

Diagnosis and Outcome in Necrotizing Fasciitis: Analysis of Predictive Factors

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Abstract

AIM OF THE STUDY:

1. To assess factors that will help in clinching the diagnosis of Necrotizing Fasciitis.
2. To identify factors responsible for morbidity and mortality

MATERIALS AND METHODS: It is a hospital based observational study of 100 cases of Necrotizing Fasciitis admitted patients in NRI medical college chinnakakani, Dept of General Surgery, from 20th august 2019 to 20th July 2021

RESULTS: Total of 100 patients were included in the study. There were 64 males (64%) and 36 female (36%). Male to female ratio being 1.77. The patients age ranged from 20 to 85 years. Diabetes mellitus (54%), cardiac or renal disease (45%) & alcohol dependence (40%) cases were most comorbid conditions associated with the disease. The lower limb (62%) was most common site followed by perineum and scrotal, upper limb, trunk and abdomen. The growth was polymicrobial (85%), monomicrobial (15%) cases. E. coli was predominant in 71% cases followed by streptococci, staphylococci, pseudomonas, klebsiella and proteus. The main procedure was debridement with secondary suturing was 21% and debridement with grafting in 41% cases. Amputation was done in 22% cases. Mortality was 11% and Morbidity was 50%

CONCLUSION: Necrotizing fasciitis is a lethal soft tissue infection mostly affecting males in middle age group (40 to 70 years). Major predisposing factors include poor personal hygiene, age more than 50 years, and diabetes mellitus. Lower extremity is the most common site affected. Most infections are polymicrobial. Early and aggressive debridements, often at repeated sittings, are the mainstay in the treatment of necrotizing fasciitis, supplemented by adequate antibiotics and nutritional support. Low Serum Sodium and histopathological evidence are the hard signs to clinch the diagnosis. Any two of the following factors at presentation indicate a grave prognosis.

Key Words: NF-necrotising fasciitis, NSTI- Necrotising soft tissue infections

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I. Introduction:

Necrotizing fasciitis (NF) is a rare, life-threatening bacterial infection characterized by rapidly spreading inflammation and necrosis of the skin, subcutaneous tissue, and superficial fascia.^[1,2] Necrotizing soft tissue infections (NSTIs) are less common than subcutaneous abscesses and cellulitis but are much more serious conditions whose severity may initially be unrecognized.^[3,4,5] Even with rapid recognition and intervention, current mortality rates remain approximately 30 to 50%^[6]. NSTIs have been described by a variety of different labels, including gas gangrene, Meleney's synergist gangrene, rapidly spreading cellulitis, gas gangrene, and necrotizing fasciitis, among others have also been described.

Today it seems best to delineate these serious infections based on the soft tissue layer(s) of involvement. (e.g., skin and superficial soft tissue, and muscle) and the pathogen(s) that cause them^[3]. Patients at risk for these types of infections include those who are elderly, immunosuppressed, or diabetic; those who suffer from peripheral vascular disease; or those with a combination of these factors.^[7]

Approximately 70 to 80% of such infections are polymicrobial, the remainder being caused by a single organism such as *Pseudomonas aeruginosa*, *Clostridium perfringens*, or *Streptococcus* species.^[6,8,9] In advanced stages of the disease, patients usually have overt signs of systemic compromise and septic physiology.

II. Aim Of The Study:

1. To study the incidence of different predisposing factors of necrotizing fasciitis.
2. To study different causative organisms and sensitivity to various antibiotics.
3. To study complication associated with the condition.
4. To study various modality of management and prognosis

MATERIALS AND METHODS:

The present study titled : **DIAGNOSIS AND OUTCOME IN NECROTIZING FASCITIS: ANALYSIS OF PREDICTIVE FACTORS** as has been conducted by utilizing the cases diagnosed clinically as NF and managed both as inpatient and outpatient basis in the department of General Surgery at NRI General Hospital, Chinakakani, from 20th august 2019 to 20th july 2021.

METHOD OF COLLECTION:

Data collected by meticulous history taking, careful clinical examination, appropriate radiological, blood and serological examination. Aggressive surgical debridement, culture of pus, tissue biopsy, antibiotic therapy, treatment of complication, amputation or skin grafting.

