



E-ISSN: 2616-3470

P-ISSN: 2616-3462

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2020; 4(3): 353-354

Received: 17-06-2020

Accepted: 21-07-2020

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## The study of Cellulitis in non-diabetic

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**DOI:** <https://doi.org/10.33545/surgery.2020.v4.i3f.521>

### Abstract

Lower limbs are commonly involved in cellulitis as they are more susceptible to injuries. This study analyzes the various causes and risk factors for cellulitis in the non-diabetics.

**Methods:** This prospective study was conducted at the Department of General Surgery, Navodaya Medical College and included 100 non-diabetic patients with cellulitis. The severity of cellulitis was graded as per the CREST guidelines. Demographics, risk factors, grades, management and treatment outcomes were recorded and analyzed.

**Results:** Cellulitis was more common in females (56%) and old age group (39%). It was more unilateral (87%) and resulted more from post bite wounds (22%). 76% had culture-positive wound infections. Severe grades of cellulitis needed surgical intervention and many patients needed skin grafting.

**Conclusions:** Non diabetic patients with lower limb cellulitis can also result in severe morbid consequences but in the absence of co-morbid illness, they usually recover with minimal residual disabilities. Non diabetic elderly patients have to be motivated to take care of their feet as the diabetic patients, as neglect of minor trauma or bites can lead to morbid illness necessitating major treatment like skin grafting.

**Keywords:** Cellulitis, CREST guidelines, Lower limb, Non-diabetic

### Introduction

Cellulitis is an inflammatory condition of the skin and subcutaneous tissue, characterized by erythema, swelling, warmth, and pain. The etiologic agents are most often *Streptococcus pyogenes* and *Staphylococcus aureus*, followed by non-group A beta-hemolytic streptococci and gram-negative bacilli. Cellulitis is a common medical emergency, the severity of which varies from mild to life threatening. The infection can occur any site in the body; lower limbs are affected in >70% of cases. Risk factors for cellulitis of the lower limbs include the presence of sites of entry for the etiologic agent and predisposing factors, such as being overweight and having lymphedema. Sites of entry are commonly created by traumatic injury, leg ulcers, and possibly, dermatophytic toe web intertrigo. Two recent case-control studies addressing risk factors for cellulitis demonstrated a significantly higher rate of toe web intertrigo in the patient group. Although dermatophytes do not cause cellulitis, they lead to scaling and fissure formation and, by disruption of the skin, provide a niche for bacteria that could enter the body. Two reports have confirmed the presence of pathogenic bacteria, such as beta-hemolytic streptococci and *S. aureus*, in abnormal toe webs of cellulitis patients. The skin is a milieu for controlled bacterial growth. Skin supports the growth of commensal bacteria, which protect the host from pathogenic bacteria. Environmental and local factors, host immunity, and organism adherence and virulence are intricately related to cutaneous infection. Resident gram-positive bacteria include *Staphylococcus*, *Micrococcus*, and *Corynebacterium* sp. *Staphylococcus aureus* and *Streptococcus pyogenes* are notoriously pathogenic in the skin. Gram-negative organisms such as *Pseudomonas aeruginosa*, *Pasteurella multocida*, *Capnocytophaga canimorsus*, *Bartonella* sp., *Klebsiella rhinoscleromatis*, and *Vibrio vulnificus* are not typical resident skin microflora but may cause cutaneous infection. Cellulitis often requires hospitalization, especially for elderly patients, who frequently have co-morbid conditions. The morbidity related to immediate complications and frequent recurrences and the cost of management warrant efforts to better understand the risk factors. We present data from a prospective study mainly on the socioeconomic status and locality of the patient.

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## Materials & Methods

We analyzed the cases of 100 patients with cellulitis at any site of the body who had been hospitalized in the septic ward of Department of General Surgery, Navodaya Medical College, a tertiary care hospital. The period analyzed was 1 year, from July 2016 to June 2017. The data required (age, sex, infection site, length of hospital stay, socioeconomic status, nutritional status, education and area etc.) were obtained by chart review. We studied the cellulitis includes both superficial and deep cellulitis. The study population consisted of patients aged >14 years who were hospitalized because of acute cellulitis on either limb or other part of the body. The study was approved by the hospital ethics committee. All participants signed an informed consent statement.

