

Causative Organisms of Cellulitis – A Retrospective Study

Vedha Pal Jeyamani S^{1,*}, Asha K Rajan¹, Indumathi S¹, Divya R¹, Lavanya R¹, Prema M¹, Narendra Babu²

¹Department of Pharmacy Practice, Jaya College of Paramedical Sciences, Chennai, Tamil Nadu, INDIA.

²Assistant Surgeon, Govt Head Quarters Hospital, Thiruvallur, Chennai, Tamil Nadu, INDIA.

ABSTRACT

Background: Cellulitis, especially of the lower limbs is found to be more common now-a-days in both the sexes. Ascending cellulitis was found to pose both short and long term morbidities.

Objective and Methodology: The following study carried out is at the general medicine ward of a government hospital where about 90 patients were taken for study with their cellulitis condition. Demographic details and their predisposing causes towards the condition were noted and risk factors were identified.

Results: Diabetes, infections due to streptococci, infections from tinea pedis etc, were the main etiological conditions among others contributing to increased cellulitis cases. Risk factors in both ipsilateral and contralateral limbs were recorded and studied upon. Long term morbidity of most of the patients was identified for which a proper follow-up along with serological examination for critical diagnosis could be carried out. Culturing of the wound for identifying the causative organism is a prior issue which would

reduce the risk of antibiotic resistance. Prophylaxis with Penicillins and its derivatives, both natural and synthetic could be suggested for long term conditions and avoiding recurrent episodes. Common therapy was with Cephalosporin (23), Ciprofloxacin (29) etc. both natural and synthetic penicillins were also found to be given in a good number.

Key words: Cellulitis, Limbs, Penicillins, Streptococci, Morbidity.

Correspondence

Prof S. Vedha Pal Jeyamani, Professor, Department of Pharmacy Practice, Jaya College of Paramedical Sciences, Chennai, Tamil Nadu, INDIA.

Phone: 044-25931362

Email: swetha21112000@gmail.com

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INTRODUCTION

Among Cellulitis of various regions, ascending cellulitis of the leg was a common medical emergency characterized by edema, fever, swelling and malaise. It is one among the multidisciplinary disorder.¹⁻³ Common organisms leading to higher frequency of cellulitis include Streptococci, mixed infections in particular when cellulitis is localized or a penetrating injury.⁴⁻⁶ Most of the time bacteriological diagnosis is difficult due to no wound site present for culturing. Severity of streptococcal infections include streptococcal toxic shock syndrome, necrotizing fasciitis, other conditions which may progress due to poor therapy include infected venous eczema or lymphoedema, deep venous thrombosis, myositis or fasciitis, tibial compartment syndrome etc.⁷⁻¹¹

Cellulitis is the inflammation of the skin and soft tissue caused due to bacterial infections majorly affecting the lower limbs. It is sometimes also called as Lymphangitis or Erysipelas.¹²⁻¹⁵ Associated risk factors for cellulitis include lymphoedema/ chronic edema, Diabetes, primary or secondary insect bites, blistering disorders like bullous pemphigoid, skin trauma/ ulcers, animal bites, bullous impetigo, skin rash-eczema, dry skin, obesity, kidney and liver disease etc.¹⁶⁻¹⁹

Initial appearance of the skin is generally glossy, tight, stretched. Tenderness and pain of the affected area is seen. Occasionally, swelling of the local lymph nodes is observed with other common symptoms like fever accompanied with or without chills, fatigue, sweating, muscle pains, malaise.²⁰⁻²⁴ Diagnosis made involve culture studies, blood test, imaging studies etc. Treatment carried out involved antibiotics, with steroids occasionally.

Some of the cases monitored were as below.

PROCEDURES AND METHODS

The study was carried out at the general medicine ward of Thiruvallur Government Hospital for a period of 3 months. A written consent was collected from all the patients who were included in the study. A close observation was done on cases of cellulitis and patients were selected

based upon the following criteria. Inclusion criteria were those with predisposing conditions of cellulitis like diabetes, skin disorders, local injury etc. those who were willing to reveal their consent were selected. Exclusion criteria were localized cellulitis, bursitis or abscesses cases or those made with incorrect diagnosis (Figure 1,2,3).

About 90 patients were chosen for the study based on the criteria's and data obtained were on demographic details, short-term morbidity, predisposing cause, antibiotic therapy, duration of admission, diagnosis, therapy after discharge. Previous episodes of attacks were documented in addition to any long term morbidity found in the patients.

