



**A PROSPECTIVE STUDY TO ASSESS THE DIAGNOSTIC EFFICACY OF LABORATORY RISK INDICATOR FOR NECROTIZING FASCIITIS (LRINEC) SCORING SYSTEM IN PATIENTS WITH SOFT TISSUE INFECTION**

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**ABSTRACT**

**Background**

Necrotizing fasciitis which is commonly known as "Flesh-Eating Disease" is an uncommon soft-tissue infection. It is characterized by widespread fascial necrosis with relative sparing of overlying skin and underlying muscle. Mostly it is associated with severe systemic toxicity and a fulminant course. It is usually rapidly fatal unless promptly recognized and aggressively treated with appropriate antimicrobials and surgical debridement at the earliest.

**Methods**

Our study was a prospective study conducted on 140 patients over a period of 2 years from June 2018 to June 2020 in a tertiary care hospital, GGH, Kadapa. All patients were selected randomly and evaluated by taking proper history, thorough clinical examination, routine laboratory investigations and histopathological examination of the debrided tissue and the outcomes were analysed to know the efficacy of LRINEC Scoring in diagnosing necrotizing fasciitis.

**Results**

Most common age group was 41-50 years. Males were commonly affected, accounting to 74% i.e., 111 patients and the remaining 39 patients were females (39%). Fever, inflammation of the involved area were the most common presentations. Majority were diabetic and hypertensive accounting to 55.3% and 52.7% respectively. All patients presented with symptoms with swelling, redness, pain and induration. Eighty-one percent had elevated CRP. Total WBC count was raised in 78.7% of the cases. Fifty-six percent of the cases had haemoglobin less than 11g/dl. Hyponatremia was observed in 81.3% of the patients. Majority (52.7%) had normal sr. creatinine i.e., < or =1.4. RBS was elevated in 54.7% of the cases. In our study 87.3% of the patients had a LRINEC score >6. Histology was positive for necrotising fasciitis in 92% of the cases, among them majority had polymicrobial organisms on culture.

**Conclusion**

In patients with severe soft tissue infections, LRINEC scoring based on laboratory parameters is an easy and reliable diagnostic tool to diagnose Necrotizing fasciitis accurately.

**KEYWORDS :** Necrotising fasciitis, LRINEC score, polymicrobial, monomicrobial.

**BACKGROUND**

Necrotizing fasciitis which is commonly known as "Flesh-Eating Disease" is an uncommon soft-tissue infection. It is characterized by widespread fascial necrosis with relative sparing of overlying skin and underlying muscle. Mostly it is associated with severe systemic toxicity and a fulminant course. It is usually rapidly fatal unless promptly recognized and aggressively treated with appropriate antimicrobials and surgical debridement at the earliest.

**METHODS**

Our study was a prospective study conducted on 140 patients over a period of 2 years from June 2018 to June 2020 in a tertiary care hospital, GGH, Kadapa. All patients were selected randomly and evaluated by taking proper history, thorough clinical examination, routine laboratory investigations and histopathological examination of debrided tissue and the outcomes were analysed to know the efficacy of LRINEC Scoring in diagnosing necrotizing fasciitis.

The LRINEC (laboratory risk indicator for necrotizing fasciitis)<sup>1</sup> score

LRINEC score of 6 or greater is considered positive for

necrotizing fasciitis

Variable	Score
C-reactive protein (mg/l)	
<150	0
150 or more	4
Total white cell count (per mm <sup>3</sup> )	
<15	0
15-25	1
>25	2
Hemoglobin (g/dl)	
>13.5	0
11-13.5	1
<11	2
Sodium (mmol/l)	
135 or more	0
<135	2
Creatinine (μmol/l)	
141 or less	0
>41	2
Glucose (mmol/l)	
10 or less	0
>10	1

**Inclusion Criteria**

Patients presenting with symptoms suggestive of severe soft

tissue infections admitted from the emergency department or outpatient department between the age group 15-90 yrs residing in Kadapa area and surrounding villages who are willing to take part in this study are included in this study.

