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STUDYOFRISKFACTORS,CLINICALPRESENTATIONAND MANAGEMENT OF CELLULITIS LOWER LIMB IN A RURAL AREA OF TAMILNADU

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ABSTRACT :

Background: Diabetics are the most susceptible population for the lower limb cellulitis primarily because of the fact they have more incidence of foot ulcers (due to the neuropathy and vasculopathy which ensues in the form of sensory loss and poor distal circulation)and also because they are immunocompromised. Poor glycemic control aids the growth of the organism in the ulcers they develop and eventually results up in the cellulitis. Yet, there is a significant section of population who are non- diabetics, are also more prone for the development of lower limb cellulitis and its complications.
Methods: This study, principally an prospective case series study, includes 100 patients who got admitted for lower limb cellulitis and its complications, underallsurgicalunitsofsreemookambika college of medical sciences asthestudy group.Allthe100patientshavebeenstudiedsystematicallywhich started with careful analytical history taking.Categorizingthepatientsaccordingtotheagegroup,andinourstudy we have included individuals of age group 13-90 years as our study group, among these the incidence of the disease in each of six decades have been recorded.
ResultsIn our study, we have observed than 94% of the patients had unilateral lower limb involvement and 14% of the patients had bilateral lower limb involvement, but according to the literature the incidence of bilateral lower limb involvement is extremely rare. In our study, cases in whom both lower limb are involved include the patients with edema going for cellulitis like patients with chronic kidney disease and cardiac failure, patients with history of barefoot walking with web space infections, and few patients with unknown etiology.
Conclusion: As the age increases, the incidence of cellulitis increases and the severity of disease as well.Maleshavethehigherincidenceofcellulitiscomparedtofemales.As our study group is principally comprising of surgical inpatients, higher grades of cellulitis are more common.In this study, diabetes mellitus, has been the most common cause (overall)ofthecellulitisinthepatientsfollowedbyinfectedtraumatic ulcer and post bite cellulitis.**Keywords:**Celluluitis, Diabetes Mellitus

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INTRODUCTION:

Cellulitis is a condition which is characterized by inflammation of connective tissue of the skin with severe involvement of dermal and subcutaneous layers. It is principally a bacterial infection, the organism can be either the normal skin flora or an exogenous one. It involves mostly the skin which is more prone for breaks, cracks, blisters, ulcerations, cuts, bite wounds or hospital related injuries like surgical wounds or the intravenous cannulae. Lower limbs are the most commonly involved sites as the skin over there is much susceptible for the injuries mentioned.

As commonly known, diabetics are the most susceptible population for the lower limb cellulitis primarily because of the fact they have more incidence of foot ulcers (due to the neuropathy and vasculopathy which ensues in the form of sensory loss and poor distal circulation)and also because they are immunocompromised. Poor glycemic control aids the growth of the organism in the ulcers they develop and eventually results up in the cellulitis. Yet, there is a significant section of population who are non- diabetics, are also more prone for the development of lower limb cellulitis and its complications.

Early cellulitis can be managed in out-patient unit with oral antibiotics, analgesics and treating the primary cause. But cellulitis of highergrades, with its complications like blisters, myositis, fasciitis needs hospital admission, parenteral antibiotics and surgical management.

AIMANDOBJECTIVESOFTHESTUDY:

- Tostudy theageandsex distribution of thepatientswithlower limb cellulitis
- Toanalysevariouscauses/riskfactorsforlowerlimbcellulits
- Tostudyvariousgradesofpresentationoflowerlimbcellulitis
- Tostudythespectrumofinfectiousagentsresponsibleandtheir sensitivity pattern
- Tostudythecirculatorychangesinthelowerlimbaffectedwith cellulitis
- Tostudytheunderlyingboneinvolvement,ifany
- Toanalysethevariousmodesoftreatmentemployed
- Tostudytheoutcomeofthetreatmentinthestudygroup
- To discuss the management of the resultant wound after treating the condition.

MATERIALSANDMETHODS:

This study, principally an prospective case series study, includes 100 patients who got admitted for lower limb cellulitis and its complications, underallsurgicalunitsofsreemookambika college of medical sciences asthestudy group.

Allthe100patientshavebeenstudiedsystematicallywhich started with careful analytical history taking.Categorizingthepatientsaccordingtotheagegroup,andinourstudy we have included individuals of age group 13-90 years as our study group, among these the

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incidence of the disease in each of six decades have been recorded.

