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Clinical Profile of Necrotising Soft Tissue Infection Patients in a North Indian Hospital

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Abstract

Background: Necrotizing soft tissue infections (NSTIs) or necrotizing fasciitis are infections of the subcutaneous tissue and fascia with variable involvement of the overlying skin and underlying muscle. They can be initiated by trivial injuries and can be idiopathic. **Material & Methods:** It is an retrospective observational study conducted in our surgical unit of a tertiary care centre, from January 2017 to December 2022, were observed for age, gender, occupation, socioeconomic status, body mass index (BMI) clinical features, radiological findings (size, site, status, involvement of tissue compartments and bone). A total of 118 patient records were analyzed. **Results:** 60% patients were over 50 years of age and 64.2% were males. 69.85 cases had body mass index more than 30 kg/m2. 50.9% patients had history of alcohol abuse and 32.1% cases gave history of intravenous drug abuse. 73.6% cases had foul smelling discharge on presentation while fever and sepsis was seen in 64.2% and 52.8% cases, respectively. Lower limb and perineal involvement was seen in more than two third of the cases. 69.4% cases were anaemic while 44.1% had hypoalbuminemia. More than 85% cases had leucocytosis. 40.7% cases required ionotropes and 22.03% cases needed ventilatory support on admission. Diabetes mellitus was the most common associated co morbidity, seen in 53.4% cases. **Conclusion:** The necrotizing soft tissue infections are a significant health problem and carry high mortality and morbidity rates. The condition carries high association with modifiable risk factors like anaemia, hypoalbuminemia, diabetes mellitus and obesity.

Keywords:- Necrotizing soft- tissue infections (NSTIs), necrotizing fasciitis, hypoalbuminemia, Fournier's gangrene, Ludwig's angina.

INTRODUCTION

Necrotizing soft tissue infections (NSTIs) or necrotizing fasciitis are infections of the subcutaneous tissue and fascia with variable involvement of the overlying skin and underlying muscle. They can be initiated by trivial injuries and can be idiopathic. The infections are inclined to spread rapidly producing extensive tissue loss over a very short span. The bacterial toxins and also the products of tissue damage with inflammatory

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response cause severe systemic toxicity, that is potentially fatal. NSTI can involve any part of the body, but commonly involves extremities, perineum, and truncal areas. Patients present with local signs of infection with inflammation and severe pain that is often inconsistent to local features. There are usually associated features of systemic toxicity.[1]

The global incidence of necrotizing fasciitis ranges from 0.3 to 15 cases per 100,000 population.[2,3] The condition carries a high mortality, irrespective of the efforts put in management. Polymicrobial NSTI commonly occurs in older with diabetes mellitus. Monomicrobial NSTIs, have been reported in any age group and in the absence of co - morbidities. Knowledge, early diagnosis, and timely management determine the outcomes.[4]

Historically, soft tissue infections have been recognized in literature and have been named using changeable jargon such as non-clostridial gas gangrene, gangrenous ulcers, phagedaenic ulcer, putrid ulcer, or hospital gangrene. The infections have also been named according to anatomical site of involvement like Fournier's gangrene (perineum), Ludwig's angina (submandibular and sublingual spaces) and Meleney's gangrene (abdominal wall). Due to similarities in pathology and line of treatment, irrespective of anatomic location or depth of infection, the term "necrotizing soft tissue infection" (NSTI) is used to replace these old names and also the term "necrotizing fasciitis" that was coined by Wilson in 1952 to describe swiftly advancing, infections of the fascia with involvement of skin, subcutaneous tissue and muscle.[5,6,7]

The depth of necrosis has also been used to classify NSTIs, with necrotizing cellulitis describing an infection involving the dermis and subcutaneous tissue, necrotizing fasciitis involving the fascia, and pyomyositis or myonecrosis describing involvement of the muscle fascicle. The deeper tissue planes can get involved without overlying skin involvement.[8,9,10,11] [Figure 1-3] show a few of our NSTI cases.