**Exclusion Criteria**

- 1) Patients below 15 yrs or above 90 yrs of age.
- 2) Patients who have received antibiotic treatment in the last 48 hours or a minimum of 3 doses of antibiotic prior to presentation.
- 3) Patient who has undergone surgical debridement for present episode of soft tissue infection.

**RESULTS**

**Age Distribution:**

**Table 1 - Age Distribution Of Patients Studied**

Age in years	No. of patients	%
21-30	2	1.3
31-40	18	12.0
41-50	55	36.7
51-60	43	28.7
61-70	22	14.7
71-80	8	5.3
81-90	2	1.3
Total	150	100.0

Mean ± SD: 52.84 ± 11.32

**Gender Distribution:**

Males were commonly affected by necrotizing fasciitis accounting to 74% i.e., 111 patients the remaining 39 patients were females (39%).

**Fever Status:**

Fever is present in all 150 patients (100%).

**Diabetics:**

In our study, 83 patients were diabetic and 67 were nondiabetic accounting to 55.3% and 44.7% respectively.

**Hypertension:**

In our study, 79 patients were hypertensive and 71 were non hypertensive accounting to 52.7% and 47.3% respectively.

**Chronic Kidney Disease And Peripheral Vascular Disease:**

In our study, 45 patients (30%) had chronic kidney disease, and 2 patients (1.33%) had PVD.

**Table 2: Location Of Necrotizing Fasciitis**

Location	No. of patients	%
Abdominal	1	0.7
LL	129	86.0
UL	5	3.3
Scrotum	15	10.0
Total	150	100.0

**Signs And Symptoms:**

All patients presented with symptoms with swelling, redness, pain and induration. 66% patients had blister at presentation whereas only 18.7% had skin anaesthesia and 16% had skin necrosis.

**Investigations**

**Levels Of CRP:**

Out of the 150 patients in the study, 122 patients (81%) had CRP > 150 whereas only 28 patients (18.7%) had CRP < 150.

**Total WBC Count:**

Out of 150 cases, 42.7% of the patients had total WBC counts in the range of 15000 to 25000 cc/m<sup>3</sup> whereas only 36 % had total WBC counts > 25000 cc/m<sup>3</sup> and 21.3% had < 15000cc/m<sup>3</sup>.

**Hemoglobin Levels:**

Out of 150 cases, 56% of the total patients had hemoglobin levels less than 11 g/dl whereas 39.3 had hemoglobin levels in the range of 11 to 13.5 g/dl.

**Distribution Of Sodium:**

Out of 150 cases, 81.3% presented with hyponatremia. Remaining 18.7% patients were normal.

**Serum Creatinine:**

Out of 150 cases, 47.3% patients had serum creatinine > 1.4, and 52.7% had <= 1.4.

**Random Blood Sugar (RBS):**

Out of 150 cases, 54.7% had a random blood sugar > 180mg/dl and remaining 45.3% were < 180m/dl.

**Table 3: LRINEC Scoring System For Necrotizing Fasciitis**

LRINEC score	No. of patients	%
<6.0	19	12.7
>6.0	131	87.3
Total	150	100.0

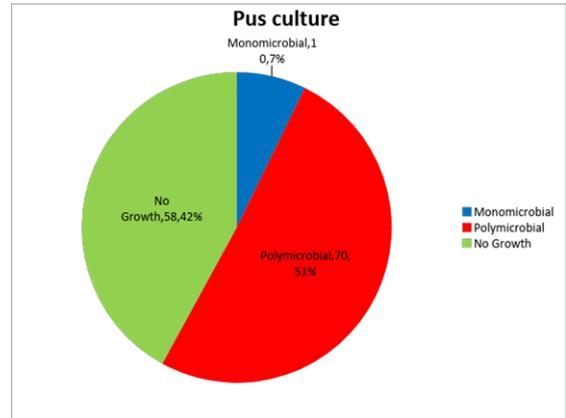
> 6 PPV (Positive predictive value)

In our study 87.3% of the patients had a LRINEC score > 6.

