

**INCIDENCE OF NECROTIZING FASCITIS IN LOWER LIMB CELLULITIS**Oruganti Shankar<sup>1</sup>, Awais Ghori<sup>2</sup>, P. Niranjana<sup>3</sup>**HOW TO CITE THIS ARTICLE:**

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**ABSTRACT: BACKGROUND:** Necrotizing fasciitis (NF) is a rare, life-threatening, mixed, synergistic gangrenous bacterial infections characterized by rapidly spreading inflammation and necrosis of the skin, subcutaneous tissue, and superficial fascia. Necrotizing Fasciitis needs early diagnosis, immediate extensive surgical debridement, antimicrobial treatment and nutritional support. **AIM:** This study aims at early detection of Necrotizing Fasciitis by tissue biopsy to enable appropriate management. **MATERIALS AND METHODS:** Total 29 patients were included in study taking inclusion and exclusion criteria. To aid in establishment of clinical diagnosis, tissue biopsy from skin and deep soft tissue was taken from the suspected area with induration, erythema or necrosis to confirm histological diagnosis. **RESULTS:** The incidence of Necrotizing Fasciitis is seen highest in age group 41 to 60 years. Male to Female ratio is 22:7. Most common predisposing factor is minor trauma (44.83%) followed by snake bites (24.14%). Average duration between onset of symptoms and first surgery is 3.7days. Klebsiella was the most common microorganism grown on the aerobic culture media. Diabetes (37.93%) is the common co-morbid condition came across in this study. Duration of hospital stay is approximately 8 to 61 days with an average around 29 days. Mortality rate is 13.8%. **CONCLUSION:** Necrotizing Fasciitis is a fatal disease and its early recognition is crucial for the outcome. Repeating procedures are often needed in order to check for evidence of progressive tissue necrosis and to remove the source of systemic toxins. It demands decision making, if limb can be salvaged and proceed as required. Mortality is high.

**KEYWORDS:** Necrotizing Fasciitis, Myonecrosis, Septicemia, Surgical debridement, Split skin grafting, Amputations.

**INTRODUCTION:** Necrotizing Fasciitis and Myositis are rapidly progressive and soft tissue destructive inflammation and infection involving the superficial fascia and muscle, respectively, with high mortality and long term morbidity. Early clinical suspicion of Necrotizing Fasciitis is crucial because patient survival is inversely related to the time interval between onset of inflammation 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 inflammation and infection.<sup>1</sup>Necrotizing soft tissue inflammation and infection occur predominantly in patients predisposed by immuno-compromise, diabetes mellitus or vascular insufficiency and mortality can be reduced by expeditious diagnosis and adequate, appropriate therapy much early.<sup>2</sup>Blister and bullae formation is an important diagnostic clue. Blister and bullae formation are rarely seen in erysipelas or cellulitis and should raise the suspicion of Necrotizing Fasciitis<sup>3</sup>. An apparent cellulitis with ecchymoses, bullae, any dermal gangrene,

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extensive edema or crepitus suggest an underlying Necrotizing Fasciitis and mandates operative exploration to confirm the diagnosis and definitively to treat the condition.<sup>4</sup> Polymicrobial infections tend to be more common finding in Necrotizing Fasciitis than isolated single organism.<sup>5</sup> Broad spectrum antibiotics, aggressive surgical debridement and intensive care unit support are essential. Here we intend to study the various modes of clinical presentation of Necrotizing Fasciitis and Myonecrosis in our hospital. Also to study the various co-morbid conditions associated with it and use the available treatment and surgical options in our set up for the management of Necrotizing Fasciitis and Myonecrosis and to study the residual morbidity and mortality after effective management

**METHODOLOGY:** The data for the study is obtained from hospitalized patients with a provisional diagnosis of Necrotizing Fasciitis on clinical evaluation and who were admitted at Govt. General Hospital, Nizamabad, Telangana State.

50 Patients presenting with signs and symptoms of Necrotizing Fasciitis and Myonecrosis were admitted during January 2013 to December 2014 at Govt. General Hospital, Nizamabad, were counselled for investigation and treatment of Necrotizing Fasciitis and its complications. All the patients were studied and clinical findings were recorded as per proforma laid in case sheet. Necessary investigations were done and analyzed for etiological factors, precipitating factors, complications. Name, age, occupation, socio-economic status, residence were recorded. The presenting complaints and details were recorded in chronological order.