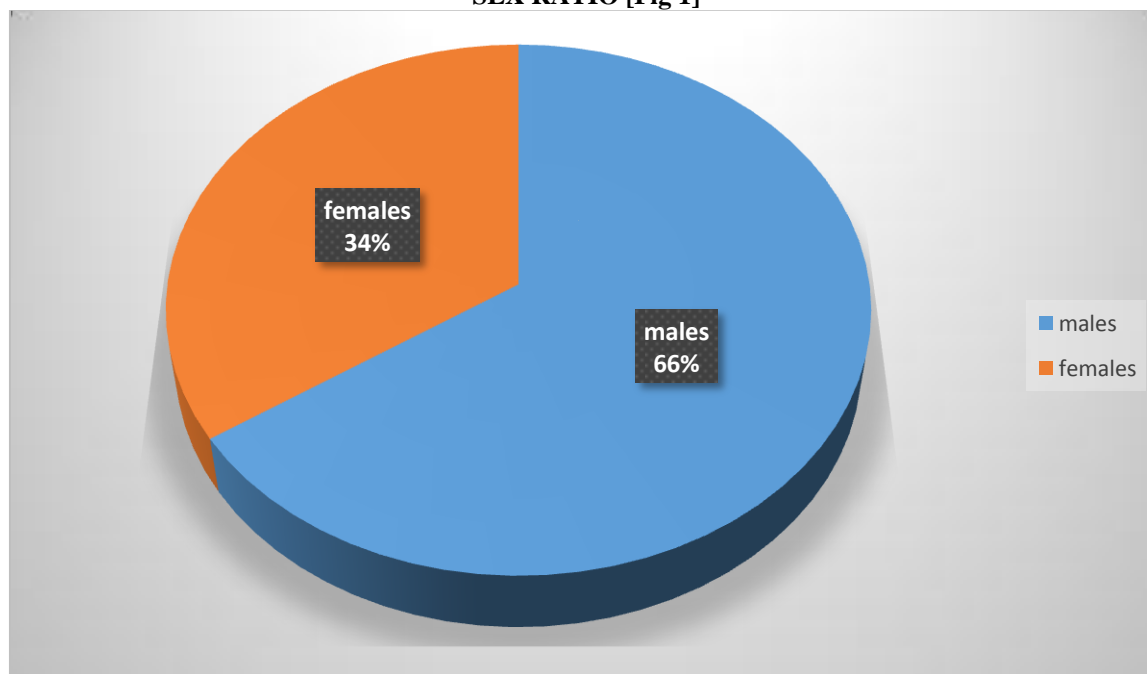
INCLUSION CRITERIA

All patients presenting with necrotizing fasciitis. Study of factors like age ,sex ,Blood Pressure on admission ,smoking, cardiac disease, cancer patients, Peripheral vascular disease, recent surgery, whether on steroids, immunosuppresses, alcoholism, diabetics