Categorizing the patients according to the Gender, to study the incidence of the disease in each sex.History regarding the presenting illness, pain, reddening of the region, swelling of the local part, any ulcerations, blister/ bleb formation.Whetherheorsheisawareofthecauseforthecellulitis,If he or she is not aware of the cause, eliciting historyregarding any trivial trauma, unknown bites, history of bare foot walking is considered.Whetherthereishistoryofanysuchillnesspreviouslyandifyeshow it was managed then, principally to study the incidence of recurrent cellulitis.Whetherthepatientisasmokeroranuseroftobaccoinotherforms.

Whetherthe patient is having any comorbid medical illness, (hypertension, epilepsy, cardiac illness, chronic kidney disease, chronic liver disease, bronchial asthma).In the clinical examination, general examination of the patient for the presence of the anemia and jaundice has been studied and the nutritional and hydration status of the patient has been recorded.

Thoroughexamination of the cardiac system, respiratory systemdone and the findings recorded. Abdominal examinationand central nervous system have also examined. Vital parameters- pulse rate, blood pressure, respiratory rate and temperature have been recorded for all the patients.

Regarding the examination of the lower limb, the limb is studied regarding the Extentofcellulitis,Blisters/blebs,Presenceofsubcutaneousabscesses,Presenceofulcerations,Tobestudiedregardingetiology,Presenceofserousorpurulentdischarge,Statusofhealing,Depthofinvolvement.Careful examination for anyweb space infections,cracks, breaks or cuts,Involvement of the deeper tissue like muscles, fascia or bones as assessed by the inspection and palpation,Distalpulsationsandcapillaryrefilltime,Carefulassessmentforthethreatofcompartmentsyndrome in cases of extensive or circumferential cellulitis, with its classical parameters

Statistical analysis was done using the statistical package for social sciences (SPSS).Different statistical methods were used as appropriate. Mean ± SD was determined for quantitative data and frequency for categorical variables. The independent t- test was performed on all continuous variables. The normal distribution data was checked before any t-test. The Chi-Square test was used to analyze group difference for categorical variables A p- value < 0.05 was consideredsignificant.

RESULTS:

Totally100suchpatientswereincludedin the study and the result being analysed as follows.

1. AGEDISTRIBUTION

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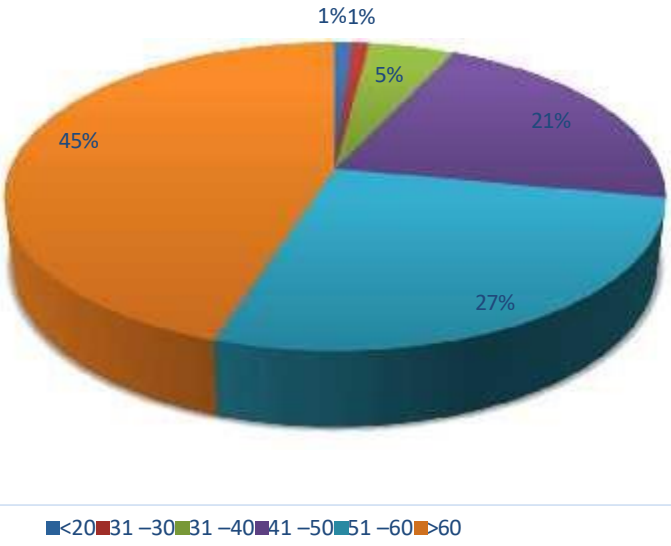
Sl.No.	Age Group	Noofcases
1.	<20	1
2.	31–30	1
3.	31–40	5
4.	41–50	21
5.	51–60	27
6.	>60	45

AGEDISTRIBUTION



Out of the 100 patients studied 1 belonged to <20 years and 21-30 years, 5 belonged to the age group 31-40years, 21 belonged to 41-50 years, 27 belonged to 51-60 years and 45 were from the age group more than 60 years from which it is evident that as the age increases, the incidence of cellulitis increases.

GRADEOFCELLULITIS

Grading of cellulitis taken in this studyhas been done as per CREST criteria. The study is being conducted in the patients who need hospital admissionforcellulitis,itcoversprincipallythepatientsbelongingtograde s II, III and IV

Sl.No.	Grade	No.ofcases
1.	II	24
2.	III	67
3.	IV	9

Out of the 100 patients studied maximum number of individuals i.e., 67

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individuals belong to the grade III cellulitis, whereas 24 patients and 9 patients belongs to grade II and IV respectively.

