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## Retrospective and prospective study on clinicopathological profile and microbiological flora in necrotising fasciitis

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### Abstract

Necrotizing fasciitis (NF) is potentially lethal bacterial infection characterized by widespread necrosis of the skin, subcutaneous tissue and superficial fascia. Retrospective data was collected from the information available in bed head tickets of patients diagnosed as a case of necrotizing fasciitis. Detailed history and clinical examination was done and recorded. Pus was sent for culture and findings were recorded. Significant observations were: Necrotising fasciitis was seen more in males (62.22%) from rural areas (66.67%) with mean age at presentation of 47.13 years, trauma being the most common cause (66.67%) involving mostly extremities (72.22%) with swelling being the most common symptom (94.45%). Local tenderness was the most common sign (92.22%). Polymicrobial infection was found in all the patients with *Staphylococcus aureus* as the most common isolate (82.22%).

**Keywords:** Retrospective and prospective study necrotizing fasciitis characterized by widespread necrosis

### Introduction

Necrotizing fasciitis is a life-threatening soft-tissue infection that is usually caused by toxin-producing bacteria. It is also called as 'flesh eating disease'. It has got its nickname because it has a high propensity for rapid speed, thus destroying human tissue.

It begins as a low grade cellulitis, followed by rapid onset of fulminant infection in the subcutaneous fascia and accompanying fat necrosis, subcutaneous vessel thrombosis and myonecrosis. Blood supply to the skin is compromised and erythema and edema of the skin progress to bullae and gangrene which is associated with fever, shock and high mortality rate. The infection can be associated with severe systemic toxicity and may rapidly progress to death unless promptly recognized and treated.

### Methods

This retrospective and prospective observational study was conducted on in-patient department, cases diagnosed with necrotising fasciitis over a period of three years in a tertiary care hospital. Ethics committee approval was obtained and written informed consent was taken from patients who agreed to participate in the study. Patient clinically diagnosed as necrotizing fasciitis irrespective of age and sex were included in this study.

Detailed history of patients was noted and they were thoroughly examined. Intravenous fluids, wide spectrum antibiotics, analgesics & inotropes were given as per requirement. Pus was sent for culture and findings recorded.

Categorical data were assessed in the form of absolute numbers and percentages. Quantitative data was assessed by calculating range and measures of central tendency such as mean and standard deviation.

### Results

In our study there were no cases below the age of 21 years while in the age group of 21-40, 41-60, 61-80 there were 57(31.67%), 98(54.44%) and 25(13.89%) patients respectively. (Table 1). The mean age of presentation was 47.13 years.

Out of 180 patients 112(62.22%) were males and 68(37.78%) were females (Table 2) with a male female ratio of 1.6:1.

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In our study most of the patients were from rural areas, 120 (66.67%) as compared to urban 60(33.33%) & rural urban ratio was 2:1. (Table 3) Patients from rural areas are prone to trauma and subsequent infection due to their habit of walking bare foot. In our study the most common cause of necrotizing fasciitis was trauma seen in 120(66.67%) patients followed by unknown bite in 40 (22.22%) whereas no cause was found in 20 (11.12%) patients. (Table 4)

In the present study the most common symptom observed at the affected site was swelling found in 170 (94.45%) patients followed by pain in 152 (84.44%) and redness in 120 (66.67%) patients. Local tenderness was present in 166(92.22%) patients followed by bullae 42(23.33%) and crepitus 15(8.34%) patients. (Table 5).

In the present study, the most commonly affected site were extremities seen in 130 (72.22%) patients followed by perineum in 40(22.22%) & abdomen in 22 (12.23%) patients. (Table 6).