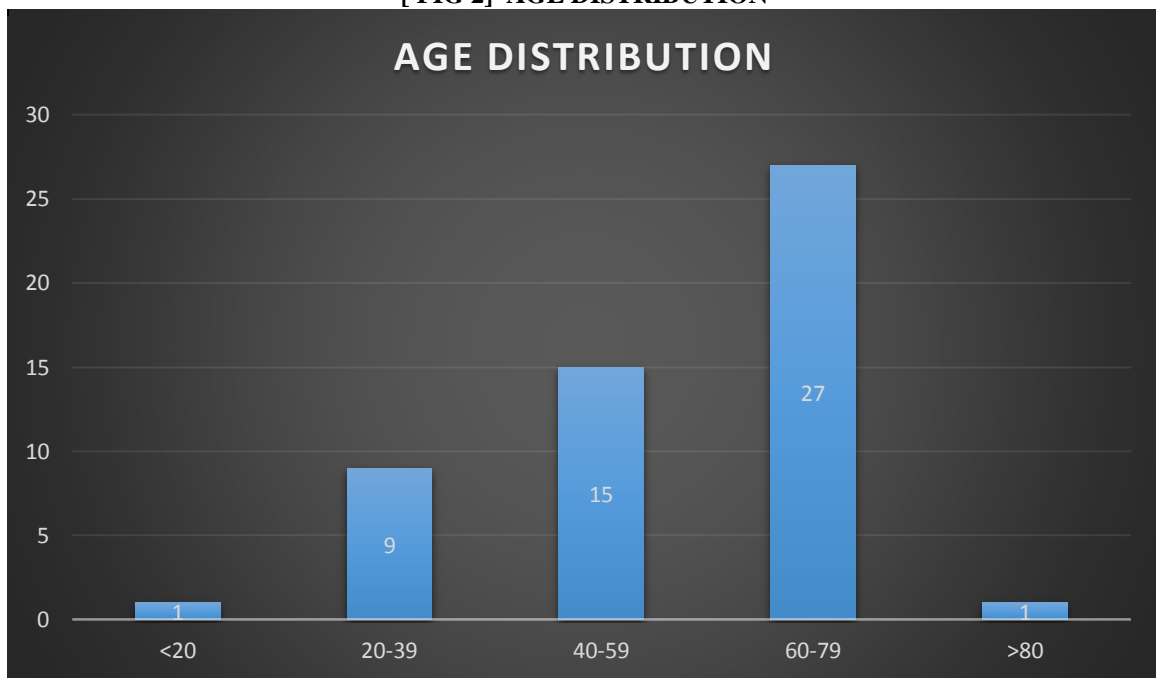
EXCLUSION CRITERIA

1. Patients of paediatric age group.
2. Pregnant woman.
3. Patients with non necrotizing soft tissue infections were excluded from study (e.g. Cellulitis, abscess)

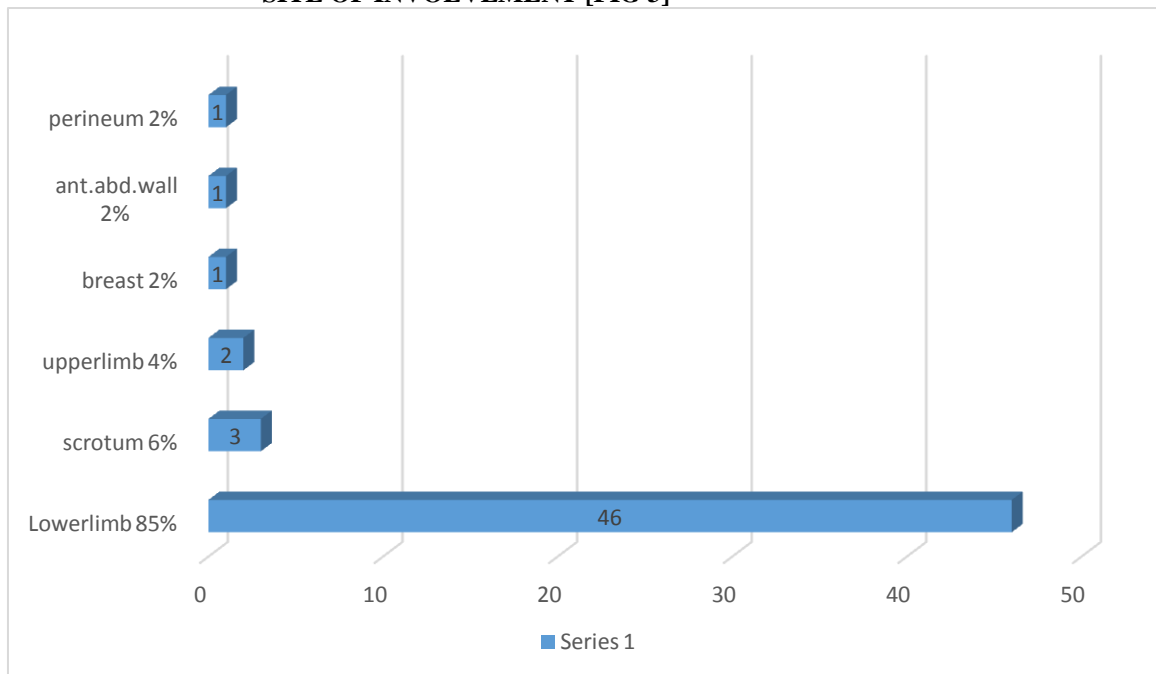
III. Results: SEX RATIO [Fig 1]