RESULTS AND DISCUSSION

Out of the 90 patients (48 females and 42 males) with age of 50-75 years (median age 62.5 ± 3.5 years), most of them were observed with pyrexia, malaise, edema etc, at the time of admission. About some 25 patients were found to be afebrile along with cellulitis. Among the various preceding causes found in cellulitis patients, those with infection due to Tinea pedis (13/90), a minor non-penetrating local injury (10/90) were found to be common (Table 1). Others had eczema of foot (9/90), diabetic foot ulcer (5/90) in which the condition worsen from the foot towards the upper knee. Leg ulceration (7/90) was also found to be common. Common concomitant diseases accompanied with the patients were cardiovascular diseases (45/90) while all others were found to be less in number (Table 4).

From the total number of patients selected for the study only about 38% (42 patients) had their wounds taken for culture examination. Among the performed culture test of the patient's dermatophytes (55%), *Staphylococcus aureus* (38%) were more common (Figure 5). Single culture could also identify the presence of more than one organism where again dermatophytes and *Staphylococcus aureus* were common.²⁵⁻²⁹

Risk factors persisting in the patients were with recurrent episodes of cellulitis (25/90). They had an episodal attack of 1 to 2 times which were

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Figure 1: Cellulitis in right leg with plaques.



Figure 2: Cellulitis in leg with edematous plaques.



Figure 3: Cellulitis with skin eruptions in Right thigh.

Table 1: Preceding causes of cellulitis in the patients were as follows.

Portals	No: of patients	% of patients
Leg ulceration	7	7.7%
Diabetic foot ulcer	5	5.5%
Blisters of foot	2	2.2%
Severe lymphoedema	1	1.1%
Local injury (minor, non-penetrating)	10	11.1%
Eczema of foot/ leg	9	10%
Tinea pedis/ toe web maceration	13	14.4%

Table 2: Demographic details of patients.

Factors	Case patients (n=90)
Median age	62.5 ± 3.5 yrs
Sex:	
Male	42
Female	48
Concomitant diseases of patients:	
Gastrointestinal	9 (10%)
Psychiatric	8 (8.8%)
Pulmonary	10 (11.1%)
Cardiovascular	45 (50%)
Others	18 (20%)

Table 3: Commonly found microorganism causing cellulitis in the patients.

Microorganism	Commonly occurring body site	No of patients affected by the organism	% of patients
<i>Staphylococcus aureus</i> (found with other organisms too in same individual)	Usually occurring in any parts of the body	38	42.2%
β -hemolytic streptococci (group A, B, C, G)	Parts of the foot and inner thighs	36	40%
<i>Dermatophytes</i> (found with other organisms too in same individual)	Foot, toe webs, toe nails, sole of foot	55	61.1%
Gram negative bacilli	Toe webs	18	20%

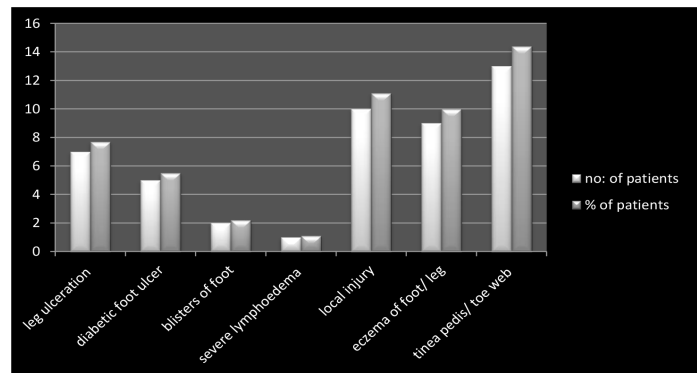


Figure 4: Predisposing causes of cellulitis in pictorial representation.

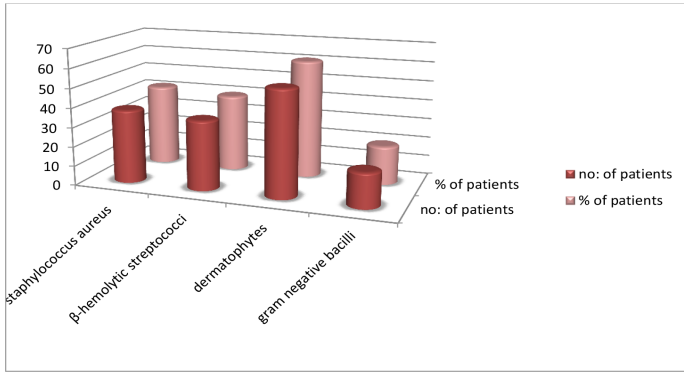


Figure 5: Analysis of Causative organisms causing cellulitis.

Table 4: Risk factors associated with cellulitis in the patients group.