**Inclusion criteria** for patients were as follows:

1) Presence of cellulitis, defined as a demarcated cutaneous inflammation that was associated with fever, chills or leukocytosis.

**Exclusion criteria** as follows:

1) Hospitalization within the 4 weeks preceding the present admission.

2) Age less than 14 years.

3) Patients discharged within 3 days of admission and OP cases.

## Results

A total of 100 patients with cellulitis were admitted to the septic ward during the period studied, 85 males and 45 females. Male to female ratio was 3.4:1. Males are affected more than females, 85(77.3%) and 25 (22.7%) cases respectively. The mean hospital stay was 11.2 days. We also found statistically significant differences on comparing age and mean hospital stay (Longer stays with increased age). Out of 110 patients in our study 2 patients underwent above knee amputation, 5 patients underwent below knee amputation, 13 patients underwent skin graft after debridement. We were divided the patients in to groups in every parameter that is 1) age;<50 years and >50 years 2) sex: female and male 3) area: rural and urban 4) education: literate and illiterate 5) socioeconomic status: APL (above poverty line) and BPL (below poverty line) 6) co-morbidities: co-morbid and non-co-morbid.

## Discussion

Cellulitis is more common in patients with Diabetes and its co-morbidities. But many non-diabetics have lower limb cellulitis who have a better prognosis than diabetic patients. But this group is often over looked and studies on cellulitis are sparse in the Indian setup. This study was instigated to find out the causes of lower limb cellulitis in non-diabetics and to study the pattern of outcomes while managing these patients. Most of the patients were in the elder age group which showed that as the age increases, the incidence of cellulitis increases. This result was similar to the result obtained in the study by Rongey C *et al.* who had a mean age of 48.8 years in the cellulitis group but lower than the results obtained by Sigridur *et al.* (66.7 years). It was also found that as the age of the patient increases, the severity of cellulitis also increases. Females were more affected in our study group 58% while males were more affected in the studies by Rongey C *et al.* and Sigridur *et al.* In the present study, we have observed that 86% of the patients had unilateral lower limb involvement and 14% of the patients had bilateral lower limb involvement, but according to Smith *et al.* the incidence of bilateral lower limb involvement is extremely rare. Patients complicated with edema due to chronic kidney disease or cardiac failure and patients with a history of bare foot

walking, resulting in web space infections, were candidates for bilateral limb involvement. Microbial growth (Staphylococcus and Streptococcus species) was more commonly isolated in the present study which was similar to the results obtained by Sigridur *et al.* This is in contrast to Shankar *et al.* and Gadepalli *et al.* whose study of cellulitis in diabetics showed that gram-negative organisms were more prevalent. Piperacillin-Tazobactam was the most effective antibiotic in the present study but first-generation cephalosporins were frequently used in the study by Rongey C *et al.* Traumatic amputation or arterial ulcer leading to amputation was not included in the study group. Cellulitis superimposed on lower limb edema resulting from chronic kidney disease, lymphedema, and heart failure constituted a considerable proportion of the present study. Superadded fungal infection can be a cause of cellulitis in intertriginous infections and where the bacterial culture was negative. This is supported by the study by Roujeau *et al.* who showed that onychomycosis and dermatophyte infection in the web space can be a risk factor for cellulitis. Also, in about 12 patients the exact cause responsible for the cellulitis was unknown which shows that patients had a very trivial injury, or the organisms were not cultivable by routine aerobic cultures. Non diabetic patients with lower limb cellulitis can also result in severe morbid consequences but in the absence of co-morbid illness, they usually recover with minimal residual disabilities. Nondiabetic elderly patients have to be motivated to take care of their feet as the diabetic patients, as neglect of minor trauma or bites can lead to morbid illness necessitating major treatment like skin grafting. Recognition of cellulitis in early stages can minimize hospital admission and expenditure.

## Conclusion

Non diabetic patients with lower limb cellulitis can also result in severe morbid consequences but in the absence of co-morbid illness, they usually recover with minimal residual disabilities. Nondiabetic elderly patients have to be motivated to take care of their feet as the diabetic patients, as neglect of minor trauma or bites can lead to morbid illness necessitating major treatment like skin grafting.

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