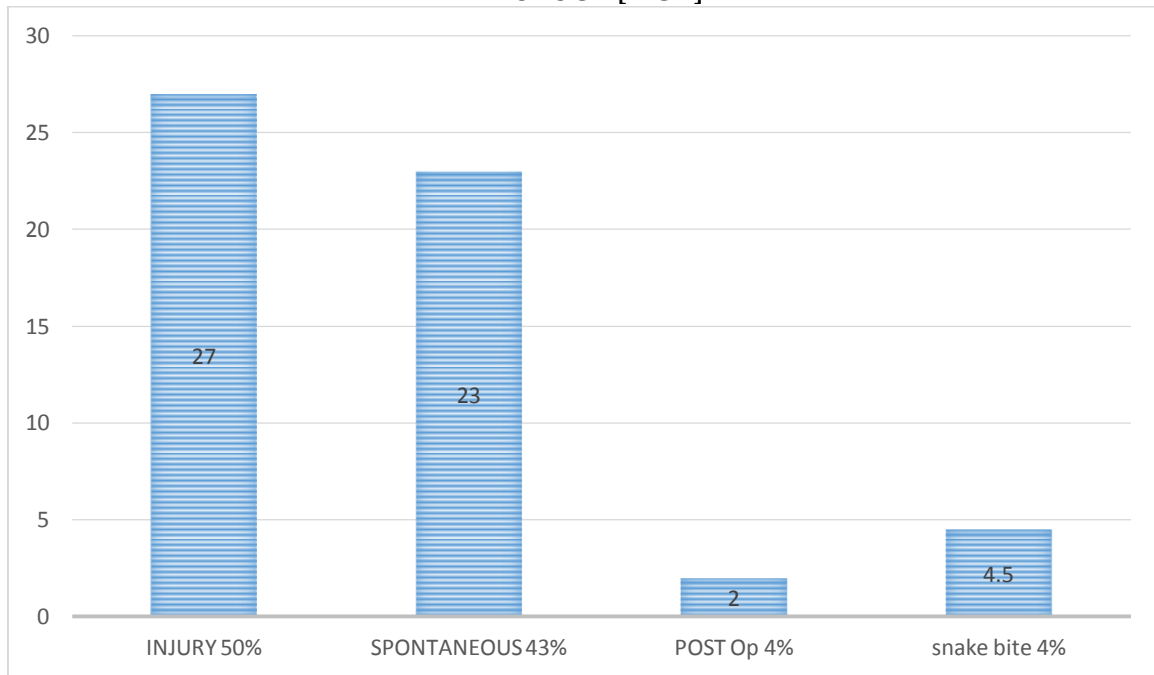
[FIG 2] AGE DISTRIBUTION



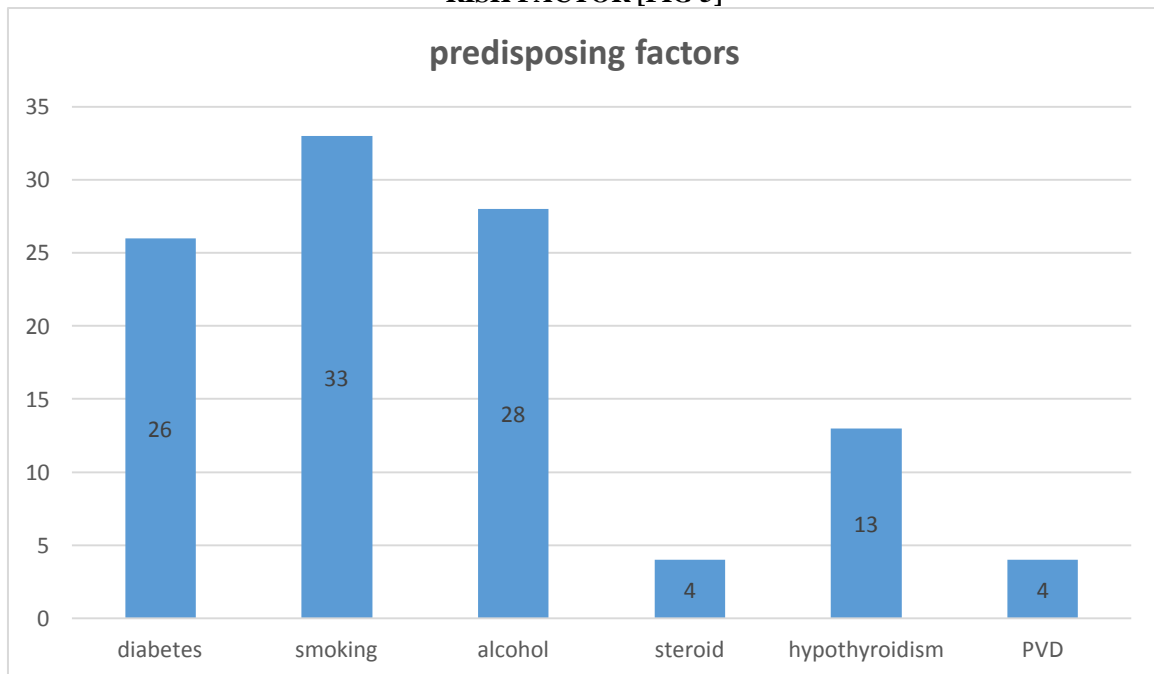
SITE OF INVOLVEMENT [FIG 3]