A detailed physical examination including nutritional status, built, status of vascular system and neurological system were recorded, detail local examination of involved part was done. Other investigations like Hemoglobin, total leucocyte count, differential count, FBS, PPBS, and corresponding urine sugar, Urine analysis: albumin, sugar, ketone bodies and microscopic examination, Blood urea and Serum creatinine, Radiograph of affected part (lower limbs) The oozing fluid/discharge was sent for culture and sensitivity test and Biopsy of the affected parts, Arterial and Tissue biopsies were taken to clinical laboratory for culture-sensitivity, grams stain and also for immediate examination by frozen section biopsy. The frozen section was evaluated by Hematoxylin-eosin stain. The pathologist was usually able to establish a diagnosis of a Necrotizing Fasciitis within 15 min of receiving the specimen.

**HISTOLOGICAL CRITERIA:** for diagnosis necrotizing fasciitis as described by Stamenkovic and Lew reliably identified even early cases of Necrotizing Fasciitis. The histological criteria for diagnosis were necrosis of the superficial fascia, polymorphonuclear infiltration of the dermis and fascia, fibrinous thrombi of arteries and veins coursing through the fascia, angiitis with fibrinoid necrosis of arterial and venous walls, presence of microorganisms within the destroyed fascia and dermis and an absence of muscle involvement.

**FINGER TEST:** Probing of the level of the superficial fascia was then performed. The lack of bleeding, foul smelling discharge/ pus and minimal tissue resistance to finger dissection constitute a positive finger test, which is diagnostic of Necrotizing Fasciitis. Surgical debridement was carried out if the finger test is positive.

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Common mode of presentation was with swelling of the affected part with blebs, blisters erythema and pain. On admission, general and medical treatment of Necrotizing Fasciitis was done and followed by surgical debridement as the definitive procedure. The patients were later managed by regular antiseptic sterile dressings, antibiotics, and supportive therapy for vital parameters and renal status. In few cases vacuum assisted dressings were tried for faster healing. Once the wound was healthy with granulation, either split skin grafting or secondary suturing was done in most cases. Some cases healed by secondary intention. Some cases had to undergo major limb amputations to control severe infection with overwhelming spread.

Diabetic patients were managed with diabetic diet, sugar restriction and anti-diabetic treatment with Hypoglycaemic drugs and insulin. Patients who developed renal complications were managed by salt restrictions, dialysis and supportive renal treatment. Supportive treatment was given for patients who had bed sores as a complication of NF with regular dressings and water beds. Patients who went into septicemia were managed in intensive care units on ventilators under guidance of anesthetists and physicians. After discharge from hospital, patients were followed up to one month regularly on outpatient basis for dressings, further management of Diabetes, Hypertension, Nutritional status and also to review liver and renal parameters. Major amputation patients were advised for clutches and artificial Prosthesis four weeks after surgery.

In this study about Necrotizing Fasciitis and Myonecrosis, we studied the modes of presentation, predisposing factors, progression, co-morbid conditions, complications and its management were analysed and discussed. Mortality rate was also studied and factors that contributed were also analysed.

**RESULTS:** In this series 50 patients were studied with provisional diagnosis of Necrotizing Fasciitis. 29 patients were diagnosed as having Necrotizing Fasciitis on frozen section examination. Incidence of Necrotizing Fasciitis is 58%.

Patients studied in this series were between the age groups ranging from 9-75 years of which 29 patients were diagnosed having Necrotizing Fasciitis on frozen section biopsy. The maximum incidence of Necrotizing Fasciitis was seen in the age group of 41 years to 60 years (52%).The youngest patient was 9 years and the oldest patient was 75 years.

Age in years	Number of cases	Percentage
<20	1	3.45%
21-40	8	27.59%
41-60	15	51.72%
>60	5	17.24%
<b>Sex</b>		
Male	22	75.86%
Female	7	24.14%
<b>Predisposing Factor</b>		
Minor trauma	13	44.83%
Snake bite	7	24.14%

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Idiopathic	6	20.69%
Abscess	3	10.34%
<b>Co-Morbid Conditions</b>		
Diabetes Mellitus	11	37.93%
Hypertension	5	17.24%
Chronic Liver Disease	3	10.34%

**Table 1: Demographic details in the study**

A number of 29 patients were diagnosed as Necrotizing Fasciitis, out of which 22 were males and 7 were females. The predominant predisposing factor for Necrotizing Fasciitis was minor trauma (44.83%), followed by snake bite (24.14%). etc.

In this study of 29 patients of Necrotizing Fasciitis, the most common co- morbid condition associated is type II Diabetes Mellitus 11 patients (37.93%) followed by Hypertension 5 patients (17.24%) and Chronic Liver Disease due to alcohol consumption in 3 patients (10.34%). Patients with above co-morbidities developed more morbidity and mortality.