Factors	No: of patients	% of patients
Obesity (BMI ≥ 30)	5	5.5%
BMI > 25 and < 30	25	27.7%
Diabetes mellitus	11	12.2%
Smoking	15	16.6%
Skin disease	22	24.4%
Persisting history of the following conditions		
Cellulitis with		
• Leg ulcer	25	27.7%
• Chronic leg edema	10	11.1%
• Leg lesions	3	3.3%
• Dry skin	8	8.8%
• Dermatophytes	4	4.4%
• Bacterial microorganisms (<i>S. aureus</i> and <i>β Hemolytic streptococci</i>) in foot and toe	30	33.3%
• Dermatitis	12	13.3%
• Varicose veins	18	20%
• Toe nail dystrophy	52	57.7%
• Abnormalities of sole	45	50%

Table 5: Details on Risk factors associated with the sides of the limbs in the patients.

Risk factors of the patients	Found in Ipsilateral limbs	Found in Contralateral limbs	Found in both limbs
History of patients:			
Leg ulcer	7	1	3
Chronic leg edema	5	0	20
Cellulitis	33	4	2
Leg surgery	8	0	3
Current conditions along with cellulitis			
Statis dermatitis	5	1	3
Varicose veins	4	3	10
Dry skin	6	0	20
Leg lesion	10	2	5
Abnormalities of the sole	7	1	23

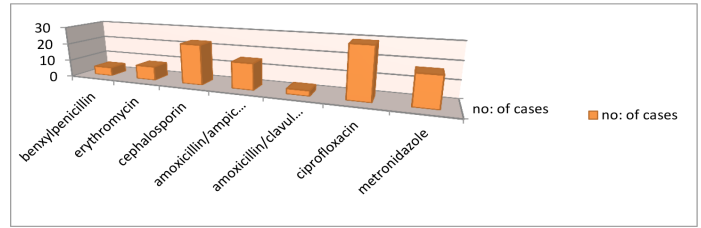


Figure 6: Antibiotic therapy observed on the patients.

Table 6: Antibiotic therapy followed in the patients initially.

Antibiotics	Monotherapy n=90	With Benzylpenicillin	With Erythromycin	With Amoxicillin/ Ampicillin	With Metronidazole	With Gentamicin
Benzylpenicillin	5	XXX	(2)	0	(1)	(1)
Erythromycin	8	(2)	XXX	0	0	0
Cephalosporin	23	0	0	0	0	0
Amoxicillin/Ampicillin	15	0	0	XXX	(1)	0
Amoxicillin/ Clavulanic acid	3	0	0	0	0	0
Ciprofloxacin	29	0	0	0	0	0
Metronidazole	17	0	0	(1)	XXX	0

unpreventable due to antibiotic resistance in them.³⁰⁻³³ Resistance towards microorganisms like *staphylococcus aureus* and β -hemolytic streptococci (30/90) initiating from the foot or toe and their rising upwards were also a risk factor towards ascending limb cellulitis.

Dermatophytes (20/90) and leg ulcer (30/90) were also prominent etiological and risk factor in most of the patients examined upon.^{34,29} Lesions and dry skin due to excessive sunlight exposure and other conditions were found to be common. Diabetes, smoking, abnormalities of the sole, toenail dystrophy etc, were the other factors found towards contributing to present condition. Skin and vascular abnormalities condition like stasis dermatitis (12), dry skin (6), varicose vein (18) etc, were also found in a good number as contributing conditions.

Common therapy was with Cephalosporin (23), Ciprofloxacin (29) etc, both natural and synthetic penicillins were also found to be given in a good number. Those allergic with Benzylpenicillin were preferred with erythromycins. Long term morbidities or frequent conditions could be treated with Benzylpenicillin based on literature studies.³⁵⁻³⁶

CONCLUSION

From the study it could be concluded that the main contributing etiological conditions towards cellulitis were streptococci, lymphoedema, infection due to tinea pedis, etc, which all when left untreated could lead to repeated episodes of cellulitis and morbidity of it. Benzylpenicillin and other penicillins would be suggested for long term use or prophylaxis for cellulitis due to its improving results when compared to other drugs. Culture examination and prescribing of required narrow line antibiotics would lay down to decreased resistance towards antibiotics unnecessarily.

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CONFLICT OF INTEREST

The authors declare no conflicts of interest concerning the content of this case report.

ABBREVIATIONS

BMI: Body mass index; **S. aureus:** Staphylococcus aureus.

SUMMARY

The study carried out upon cellulitis patients highlights the etiological causes, main causative organisms and therapy followed in them. Penicillin was found to be a good antibiotic for cellulitis patients, which even prevents recurrent attacks of cellulitis. Ascending cellulitis of the limbs was found to be in common, where diabetes condition was a prior etiological factor for most of the cases. Pharmacists role mainly involved in culturing of the wound section which is in most cases neglected, being a common factor for antibiotic resistance. Other points could be in counseling of the patients and making them take the precaution steps in advance.

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