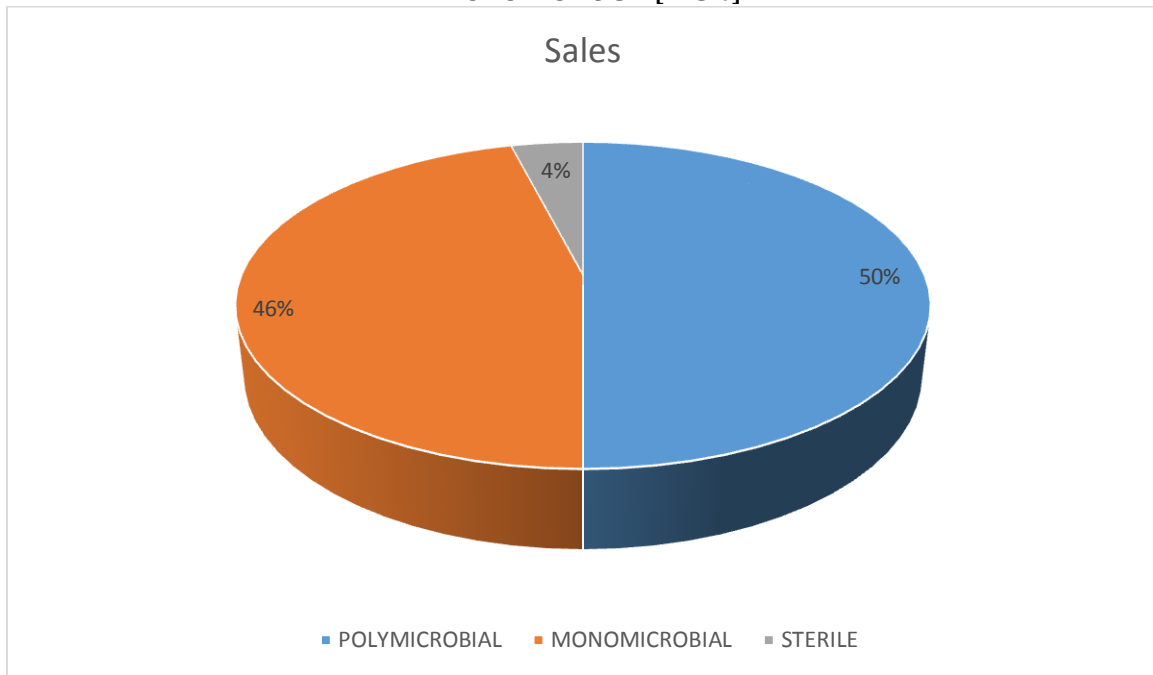
ETIOLOGY [FIG 4]



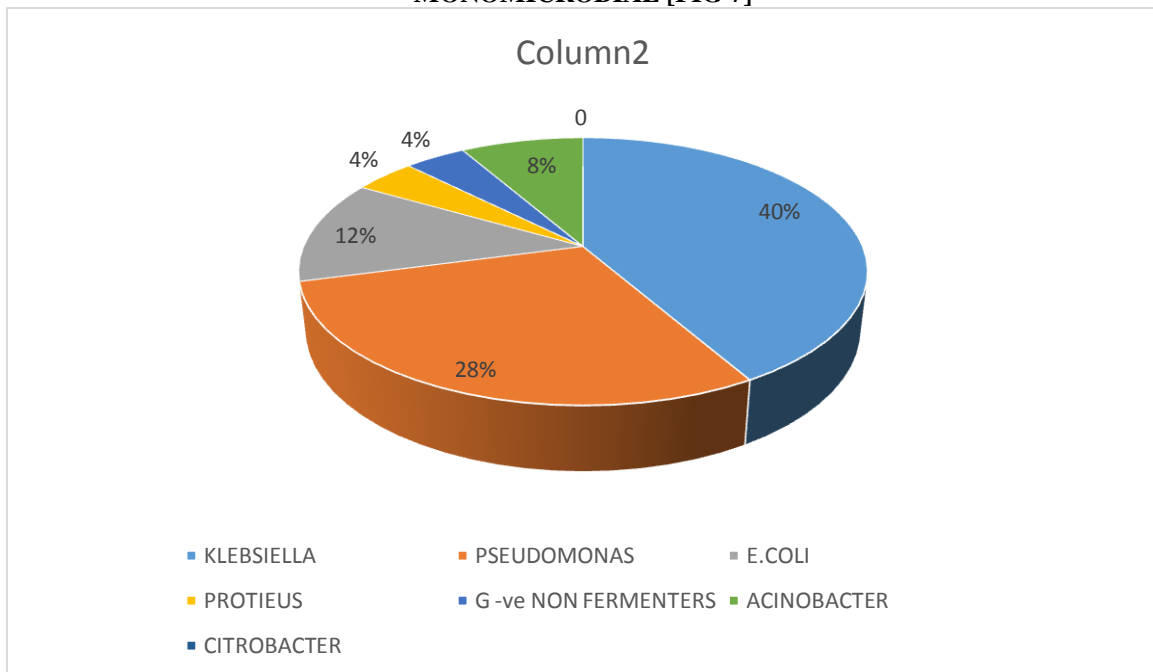
RISK FACTOR [FIG 5]