<b>Time Between Onset of Symptoms and Hospital Presentation (Days)</b>	<b>Number of Cases</b>	<b>Percentage</b>
1 day	5	17.24%
2-3 days	17	58.62%
4-6 days	4	13.79%
7-9 days	2	6.90%
≥9 days	1	3.45%
<b>Time Between Onset of Symptoms and First Surgery (Days)</b>		
1 day	3	10.34%
2-3 days	13	44.83%
4-6 days	9	31.03%
7-9 days	3	10.35%
>9 days	1	3.45%
<b>Duration of Hospital Stay (Days)</b>		
≤10 days	3	10.35%
11-20 days	5	17.24%
21-30 days	10	34.48%
31-40 days	6	20.68%
41-50 days	2	6.90%
>50 days	3	10.35%

**Table 2: Timed details in the study**

In this study of 29 patients of Necrotizing Fasciitis, 13 patients (44.83%) underwent first surgical debridement after an interval of 2-3 days from the time of onset of symptoms. The

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average duration from the time of onset of symptoms to first surgery was 3.7 days. Average duration of hospital stay was 29.4 days. The longest stay is 61 days and the shortest stay is 8 days. 34.48% patients stayed for duration of 21 to 30 days.

Organisms	Number of Cases	Percentage
Citrobacter	1	3.45%
E-coli	4	13.79%
Klebsiella	10	34.48%
Polymicrobial	2	6.89%
Proteus	2	6.89%
Pseudomonas	3	10.35%
Staphylococcal positive	6	20.70%
Staphylococcal negative	1	3.45%
Antibiotic Sensitivity		
Amikacin	10	34.48%
Cefotaxime	6	20.70 %
Ciprofloxacin	5	17.24%
Ceftriaxone	4	13.79%
Gentamycin	2	6.89 %
Imipenem	1	3.45%
Amoxycillin	1	3.45%

**Table 3: Organisms in culture and antibiotic sensitivity**

Most common organism grown on aerobic culture was klebsiella in 10 cases (34.48%) followed by staphylococcus aureus coagulase positive in 6 cases (20.69%). E. coli in 4 cases (13.79%), Pseudomoas in 3 cases (10.35%), Polymicrobial infection in 2 cases (6.89%). Citrobacter in 1 case (3.45%). Most common antibiotic found to be sensitive was Amikacin in 10 cases (34.48%) followed by Cefotaxime in 6 cases (20.70%), Ciprofloxacin in 5 cases (17.24%), Ceftriaxone in 4 cases (13.79%), Gentamycin in 2 cases (6.89%), Imipenem in 1 case (3.45%) and Amoxicillin in 1 case (3.45%).

Final procedure	Number of patients	Percentage
Split skin grafting	16	55.18%
Secondary intention	8	27.58%
Secondary suturing	2	6.89%
Amputation	3	10.35%

**Table 4: Treatment followed in the study**

Subsequent split-skin grafting was done as the final procedure in 16 (55.18%) patients. Out of the 3 patients (10.35%) who underwent amputation, 2 patients underwent surgical

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debridement as an initial procedure followed by major amputation for control of infection and to save life. 8 cases healed by secondary intention (27.58%). Secondary suturing was done in 2 cases (6.89%). Timely, early and aggressive surgical debridement is the mainstay of treatment in this condition.

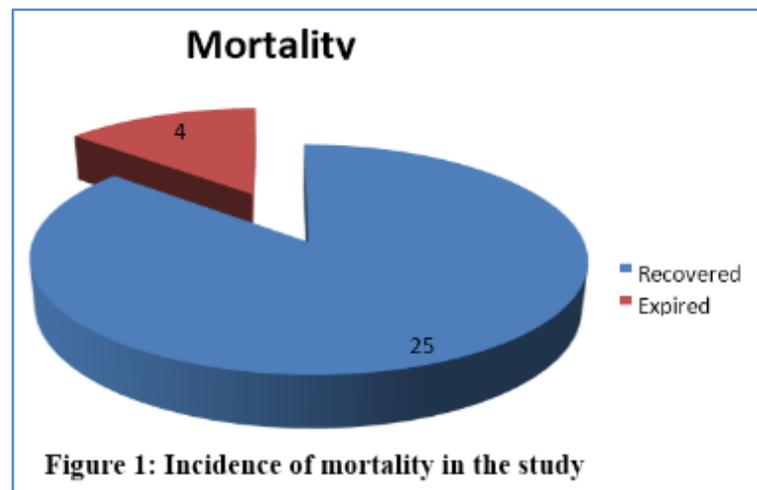
Antibiotics, regular dressings, supportive treatment with intra venous fluids and vasoactive agents were added for better outcome.