Large number of risk factors have been associated with NSTIs. Age, drug abuse, diabetes, obesity, malnutrition, cardiac and respiratory diseases, peripheral vascular disease, alcoholism, immunocompromised states such as malignancy and steroid use and human immunodeficiency virus 9 HIV) infection are the most commonly reported in literature.[12,13]

Higher mortality was seen in patients aged more than 50 years, presentation with shock, diabetes mellitus, leucocytosis, jaundice, hyponatremia, hypoalbuminemia, anaemia, elevated serum creatinine, higher percentage of body surface area involved and delay in surgery.[14,15,16] The present study was planned with an aim of studying the clinical profile of NSTI patients and identify potential risk factors that could be amenable to modulation.

MATERIAL AND METHODS

It is a retrospective observational study conducted in our surgical unit of a tertiary care centre, Guru Gobind Singh Medical College and Hospital, Faridkot, India with ethical compliance. Case records, from January 2017 to December 2022, were observed for age, gender, occupation, socioeconomic status, body mass

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index (BMI) clinical features, radiological findings (size, site, status, involvement of tissue compartrments and bone). A total of 118 patient records were analyzed. The demographic characteristics include age, sex, and socioeconomic status. Nonclinical risk factor includes parity, obesity, nutritional status, substance abuse, use of immuno- supressor drugs and steroids. Use of vegetarian diet and non-vegetarian diet was included in dietary habit.

Clinical profile included performance status, presenting symptoms, duration of symptoms, presence of anaemia, number and site of disease, and features of sepsis, deranged laboratory parameters. Interview technique was used to collect the information about demographic characteristics, nonclinical characteristics, and dietary habit. A questionnaire developed specially for the study was used for the interview through telephonic conversation. Socioeconomic status was determined as per the modified Kuppuswamy's socioeconomic scale 2021. Documentation of clinical features was done by history, physical examination, and imaging features. All consenting adult patients who consented to be part of the study were included and patients with age below 18 years, non-consenting individuals, patients on who left hospital against medical advice were excluded.

All patients were managed according to the local protocol for treatment of NSTIs and intensive care support. In our institute, cases of severe NSTIs mandate treatment with beta lactams and beta lactamase inhibitors (e.g., piperacillin, tazobactam) or carbapenems (e.g., meropenem) along with clindamycin as empirical antibiotic therapy and immediate surgical consultations for debridement or amputation. The antibiotics were further adjusted according to disease progression and availability of antibiotic sensitivity reports. Descriptive variables were represented using mean for continuous data and frequency (%) for categorized data.

RESULTS

Figure 1: NSTI of lower and upper limb and head.

60% patients were over 50 years of age and 64.2% were males. 54.7% cases were from rural areas and 71.7% belonged to low socio-economic status. 69.85 cases had body mass index more than 30 kg/m2. 50.9% patients had history of alcohol abuse and 32.1% cases gave history of intravenous drug abuse. 90.6% admissions were through emergency. 73.6% cases had foul smelling discharge on presentation while fever and sepsis were seen in 64.2% and 52.8% cases, respectively. Lower limb and perineal involvement were seen in more than two third of the cases. 69.4% cases were

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anaemic while 44.1% cases had hypoalbuminemia. More than 85% cases had leucocytosis. 40.7% cases required ionotropic support on presentation and 22.03% cases needed ventilatory support on admission. Diabetes mellitus was the most common associated co morbidity, seen in 53.4% cases. 64.4% cases had gram negative growth on swab culture. Overall mortality was 25.4%.

Table 1: Clinical parameters and incidence

Attribute		**Frequency**	**Percentage**
Age in years	< 18	Nil	Nil
	18-30	2	1.8
	31-40	14	13.2
	41-50	30	24.5
	51-60	38	28.3
	>60	34	32
Gender	Male	76	64.2
	Female	42	35.8
Residence	Urban	53	45.3
	Rural	65	54.7
Socioeconomic status	Upper	Nil	Nil
	Middle	33	28.3
	lower	85	71.7
Admission	Elective	11	9.4
	Emergency	107	90.6
Body mass index BMI	<30 kg/m2	36	30.2
	>30 kg/m2	82	69.8
Alcohol		60	50.9
Intravenous drug abuse		38	32.1
Immuno suppressant drugs		27	22.6
Clinical features			
Fever		76	64.2
Pain		75	63.2
Loss of function		65	54.7
Chest findings		43	35.8
Loss of consciousness		37	30.2
Discharge / foul smell		87	73.6
Sepsis or Multi organ dysfunction syndrome		62	52.8
Anatomical site			
Lower limbs	Unilateral	42	35.6
	Bilateral	16	13.5
Upper limb	Unilateral	11	9.3
	Bilateral	Nil	Nil