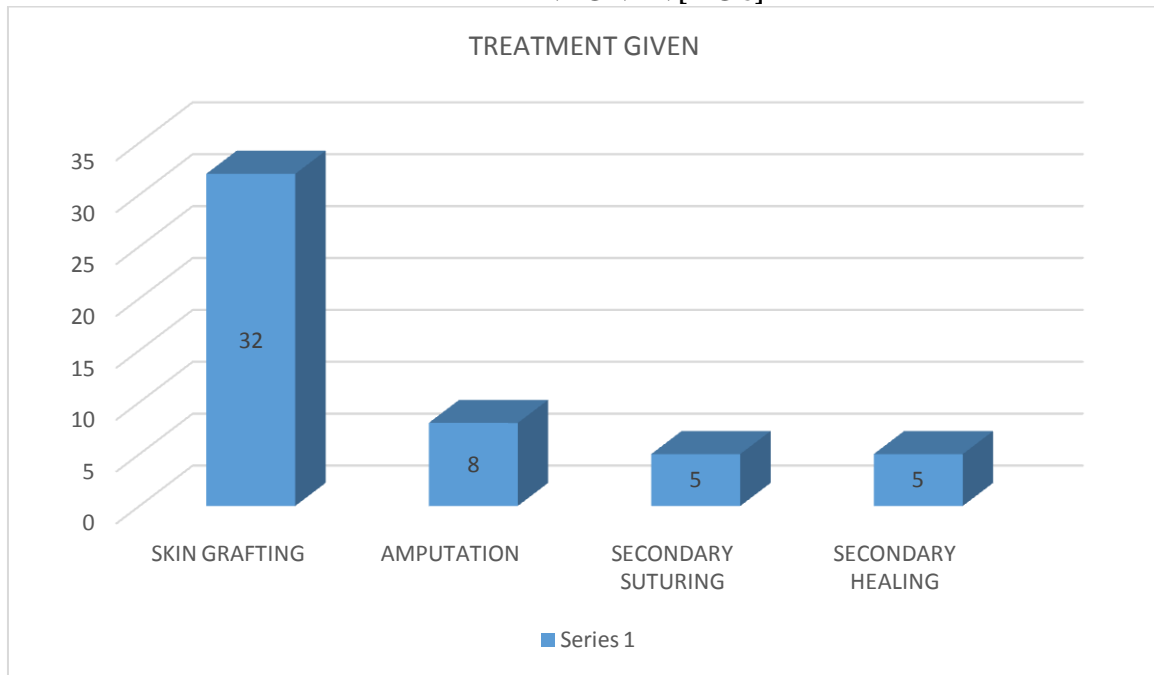
MICROBIOLOGY [FIG 6]



MONOMICROBIAL [FIG 7]



TREATMENT GIVEN [FIG 8]



OUTCOME [FIG 9]