Patients presenting with systemic manifestations of Necrotizing Fasciitis and patients developing complications were appropriately managed in Intensive Care Unit in a multidisciplinary approach.

Complications	Number of patients	Percentage
CRF	3	10.35%
Bed sores	1	3.45%
Osteomyelitis	1	3.45%
Septicemia	4	13.79%

Table 5: Complications of NF in present study

In this study 9 patients (31%) developed complications, the most common being Septicemia with MODS in 4 patients (13.79%) followed by Chronic Renal Failure in 3 patients (10.35%). Bed sores developed in 1 patient (3.45%) who had associated Chronic Renal Failure and Osteomyelitis in 1 patient (3.45%).



In this study of 29 patients, 25 patients (86.20%) recovered from the disease. 4 patients (13.80%) expired. Mortality rate was 13.80%.

**DISCUSSION:** Necrotizing Fasciitis is first described as a rapidly spreading gangrene of the subcutaneous tissue caused by beta hemolytic streptococci group A. This disease is later considered as a clinical entity rather than specific bacterial infection. Many virulent organisms can

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cause Necrotizing Fasciitis.<sup>5-8</sup> Necrotizing Fasciitis is a surgical emergency. Early recognition and prompt aggressive surgical debridement of all necrotic tissue is critical for survival.<sup>7</sup>

We have diagnosed Necrotizing Fasciitis and myonecrosis whenever there is a necrosis of subcutaneous tissues extending through the fascial planes and necrosis of underlying muscle tissue paucity of cutaneous findings early in the course of disease makes it difficult to diagnose the condition early. Often the disease is masqueraded as cellulitis or abscess, in these patients diagnosis has been made when the infection progressed despite treatment with broad spectrum intravenous antibiotics.

This study is done as a cross sectional observational study to analyze the factors contributing to morbidity and mortality associated with Necrotizing Fasciitis and myonecrosis.

	<b>Hefny, Ashraf F. et al<sup>8</sup></b>	<b>Wong, Chin-ho et al<sup>7</sup></b>	<b>Rieger, Ulrich et al<sup>9</sup></b>	<b>Present study</b>
Sample size	11	89	16	<b>29</b>
Mean age (years)	46	56	47.1	<b>48</b>
Male: Female	9:2	58:36	9:7	<b>22:7</b>
Mean no. of debridements	2	2.7	5.2	<b>1.7</b>
Mean duration of hospital stay (days)	45	40.6	46.6	<b>29.4</b>
Mortality	18%	21.3%	28.7%	<b>13.80%</b>

**Table 6: Comparing the studies done by other authors**

The above study shows a comparison of the present study to a similar study conducted by Hefny et al,<sup>8</sup> Wong et al<sup>7</sup> and Rieger et al.<sup>9</sup> The mean age of appearance of necrotizing fasciitis in the present study is 48 years, which is similar to those found in Hefny et al<sup>8</sup> and Rieger et al<sup>9</sup> studies. The mean age of presentation in Rieger et al<sup>9</sup> is 56 years which is slightly higher than the present study.

Male to female ratio in the present study is 3:1, showing the higher incidence of this condition in males. Higher incidence of NF in males 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 is the lower limbs, which is similar in lines to those found in all the other studies. In Elliot et al<sup>2</sup> study, perineum (Fourniers gangrene) is the common site of involvement followed by lower limbs. Again lower limbs being exposed more often to trauma and snake bites, becomes most common site of involvement.

Mean duration of symptoms prior to first surgical debridement in present study is 3.7 days, which when compared to Hefny et al<sup>8</sup> study (5 days) and Elliot et al<sup>2</sup> study is low (4.1 days). This factor also contributes to lower morbidity and mortality in NF patients mortality being higher in Hefny et al<sup>8</sup> (18%) and Elliot et al<sup>2</sup> (25.3%) studies.

Mean number of debridements done on patients in the present study is 1.7 times which is comparatively low when compared to all the other studies—Hefny et al<sup>8</sup> (2 times), Wong et al<sup>7</sup> (2.7 times) and Rieger et al<sup>9</sup> (5.2 times). In the present study mean duration of symptoms prior to first surgical debridement 3.7 days which is low compared to 5 days in Hefny et al<sup>8</sup> study,

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which is probably the reason for less number of debridements done in present study compared to Hefny et al<sup>8</sup> study. Early presentation, early diagnosis and early aggressive surgical debridement have a favourable outcome. Mean duration of hospital stay in the present study is 29.4 days, which is low compared to all the other studies mentioned above.

