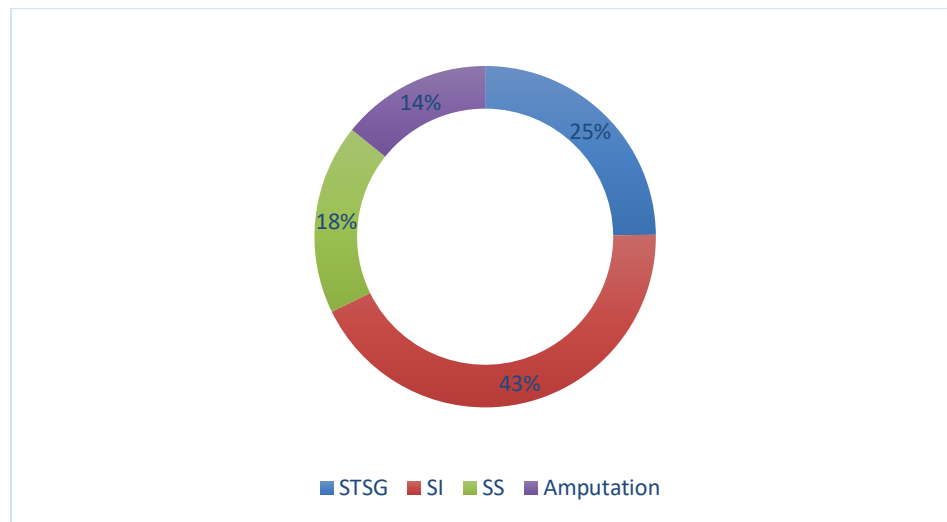


Fig 10:Final treatment

Duration of Hospital Stay

Average duration of Hospital stay was 26.9 days. The longest stay was for 50days, Shortest stay was for 16days, 73.3% patients stayed for duration of 21-30days.

Table 11: Duration of Hospital Stay

Duration of Hospital Stay	Number of Patients	Percentage
≤10Days	2	2.2
11-20 Days	11	12.2
21-30 Days	66	73.3
31-40 Days	8	8.8
41-50 Days	2	2.2
>50 Days	1	1.1

Complications

In this study total 29 patients (32.2%) developed complications, most common complications was septicemia and MODS.

Table 12:Complications

Complications	Number of Patients	Percentage
Septicemia	26	28.8
Acute Renal Failure	7	7.7
ARDS	8	8.8
Bed sores	8	8.8
Osteomyelitis	3	3.3

Mortality

In this study of 90 patients, 77 patients were recovered from the disease and 13 patient expired. Mortality Rate 14.4%.

Table 13:Mortality

Outcome	Number of Cases	Percentage
Recovered	77	85.55
Expired	13	14.4

Discussion

Necrotizing Fasciitis was first described as a rapidly spreading gangrene of the subcutaneous tissue caused by beta hemolytic streptococci group A. This disease was later considered as a clinical entity rather than a specific bacterial infection. Many virulent organisms can cause necrotizing fasciitis[7].Necrotizing Fasciitis is a surgical emergency, early recognition and prompt aggressive surgical debridement of all necrotic tissue is critical for survival.We have

diagnosed necrotizing fasciitis whenever there is a necrosis of subcutaneous tissue extending through the fascial planes and necrosis of underlying muscle tissue. Paucity of cutaneous finding early in the course of disease makes it difficult to diagnose the condition early[8]. This study was done as a cross sectional observational study to analyze the factors contributing to mortality and morbidity associated with necrotizing fasciitis.The above study shows a comparison of the present study to a similar study conducted by

Divakara SR et al. Dilip Kumar Das et al. Yogendra Gupta et al. The mean age of Necrotizing fasciitis in the present study was 50.77 years, which is similar to those found in Yogendra Gupta et al. studies [9].

Male to female ratio in the present study is 1.9:1, showing the higher incidence in male, higher incidence in male may be due to increased outdoor activities of male like working in fields where they are more prone for minor trauma and snake bites.

Most common site of involvement in our study was the lower limbs, which is similar in lines to those found in all the other studies. Lower limbs are exposed more often to trauma and snake bites, becomes most common site of involvement. Mean number of debridement's done on patients in the present study was 2.43 times which is comparatively low when compared to Dilip Kumar et al. In the present study mean duration of symptoms prior to first surgical debridement was 2.52 days which is low compared to 3.4 days in Yogendra Gupta et al. study, which is probably reason for less number of debridement's done in present study compared to Yogendra Gupta et al. study. Early presentation, early diagnosis and early aggressive surgical debridement's has a favorable outcome. Mean duration of hospital stay in the present study was 26.9 days, which is similar to Dilip Kumar et al study (26.2) and less than Yogendra Gupta et al (31.74). In present study predominant organism was *Staphylococcus aureus* seen in 24.4% followed by Polymicrobial 15.5%. Most sensitive antibiotic against the organisms (considering total cases) was Amikacin in (21.1%) followed by Ceftriaxone in 14.4% cases. Most common comorbid condition in this study was Diabetes mellitus type II (38.8%) followed by Chronic Renal failure (23.3%). Septicemia with MODS being the most common and life threatening complication. Mortality rate in the present study is 14.4% which is comparatively low when compared to - Dilip Kumar et al (21.3%) and Yogendra Gupta et al. (27%) [10]. Aggressive resuscitation and early aggressive surgical debridement has been the mainstay of our treatment and has contributed to the low mortality in the present study. Administration of antibiotics plays a supportive role but doesn't replace the extensive excision and removal of the source of sepsis.

Conclusion

We conclude that NF incidence and outcome is strongly influenced by the presence of various known predisposing conditions which compromise immunity, particularly in the elderly males. Patients presenting with pain out of proportion, fever, skin discoloration, cellulitis, edema, local cutaneous anesthesia, crepitations should be viewed with high clinical suspicion to be diagnosed as NF. Leukocytosis, anemia, hypoleukemia, low serum ferritin levels increase blood sugar levels were consistent findings seen in majority of the patients which resulted in increased mortality.

There is also potentially a contribution from changes in the virulence of the causative organisms, though we could not assess this potential factor with the data that were available. Various studies suggest that there may also be a contribution to NF from broad health

determinants, such as disparities in income, housing conditions, and access to health services.

Given the rising incidence of NF and its severity, greater effort should be put into preventing this disease and improving the outcomes for those infected. Findings from this study suggest that high risk groups identified here should be the focus of attention. Patients over 50 years of age with important predisposing conditions (Diabetes, Renal failure, Liver failure, obesity, PVD) should be alerted to this risk. In particular, they should take care to protect themselves from skin trauma and ulcers, and also ensure rapid assessment of skin infections if they develop. Further analytic studies (probably case-control) should be considered to quantify the importance of the risk factors identified here, particularly the role of pharmaceuticals such as NSAIDs, steroids, and other immune suppressive drugs.

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Conflict of Interest: Nil Source of support: Nil