2. LIMBINVOLVED

In our study, we have observed that 94 patients had unilateral lower limb involvement and 6 patients had bilateral lower limb involvement, patients with edema going for cellulitis like patients with CKD and cardiac failure, patients with history of barefoot walking with web space infections were candidates who presented with involvement of both lower limbs.

LIMB INVOLVED

Unilateral	94
Bilateral	6

THECAUSEOFCELLULITIS:

Various causes werestudied forbeing responsibleforthe cellulitis in the study group such as web space infections, diabetes mellitus, bites, infected traumatic ulcers, infected venous ulcers, cellulitis imposing on the lymphedematous limb and in the edematous limb of the renal failure and cardiacfailurepatients,andinfewpatientsexactcauseofthecellulitiscould not be made. The result can be tabled as follows

CAUSEOFCELLULITIS

Cause	No.ofPatients
Diabetesmellitus	44
Infectedtraumaticwounds	13
Chronickidneydisease	11
Bites	10
Webspaceinfections	7
Edemaincardiacfailure	5
Lymphedema	3
Unknown	3

Unknown	3

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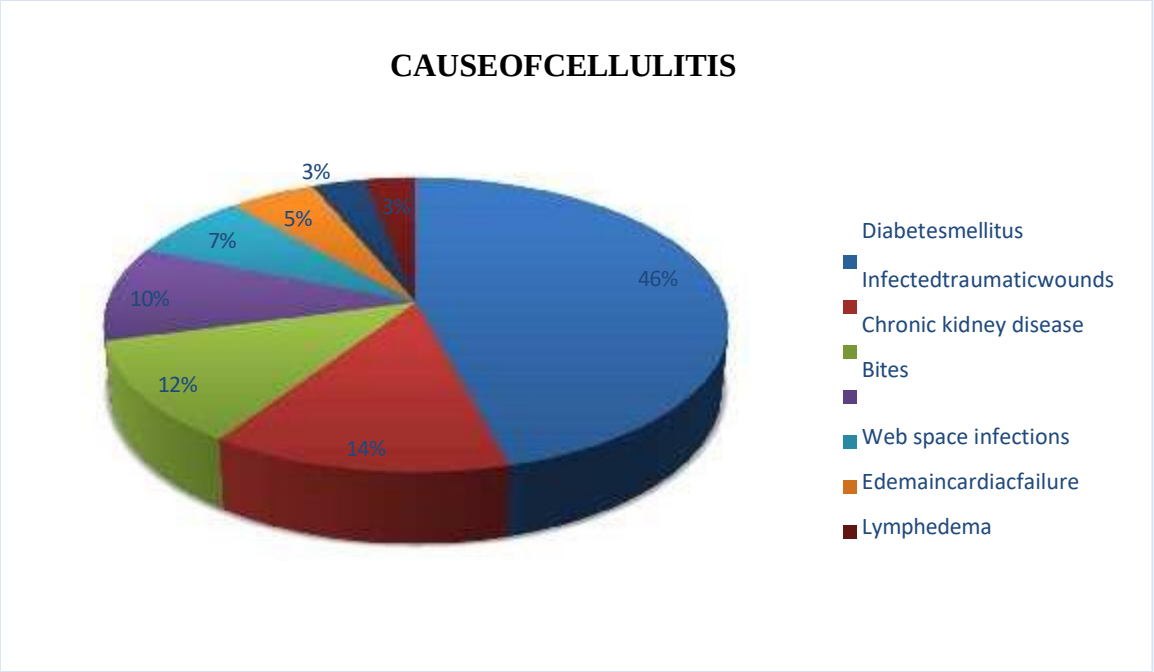

The chart shows that diabetes mellitus is responsible for most cases of cellulitis in the study group, followed by the traumatic infected ulcers and post bite cellulitis. It is to be noted that cellulitis superimposing on the lower limb edema occurring in chronic kidney disease, lymphedema and cardiac failure constitutes a considerable proportion as the etiology for the cellulitis in our study group. Also in about 3% individuals the exact cause responsible for the cellulitis is unknown.