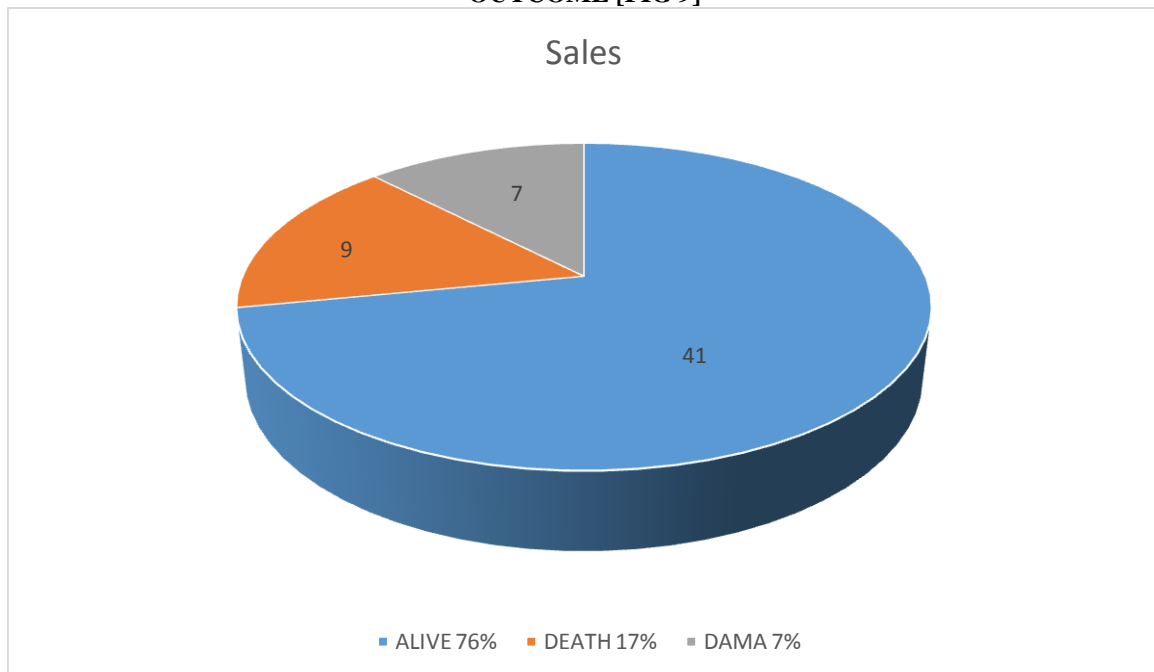


TABLE 1: ORGANISMS AND SENSITIVITY TO ANTIBIOTIC

Organisms		Sensitivity to antimicrobials
Klebsiella	14(51%)	Amikacin , Gentamicin, Chloramphenicol, Cefipime + Tazobactum
Protieus	11(40%)	Ciplox, Amikacin, Gentamicin, Amoxiclav, Imipenem, Ertapenem
Stap Aureus	11(40%)	Linezoild, vancomicin, Clindamicin
G-ve Non Fermenters	7(26%)	Amikacin, Gentamicin, Piperacillin+Tazobactum
E coli	6(22%)	Amikacin, Ciplox, Imipenem, Gentamicin, Piperacillin+Tazobactum
Pseudomona	3(11%)	Cefotaxime, Imipenem, Netilmicin, Cefperazone+Sulbactum, Chloramphenicol
Acinobacter	1(3%)	Cefotaxime, Imipenem, Ertapenem

TABLE – 2 ORGANISM AND SENSITIVITY

STUDY	PRESENT	KUNDIL et al[10]
STAPH. AUREUS	VANCOMICIN, LINEZOLID	CEFOTAXIME, AMIKACIN
PROTEUS SPECIES	GENTAMICIN, AMIKACIN, CIPLOX	GENTAMICIN, AMIKACIN
PSEUDOMONAS	NETILMICIN, IMPENEM	AMIKACIN, AMPICILLIN
KLIEBSIELLA	GENTAMICIN, AMIKACIN	CIPLOX, AMIKACIN
E.COLI	GENTAMICIN, AMIKACIN	GENTAMICIN
CITROBACTER	IMIPENEM, CEFOTAXIME	-

IV. Discussion:

- A total of 100 cases of necrotizing fasciitis were studied. The incidence of necrotizing fasciitis has been rising. The higher number of cases were reported in the middle-age group, and the vast majority were males.
- The most common predisposing factors noted in the study included advanced age and diabetes mellitus. Both these conditions are associated with a progressive decrease in immunity, which may be responsible for the infections in the tissue planes. Diabetic microangiopathy is well known to reduce the vascularity to the extremities, thereby reducing the immunity and allowing the spread of disease. Diabetic neuropathy further increases the risk of injuries, which are very often the triggering factors in cases of necrotizing fasciitis.
- Pre-existing chronic liver dysfunction, chronic renal failure, thrombocytopenia, hypoalbuminemia, and postoperative dependence on mechanical ventilation represent poor prognostic factors in monomicrobial necrotizing fasciitis.
- The most common site involved was lower extremity. The higher chance of injury, combined with the higher affection of vascularity of this region due to diabetes mellitus, is the likely reason for the same. The other areas affected were the upper extremity and the perineum.
- The microbiological profile of the patients revealed polymicrobial infections in the majority of patients, which is consistent with other studies. The most common organisms included E. coli, Streptococcus, and Staphylococcus. Community-associated methicillin-resistant Staphylococcus aureus has emerged as a prominent causative pathogen in community-acquired necrotizing fasciitis. The laboratory risk indicator for necrotizing fasciitis scores can be used for predicting a necrotizing component to a soft-tissue infection.