In the present study predominant organism is Klebsiella seen in 10 cases (34.48%), followed by Staphylococcal aureus coagulase positive seen in 6 cases (20.69%). Polymicrobial infection is seen in 2 cases (6.90%).

Most sensitive antibiotic to the growth in present study is Amikacin in 10 cases (34.48%) followed by cefotaxime in 6 cases (20.69%). Most common co-morbid condition in this study is diabetes mellitus type II (38%). Diabetes as a co-morbid condition contributed more towards complications associated with NF.

Most common complication come across in this study was Septicemia (4 cases) followed by renal failure (3 cases). Osteomyelitis developed in 1 case. The complications observed in other studies mentioned above were in similar lines with septicemia with MODS being the most common and life threatening complication. Mortality rate in the present study is 13.80% which is comparatively low when compared to Hefny et al<sup>8</sup> (18%) Wong et al<sup>7</sup> (21.3%) and Rieger et al<sup>9</sup> (28.7%) studies. Adequate resuscitation, 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 surgical debridement and removal of the source of sepsis.

**CONCLUSION:** It is concluded that commonest age group being 41 to 60 years. Male to female ratio is 3:1 Minor trauma (44.83%) is the most common predisposing factor, commonest site of involvement is the lower limbs, Commonest co-morbid condition associated is diabetes (37.93%). The most common bacterial isolate found is Klebsiella (34.48%) and Polymicrobial infections were seen in two cases (6.90%) Amikacin (34.48%) is the most sensitive antibiotic. Most of the patients were managed by surgical debridement and split skin grafting 16 patients and 3 patients had to undergo major lower limb amputations. Mean duration of symptoms prior to first surgical debridement is 3.7 days Mean duration of hospital stay is 29.4 days. Mortality rate is 13.80%. Necrotizing Fasciitis which is a fatal disease and its early recognition is crucial in determining the outcome. Repeating procedures are often needed in order to check for evidence of progressive/control of tissue necrosis and to remove the source of sepsis, systemic toxins.

### REFERENCES:

1. Rieger, Ulrich M, Gugger, Christine Y, Farhadi, Jian, Heider, Ilonka, Andreson, Reimer, Pierer, Gerhard, Scheufler, Oliver. Prognostic factors in Necrotizing Fasciitis and Myositis. *Ann of Plastic Surgery* May 2007; 58 (5): 523-530.
2. Elliott, David C, Kufera, Joseph AMA, Myers, Roy AM. Necrotizing soft tissue infections: Risk factors for mortality and strategies for management. *Ann of surgery* Nov. 1996; 224 (5): 672-683.
3. Wong, Chin-HO, Wang, Yi-Shi. The diagnosis of Necrotizing Fasciitis. *Current Opinion in Infectious Diseases* April 2005; 18(2): 101-106.

## ORIGINAL ARTICLE

4. Dellinger PE., Surgical infections and choice of antibiotics'. In: Chapter11, Townsend CM (ed), Sabiston Textbook of Surgery, 16th edition, Saunders Publishers, 2001: pp.177.
5. Elliot D, Kufera JA, Myers RAM. The microbiology of Necrotizing soft tissue infections. Am J Surg 2000; 179: 361.
6. Hansen SL, Mathes SJ and Young DM. =Skin and subcutaneous tissue'. In: Chapter 15, Brunicaardi FC (ed) Schwartz Principles of Surgery. 8<sup>th</sup> edition, McGraw Hill Companies Inc. 2005: pp 434.
7. Wong, Chin-Ho, et al. Necrotizing Fasciitis: clinical presentation, microbiology and determinants of mortality. JBJS 2003 Aug; 85-A (8): 1454-1460.
8. Hefny, Ashraf F, Eid Hani O, Al-Husona, et al. Necrotizing Fasciitis: a challenging diagnosis. European J Emerg Med 2007; 14 (1):50-52.
9. Rieger, Ulrich M, et al. Prognostic factors in Necrotizing fasciitis and Myositis: analysis of 16 consecutive cases at a single institution in Switzerland. Ann PlastSurg 2007 May; 58(5): 523-530.
10. Leitch HA, Palepu A, Fernandes CM.—Necrotizing Fasciitis secondary to group A streptococcus|. Can Fam Physician 2000; 46: 1460-6.

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