MICRO-ORGANISMSCULTURED

Sl.No.	Organisms	No.ofPatients
1.	Staphylococcusaureus	37
2.	StreptococcusSP	26
3.	KlebsiellaSP	21
4.	ProteusSP	17
5.	E-Coli	7
6.	Pseudomonas SP	6
7.	No Growth	31

From the table and chart above we can see it is Staphylococcus and streptococcus SP were the predominant organisms responsible for the cellulitis in the study group other organisms responsible include klebsiclla SP, proteusSP, pseudomonas SP, Ecoil.

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SENSITIVEDRUGS

Sl.No.	Antibiotic	No.ofPatients
1.	Piperacillin–Tazobactum	64
2.	Cephalosporingroup	39
3.	Imipenam	54
4.	Amikacin	18
5.	Ciprofloxacin	18
6.	Cloxacillin	7
7.	Ampicillin	6

CIRCULATORYCHANGESOBSERVED

Sl.No.	Changesobserved	No.ofPatients
1.	Noflowincalfvessels	1
2.	Monophasicflowinperoneal artery	4
3.	Monophasicflowinposteriortibial artery	6
4.	Venousinsufficiency	4
5.	Deepveinthrombosis	0

Incasesofdiabetesmellitus,biteinjuriesespeciallyincasesofsnake bite at site of bite the toes or the metatarsals under neath showed lytic changes, or destruction due to the gangrenous changes otherwise no other bony changes were noticed in the patients.

Treatment of the individuals varied according to the severity of the disease, some patients were managed conservatively with parenteral antibiotics, the anti-inflammatory agents and limb elevation so as to reduce the associated edema, while majority of the others required surgical wound debridement with or without decompression of the fascial compartment by a fasciotomy. Very few patients needed amputation of the limb.

TREATMENT

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Sl.No.	Management	No.ofcases
1.	Conservative	13
2.	Wounddebridement	27
3.	Wound debridement fasciotomy	48
4.	Amputation	12

The outcome of the treatment done has been studied, whether it is universal, or whether patient remained with a wound that needs, further managements or patient had some residual deformity or the patient had expired because of the comorbidities complicating the disease.

OUTCOME:

Sl.No.	Outcome	No.ofcases
1.	Uneventful	27
2.	Postprocedurewound	61
3.	Disability	11
4.	Death	1

MANAGEMENTOFTHE WOUND

61 patients in the study group with resultant wound were managed ultimately with either a split thickness or allowed to heal by secondary intention.

MANAGEMENTOFTHEWOUND

Sl. No.	Managementofthewound	Noofcases	Percentage
1.	Splitskingrafting	17	28
2.	Healing by secondary intention	44	72

DISCUSSION:

Our study, a prospective case series study, included 100 patients who got admitted for

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lower limb cellulitis and its complications, under all surgical units of sreemookambika institute of medical sciences during the span of one year and eight months as the study group. The results observed from the study are discussed here,
Regarding the age distribution, it is evident that as the age increases, the incidence of cellulitis increases, and it has also been studied that the severity of the disease increases with the age, both the inferences correlate, with the literature. This is being explained by the comparatively poorer immune response and the associated comorbidities in the elderly population.

There were 85% males and 15% females, among the 100 patients and this slightly increased male preponderance is supported by the literature.
Out of the 100 patients studied maximum number of individuals, i.e 67 individuals belong to the grade III cellulitis, whereas 24 patients and 9 patients belong to grade II and IV respectively. One consideration to be offered here is, the study is being conducted in the inpatients of the surgical wards, and most early forms of cellulitis are managed on the outpatient basis, our study tend to project the increased incidence of severe forms of cellulitis.

In our study, we have observed than 94% of the patients had unilateral lower limb involvement and 14% of the patients had bilateral lower limb involvement, but according to the literature the incidence of bilateral lower limb involvement is extremely rare. In our study, cases in whom both lower limb are involved include the patients with edema going for cellulitis like patients with chronic kidney disease and cardiac failure, patients with history of barefoot walking with web space infections, and few patients with unknown etiology.
In our study, incidence wise diabetes mellitus is responsible for most cases of cellulitis in the study group, followed by the traumatic ulcers which have been infected and post bite cellulitis. It is to be noted that cellulitis superimposing on the lower limb edema occurring in chronic kidney disease, lymphedema and cardiac failure constitutes a considerable proportion as the etiology for the cellulitis in our study group. In about 3 individuals the exact cause of cellulitis is unknown.