In our study polymicrobial infection was present in all patients. Staphylococcus aureus, Streptococcus pyogenes, Pseudomonas aeruginosa were isolated in 56 (31.11%) patients. Staphylococcus aureus, Pseudomonas aeruginosa, Klebsiella species were grown on culture in 48 (26.67%) patients whereas Streptococcus pyogenes, Pseudomonas aeruginosa, Klebsiella species were isolated in 31 (17.22%) patients. Staphylococcus aureus, Klebsiella species, E. coli were the organisms grown on culture in 26 (14.44%) patients, Staphylococcus aureus, E. coli in 18(10.00%) whereas Pseudomonas aeruginosa, Klebsiella species only in 1(0.56%) patient. (Table 7).

Our study found that necrotizing fasciitis infection was polymicrobial in nature and most common bacteria isolated in pus culture of wound was Staphylococcus aureus 148 (82.22%) while Pseudomonas aeruginosa was found in 136(75.55%) followed by Klebsiella species in 106(58.89%) Streptococcus pyogenes in 88 (48.89%) and E. coli in 44 (24.44%) patients. (Table 8).

**Table 1:** Age wise distribution of patients in the study

Age (yrs.)*	No. of patients	Percentage
21-40	57	31.67
41-60	98	54.44
61-80	25	13.89
Total	180	100.00

\*no cases below the age of 21 years.

**Table 2:** Sex wise distribution of patients in the study

Sex	No. of patients	Percentage
Male	112	62.22
Female	68	37.78
Total	180	100.00

**Table 3:** Distribution of patients according to locality

Locality	No. of patients	Percentage
Rural	120	66.67
Urban	60	33.33
Total	180	100

**Table 5:** Clinical presentation of necrotizing fasciitis

Clinical presentation	No of patients	Percentage	
a) Symptoms	Swelling*	170	94.45
	Pain*	152	84.44
	Redness*	120	66.67

\*at affected site

Clinical presentation	No of patients	Percentage	
b) Signs	Local tenderness	166	92.22
	Bullae	42	23.33
	Crepitus	15	8.34

**Table 6:** Site of necrotizing fasciitis

Site	No. of patients	Percentage
Extremities	130	72.22
Perineum	40	22.22
Abdomen	22	12.23

**Table 7:** Microbiological flora in pus culture for aerobic organisms

Group	Type of organism	No. of patients	Percentage
1	Staphylococcus Aureus, Streptococcus Pyogenes, Pseudomonas Aeruginosa	56	31.11
2	Staphylococcus Aureus, Pseudomonas Aeruginosa, Klebsiella Species	48	26.67
3	Streptococcus Pyogenes, Pseudomonas Aeruginosa, Klebsiella Species	31	17.22
4	Staphylococcus Aureus, E. coli, Klebsiella Species	26	14.44
5	Staphylococcus Aureus, E. coli	18	10.00
6	Pseudomonas Aeruginosa, Klebsiella Species	1	0.56
Total		180	100

**Table 8:** Distribution of aerobic organism in pus culture

Type of organism	No. of patients	Percentage
Staphylococcus Aureus	148	82.22
Pseudomonas Aeruginosa,	136	75.55
Klebsiella Species	106	58.89
Streptococcus Pyogenes	88	48.89
E. Coli	44	24.44

## Discussion

Present study comprises a review of 180 patients with necrotising fasciitis, admitted in various surgical wards of a tertiary care hospital over a period of three years.

In our study there were no cases below the age of 21 years while in the age group of 21-40, 41-60, 61-80 there were 57(31.67%), 98(54.44%) and 25(13.89%) patients respectively. The mean age of presentation was 47.13 years. These results are similar to the study conducted by Martin *et al.* (2008)<sup>[1]</sup> who observed that the patients age range was from 19 to 75 years with a mean of 41.6 years. Similar studies by Yuag *et al.* (2005)<sup>[2]</sup> and Nissar Sheikh (2010)<sup>[3]</sup> observed the mean age of 53.4 and 48.6 years respectively.