Laboratory parameters		
C-reactive protein (CRP)	>150 mg/dl	4 points
Total white cell count (WBC)	<15 x10 ⁶ /mm ³	0 point
	15–25 x10 ⁶ /mm ³	1 point
	>25 x10 ⁶ /mm ³	2 points
Erythrocyte count	<4 x10 ⁶ /μl	1 point
Haemoglobin	>13.5 g/dl	0 point
	11–13.5 g/dl	1 point
	<11 g/dl	2 points
Creatinine	<135 mmol/L	2 points
Fibrinogen levels	>750 mg/dl	2 points
Clinical parameters		
Pain	mild/none	0 point
	intermediate	1 point
	strong	2 points
Fever	≤37.5°C	0 point
	37.6–37.9°C	1 point
	≥38°C	2 points
Tachycardia	>100 heart beats/minute	1 point
Signs of acute renal injury	no	0 points
	yes	1 point
Sum:		

Score results: ≥8: strong suspicion for NF; 6–7 suspicion, ≤5 no suspicion.

V. Conclusion:

• **Necrotizing fasciitis** is a surgical emergency, early diagnosis of these rapidly progressing and life threatening infections is a crucial prognostic factor for patient survival and relies on correct interpretation of clinical findings.

• **At the initial stage of presentation**, it has a paucity of clinical signs and it is difficult to differentiate from cellulitis. So high index of suspicion is needed to diagnose ,especially in individuals who are elderly, immunosuppressed, diabetics, smokers, alcoholics, hypothyroid, intra venous drug abusers, obese, malnourished.

• **Clinical features** includes, tenderness out proportion to skin involvement(Trauma/Injury), rapid spreading inflammatory changes ,blebs formation ,crepitus ,dish water like pus, gangrene ,dehydration hypotension, MODS, shock. Blebs and dish water pus are more specific.

• **Investigations** usually shows leukocytosis, elevated creatinine levels, hyponatremia(Na<135),gram staining culture/sensitivity of pus ,radiographs,tissue biopsy. Diagnosis usually on clinical basis as either NF or NF with myonecrosis.

• Aggressive resuscitation and empiric broad spectrum antibiotic coverage. All necrotic tissue should be removed regardless of function like amputation and cosmetic defects and the progress of NSTI must be re-evaluated frequently. Thus, repeating procedures are often needed in order to check for evidence of progressive tissue necrosis, and to remove the source of systemic toxins. Decision need to be taken if limb can be salvaged and proceed as required. Other treatment modalities such as specified antibiotics, close ICU care should be considered as extra to surgery.

Any of these factors indicates grave prognosis –shock at presentation , delay of >24 hrs before hospitalization , anemia ,hypoproteinemia , uncontrolled blood sugar levels , increased creatinine and decreased serum Na levels

• Delay in diagnosis or delay in operative treatment even by few hours shows increased mortality and morbidity.

• Other risk factors include advanced age , diabetes mellitus , chronic liver diseases, cardiac, peripheral vascular disease, immunosuppressors , smoking ,alcohol.

• This study was conducted on 54 randomly selected patients in 2 years period . Youngest in this series was 17 years old and oldest patient was 87 years old , with commonest age group being 60 to 79 years. • Male to female ratio was 7: 2.Minor trauma (50%) was the most common predisposing factor.

- The commonest site of involvement was the lower limbs (85%). Commonest co-morbid condition associated with NF was diabetes (48%), From this study hypothyroidism(13%) also found to be one of the predisposing factor.
- Polymicrobial infections(27-cases 50%) are the most common cause . The most common bacterial isolate found was Klebsiella (44%) . Amikacin was the most sensitive antibiotic in the study.
- Most patients were managed by wound debridement and split skin grafting – 32(64%) patients and 8(16%) patients had to undergo major lower limb amputation. Mean duration of hospital stay was 26 days. Mortality rate 17% in our study

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