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Perineum and gluteal region			48	40.7
Anterior abdominal wall			12	10.2
Head and neck			1	0.8
Laboratory parameters				
Haemoglobin	< 10 gm/dl		82	69.4
	>10 gm/dl		36	30.6
Leucocytosis (cells > 11000/mm3)			102	86.4
Liver function Tests				
Raised bilirubin (> 17µmol/L)			44	37.3
Raised transferase enzymes (> 60 units /L)			56	47.5
Raised alkaline phosphates (> 150 units/L)			50	42.4
Low serum albumin(< 35 gm / L)			52	44.1
Renal function tests	Blood urea >20 mg/dl		70	59.3
	Serum creatinine >1.5 mg/dl		55	46.6
International normalized ratio	>1		68	57.6
C Reactive proteins	> 4mg/dl		88	74.5
Acidosis on presentation			32	27.1
Ionotropic support on presentation			48	40.7
Ventilator requirement on presentation			26	22.03
Onset to hospital time (days)			07	
Admission to debridement surgery		Same day	74	62.7
		Delay > 01 day	44	37.3
Mean Hospital stay till discharge or reconstructive surgery in days			09	
Co morbidities				
Diabetes mellitus			63	53.4
Hypertension			56	47.5
Respiratory disorders			24	20.3
Human immuno deficiency virus positive status			24	20.3
Others like malignancy, connective tissue disorders and coronary artery disease			44	37.3
Microbiology	Gram positive		36	30.5
	Gram negative		76	64.4
	Polymicrobial		6	3.4
Mortality	Total		30	25.4
	< 24 hours		11	9.3
	< 48 hours		10	8.5
	< 07 days		7	5.9
	> 07 days		2	1.7
Requirement for amputation			20	16.9

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Figure 2: NSTI upper limb, abdominal wall and perineum

Figure 3: NSTI lower limb and perineum

DISCUSSION

NSTI s are an ever-increasing presentation in surgical practice and produce significant mortality and morbidity. The condition even after prolonged hospital stays, often produce long term sequele. We studied clinical profile of NSTI patients and analyzed association of various risk factors for their association with the disease. We found that 60% of our patients were over 50 years of age and 64.2% were males. This is in sync with the results observed by Barupal SR et al. they also observed that the perineal and lower limbs involvement constituted 78% of their cases. This also is consistent with our study.[1]

Tarun K et al compared factors associated with poor outcome in NSTI patients. They found poor outcome in older, diabetic and other co morbid patients, patients with multiorgan dysfunction and in patients having larger surface area affected by the disease. They also reported higher prevalence of gram-negative isolates on culture. We also observed similar results in our study.[5]

Kurian et al observed a higher rate of amputation requirement (48%) and a higher mortality (34%) than our study. This may be because of differences in at risk population of both studies. However the age and gender distribution of their case population was comparable to our study.[2]

Huang et al studied independent predictors of mortality for NSTI. They observed that liver cirrhosis, presence of soft tissue air, Aeromonas infection, age more than 60 years, band polymorphonuclear neutrophils >10%, activated partial thromboplastin time aPTT more than 60 seconds, bacteremia, and serum creatinine >2 mg/dL were independent risk factors for development of NSTIs and also were associated with a poor outcome.[17]

GG Kihiczak et al reported leucocytosis and raised blood urea in NSTI patients. They also

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called for prompt diagnosis and treatment for a favorable outcome. We also report a better outcome in patients who were fit for surgical intervention on arrival in the emergency department. The mortality, in our study declined after initial 24 hours.[18]

Though we are able to conclude the risk factors associated with NSTIs, we recommend a broader study with a larger sample size and a long term follow up to study risk attribution as well as long term outcomes.

CONCLUSIONS

The necrotizing soft tissue infections are a significant health problem and carry high mortality and morbidity rates. The condition also contributes to utilization of intensive care resources. The condition carries high association with modifiable risk factors like anaemia, hypoalbuminemia, diabetes mellitus and obesity. Hence we need to devise preventive strategies to tackle modifiable risk factors.

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