Out of 180 patients 112(62.22%) were males and 68(37.78%) were females with a male female ratio of 1.6:1. The findings of study are similar to that of Yuag *et al.* (2005)<sup>[2]</sup> who observed a ratio of 2.5:1. Similarly Nissar Sheikh (2010)<sup>[3]</sup> observed male female ratio of 3:1 in his study whereas Wong *et al.* (2003)<sup>[4]</sup> found no such difference.

In our study most of the patients were from rural areas, 120(66.67%) as compared to urban 60(33.33%) & rural urban ratio was 2:1. Patients from rural areas are more prone to trauma and subsequent infection due to their habit of walking bare foot. In our study the most common cause of necrotizing fasciitis was trauma seen in 120(66.67%) patients followed by unknown bite

in 40 (22.22%) whereas no cause was found in 20(11.12%) patients. Our study is similar to that of Anaya *et al.* [5] who observed that 46% and 18% cases were due to trauma and of spontaneous onset respectively. Fournier JA in 1884 [6] showed that necrotizing fasciitis of the perineum can arise spontaneously or may develop from a perineal abscess, Bartholin gland infection, scrotal infections and genitourinary procedures.

In the present study the most common symptom observed at the affected site was swelling found in 170 (94.45%) patients followed by pain in 152 (84.44%) and redness in 120 (66.67%) patients. Local tenderness was the most common sign in 166 (92.22%) followed by bullae in 42(23.33%) and crepitus in 15(8.33%) patients. Similarly, Sing *et al.* [7] in his study observed swelling in 99% followed by pain in 91% and redness in 72% patients whereas he noted local tenderness in 91% followed by bullae and crepitus in 15% patients each. Most common sign noted was local tenderness in 72.9% followed by bullae in 15% and crepitus in 36% of the patients.

In the present study, the most commonly affected site was extremities seen in 130 (72.22%) cases followed by perineum in 40(22.22%) & abdomen in 22(12.23%). In 12(6.67%) patients both abdomen and perineum were involved. The findings of the study are similar to that of Sing *et al.* [7] who observed extremities involvement in 76%, perineum in 28 and abdomen in 36% of the patients.

In our study polymicrobial infection was present in all patients. Staphylococcus aureus, Streptococcus pyogenes, Pseudomonas aeruginosa were isolated in 56 (31.11%) patients. Staphylococcus aureus, Pseudomonas aeruginosa, Klebsiella species were grown on culture in 48 (26.67%) patients whereas Streptococcus pyogenes, Pseudomonas aeruginosa, Klebsiella species were isolated in 31 (17.22%) patients. Staphylococcus aureus, Klebsiella species, E. coli were the organisms grown on culture in 26 (14.44%) patients, Staphylococcus aureus, E. coli in 18(10.00%) whereas Pseudomonas aeruginosa, Klebsiella species only in 1(0.56%) patient. McHenry CR (1995) [8], Wong CH (2003) [9], Childers BJ *et al.* (2002) [10] in their study stated that 55% to 75% of the infections were polymicrobial in nature and most common organisms isolated were E.coli and Proteus.

Our study found that necrotizing fasciitis infection was polymicrobial in nature and most common bacteria isolated in pus culture of wound was Staphylococcus aureus 148(82.22%) while Pseudomonas aeruginosa was found in 136(75.55%) followed by Klebsiella species in 106(58.89%) Streptococcus pyogenes in 88(48.89%) and E. coli in 44(24.44%) patients. The findings of study are similar to that of Yuag *et al.* (2005) [2] who had isolated Staph aureus as the most common organism in 78% followed by Streptococcus in 43% patients. Brook and Frazier (1995) [11] concluded that Staph aureus was the most common aerobic organism in 67.3% followed by Streptococci in 23% and E. coli in 14.8% in their patients.

## Conclusion

Necrotising fasciitis is a potentially lethal bacterial infection preponderant in males within the age group of 40-60 years in rural areas perhaps due to increase incidence of trauma, presenting with swelling, pain and redness and is mostly due to polymicrobial infection, Staphylococcus aureus being the most common organism involved.

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