**Histopathology:**

Histopathology was positive in 92% of the patients, remaining 8% were negative.

**Pus Culture:**



**Figure 1 – Pus Culture**

In our series, out of the total monomicrobial pus cultures, 80% had grown Staphylococcus aureus and 20 % had Streptococcus pyogenes. All the Streptococcus pyogenes containing cultures were sensitive to both Piperacillin Tazobactam and Clindamycin.

In our series where the cultures had grown more than one organism, most common organism was acinetobactor followed by E. coli. Out of the total patients who had grown E. coli, 27% of the patients were ESBL which was sensitive only to Meropenem and Imepenem.

**Table 4: Correlation Of LRINEC With Histopathology Findings: Diagnostic Role Of LRINEC**

	True Positive	False Positive	False Negative	True Negative	Total	P value
Observation	125	6	13	6	150	<0.001 **
	Sensitivity	Specificity	PPV	NPV	Accuracy	Kappa
Evaluation (%)	90.58	50.00	95.42	31.58	87.33	0.321

## DISCUSSION

The mean age group was  $52.84 \pm 11.32$  years in the present study, it was 57.8 in **L.D.Faucher.et.al**<sup>2</sup> study. In our study, 75% of the patients were males whereas it was 51 % and 75% in studies conducted by **L.D.Faucher.et.al**<sup>2</sup> and **Rekha.et.al**<sup>3</sup> respectively. In our series, 55.3% were diabetic, 52.7% were hypertensive, 30 % had chronic kidney disease and 1 % had peripheral vascular disease. In the study by **Rekha.et.al** 73% patients were diabetic, 13.3 % had chronic kidney disease and 6.6% had peripheral vascular disease whereas in the **L.D. Faucher**<sup>2</sup> series 37 % had diabetes.

In our study, the most commonly involved site was extremities (upper and lower limbs) in 89.3% of the patients followed by Fournier's gangrene in 10% and abdomen in 0.7%. In **L.D.Faucher.et.al**<sup>2</sup>, extremity involvement was seen in 51% followed by abdominal wall in 21%.

In our series 36.2% of the patients had polymicrobial growth on pus culture followed by 34.7% had no growth and 28.9% had monomicrobial growth. Whereas 28% and 29 % had polymicrobial growth in **L.D.Faucher et.al**<sup>2</sup> series and **Rekha et.al**<sup>3</sup> series respectively. So, the polymicrobial pattern in our series is comparable to the series being published.

While the average number of of polymicrobial organisms grown in our series was 2. Acinetobacter and E.coli was the common organism cultured in our series. In Taiwanese studies, 20 to 38% of patients had polymicrobial disease and 49 to 68% had monomicrobial disease<sup>45</sup>. Monobacterial infection was most commonly due to *Streptococcus pyogenes* (25% of cases)<sup>6</sup>. On the contrary, US studies have shown that 71 to 75% of tissue culture isolates yielded mixed aerobic and anaerobic bacteria.

In our series, the mortality rate was 10% as compared to 12% and 46.67% in **L.D.Faucher et.al**<sup>2</sup> and **Rekha et.al**<sup>3</sup> respectively.

In our study, out of the total 150 patients, 138 patients (90%) were proved histologically positive for necrotizing fasciitis. Out of the above 138 patients, 125 (90%) of them had a LRINEC score of more than 6 and it was statistically significant (P value < 0.001). In our study the positive predictive value of LRINEC score when it was > 6 was 95.5% which was comparable to the 92% in original study done by **Wong.et.al**. The negative predictive value of LRINEC in our series was 31.58% as compared to 96 % in study by **Wong.et.al**<sup>4</sup>. The sensitivity and specificity of LRINEC score for our series were 90.58% and 50 % which the usefulness LRINEC in reliably distinguishing necrotizing fasciitis from other soft tissue infections.

## CONCLUSION

In patients with severe soft tissue infections, LRINEC scoring based on laboratory parameters is an easy and reliable diagnostic tool to diagnose Necrotizing fasciitis accurately.

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