Of the 100 Patients studied in 47 patients the infection is mono microbial and in 22 patients the infection is poly microbial and in about 31 patients no growth has been cultured. Staphylococcus SP and streptococcus SP were the predominant organisms responsible for the cellulitis in the study group, which correlates with literature. Other organisms observed in the study group include Klebsiella SP, Proteus SP, pseudomonas SP and E coli. The sensitivity pattern studied for the organisms cultured showed piperacillin tazobactum and imipenam were the two groups of antibiotics which tend to have the maximumsensitivity for the common organismsCausingthe cellulitis. Cephalosporin group of antibiotics, amikacin, ciprofloxacin and gentamycin are found to be effective in good proportion of individuals.

All the 100 patients in the study group were done Doppler evaluation of the arterial and venous systern to study the circulatory change, associated with the cellulitis of the lower limb. We noticed 4% of the patients showed monophasic flow in peroneal artery and 6% had monophasic flow in posterior tibial artery and venous insufficiency has been noticed in 4% of individuals. 1% of the patients had no flow in the calf vessels and no patients was seen to have deep venous thrombosis.

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Bony changes were noticed in the 12% patients, with cellulitis of the concerned limb in phalanges or the metatarsals in cases of diabetes mellitus.
Regarding the treatment, we have noticed that around 75 patients in the study group required surgical debridement, 48 of them required decompression of the some muscular compartment by means of a fasciotomy. 13% of patients with less severe form of cellulitis were managed conservatively with parenteral antibiotics, the anti-inflammatory agents and limb elevation so as to reduce the associated edema 12% of individuals in the study group required amputation, because of the loss of almost all viable soft tissues and the possibility of sepsis syndrome because of the badly infected limb.

Regarding the outcome of the management, almost all the patientsmanaged conservatively had uneventful recovery, around 61% of thepatients had the residual wound that needed further attention, 11% of the patients remained with disability (amputation being done), and around 1% of the patient died because of the comorbidities complicating the illness, especially diabetes mellitus.

In 28% of the patients, resultant wounds persisted as the raw area after preparing the same, they were managed with split skin grafting, and remaining 72% of the wounds were allowed to heal by secondary intention.

CONCLUSION:

As the age increases, the incidence of cellulitis increases and the severity of disease as well.Maleshavethehigherincidenceofcellulitiscomparedtofemales.As our study group is principally comprising of surgical inpatients, higher grades of cellulitis are more common.In this study, diabetes mellitus, has been the most common cause (overall)ofthecellulitisinthepatientsfollowedbyinfectedtraumatic ulcer and post bite cellulitis.Staphylococcus SP and streptococcus SP are the common organisms responsibleforthecellulitisinthestudygroup,whichcorrelates,with the literature.

Piperacillin tazobactum and imipenam are the most sensitive antibioticsinmajorityofcases,thisshowstheemergingresistancefor the commonly used antibiotics (ampicillin, cloxacillin and cephalosporins).Circulatory changes in the form of altered arterial flow pattern has been noticed in 11% of the individuals an in around 4% of the individuals venous reflux has been noticed.Nopatientinthestudyhashaddeepvenous thrombosis.12%ofthepatientsshowedunderlyinglyticchangesin bone.13% of patients were managed conservatively.75% patients in the studygrouprequiredsurgicaldebridement,48%inthisgrouprequired fasciotomy, and 12% of individuals in the study group required amputation.All the patients managed conservatively had an uneventful recovery and 61% of the patients had the residual wound that needed further attention 11%of thepatients remained with disability, and 1% of the studygrouppatientexpiredbecauseofthecomorbiditiescomplicating the illness.

Majority of the resultant wounds healed by secondary intention 72% rest were managed by split skin grafting 28%.This study on lower limb cellulitis found that diabetes mellitus is the most common cause besides traumatic infected ulcer, post bite cellulitis, chronic kidney disease also contributing. Early diabetes mellitus screeningand good glycaemic control prevent the incidence of cellulitis lower limb.Educating thepeopleregarding

properfootcare,foot wearusagecan prevent cellulitis occurring due to web space infections, cracks in the sole, trivial trauma in the foot.Hospital admission for the severe forms of cellulitis, appropriate and emergency surgical intervention as needed, employing culture directed antibiotics, managing the comorbidities can salvage the limbs and lives.

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