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Predisposing Factors, Complications and Management of Cellulitis in Warangal Region

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ABSTRACT

Objectives: To determine the predisposing factors, complications and management of cellulitis in Warangal region.

Design: Retrospective observational study.

Background: Cellulitis is the most common skin and soft tissue infection. It indicates as an area of skin erythema, edema and warmth. The common risk factors are Diabetes mellitus, Deep Vein Thrombosis, trauma, smoking and varicose veins. Cellulitis can worsen into necrotizing fasciitis, osteomyelitis, and septic shock. Since most cases of cellulitis are caused by staphylococcal & streptococcal species, beta-lactam antibiotics and penicillins are the drugs of choice.

Materials and Methods: The study included 102 patients with cellulitis. The data was obtained based on review of patient's records, case sheets, direct communication with patients, collecting demographic details, past medical & medication history and social habits.

Results: Among the study population, mean age was found to be 55.9 years. The common predisposing factors leading to cellulitis were diabetes mellitus (45 %), Deep Vein Thrombosis (10.7%), trauma (3.9 %) and varicose veins (18.6 %). Cellulitis led to complications like edema (30.3 %), sepsis (11.7%) and lymphoedema (5.8 %).

Conclusion: The most common predisposing factors of cellulitis are Diabetes mellitus, Deep Vein Thrombosis, trauma, smoking and varicose veins. Complications of cellulitis were edema, sepsis and lymphoedema. Most of the patients were prescribed with metronidazole, linezolid followed by penicillins. Pharmacist play a vital role in educating patients about usage of antibiotics, wound care and educating nurse and medical staff about antibiotic policies.

Keywords: Cellulitis, Complications, Diabetes mellitus, Deep Vein Thrombosis, Risk factors.

INTRODUCTION

Cellulitis is the most common skin and soft tissue infection. It is an inflammatory skin condition with an infectious origin which develops as a result of bacterial entry via breaches in the skin barrier involving the dermis and subcutaneous tissues [1, 2]. It is a medical condition with severity varying from mild to life threatening disease. Common pathogenic bacteria include Streptococcus aureus, Klebsiella pneumonia, and Streptococcus agalactiae [1]. Most commonly, cellulitis involves lower extremities but may involve any parts of the body. The diagnosis of cellulitis is generally based on the morphologic features of the lesion and the clinical setting characterized by erythema, swelling, warmth, and pain and may present with or without purulence [3].

The most common risk factors are Diabetes mellitus, Hypertension, Deep Vein Thrombosis (DVT), trauma, smoking and varicose veins. Cellulitis can worsen into necrotizing fasciitis, osteomyelitis, and septic shock. The risk is also higher in people who are overweight or have diabetes, problems with the circulation of lymph or blood, or have venous insufficiency (deep vein thrombosis). Previous cellulitis is considered to be a risk factor too. The greater frequency of bacterial infections (cellulitis) in diabetic patients is caused by the hyperglycemic environment that favors immune dysfunction (e.g., damage to the neutrophil function, depression of the antioxidant system, and humoral immunity), micro-

and macro-angiopathies, neuropathy, and decrease in the antibacterial activity of urine [4].

Patients with varicose veins suffering from symptoms such as bloating, redness of the skin, pain, and itchy calves may give difficulty in identifying early signs of infection, leading to delayed treatment of cellulitis that is more severe [1]. Additionally, poor circulation in the lower limbs and lymphatic reflux will increase the risk of infection [1].

The mechanism of increased susceptibility of infections in smokers is multifactorial. Cigarette smoking is associated with a variety of alterations in cellular and humoral immune system function. These alterations include a decreased level of circulating immunoglobulins, depression of antibody responses to certain antigens, decrease in CD4+ lymphocyte counts, increase in CD8+ lymphocyte counts, depressed phagocyte activity and decreased release of proinflammatory cytokines.

Patients with cellulitis often receive antibiotic treatment. Since most cases of cellulitis are caused by staphylococcal and streptococcal species, beta-lactam antibiotics with activity against penicillinase-producing S. aureus are the drugs of choice. Cefazolin, a first-generation cephalosporin, nafcillin, an antistaphylococcal synthetic penicillin and ceftriaxone, a third-generation cephalosporin, are all initial treatment options. If methicillin-resistant S. aureus (MRSA) is suspected or the patient is highly allergic to penicillin, then vancomycin and linezolid are the drugs of choice and have similar cure rates [6]. Mild cases can be treated on an outpatient basis with oral antimicrobials, but more severe infections require intravenous (IV) antibiotics and hospitalizations. Hospitalization is often indicated for patients who have failed outpatient treatment or for patients with severe systemic symptoms [7].

MATERIALS AND METHODS:

A Retrospective observational study was conducted in an inpatient Department of General Surgery and General Medicine at 3 hospitals in and around Warangal region for a period of 4 months. The study included 102 patients diagnosed with cellulitis. Among 102 patients observed, data was obtained based on review of patient's records, case sheets, direct communication with patients, collecting demographic details, past medical & medication history and social habits.

RESULTS:

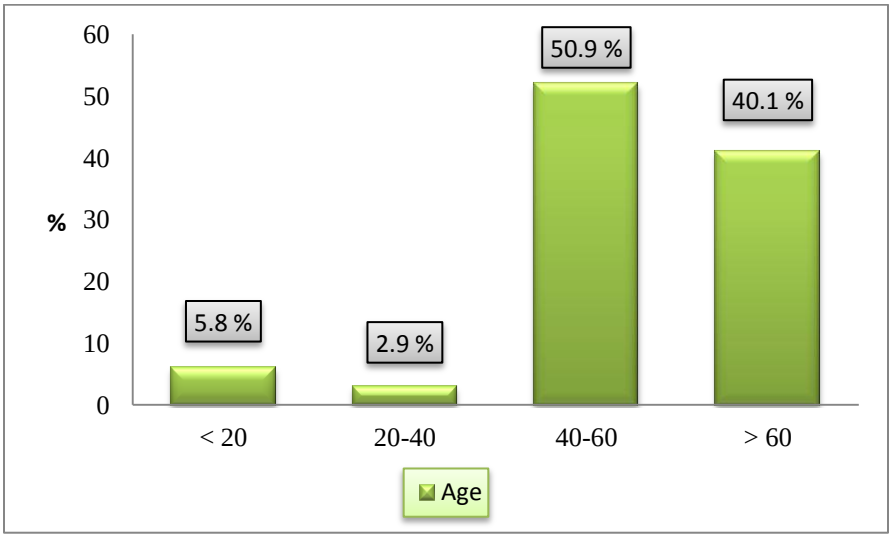

Figure 1: Age wise distribution

Among 102 patients, the mean age was found to be 55.9 years (n=102). The highest prevalence was seen in the age group 40-60 years and 61.7 % male (n=63) and 38.2 % female (n=39) were found.

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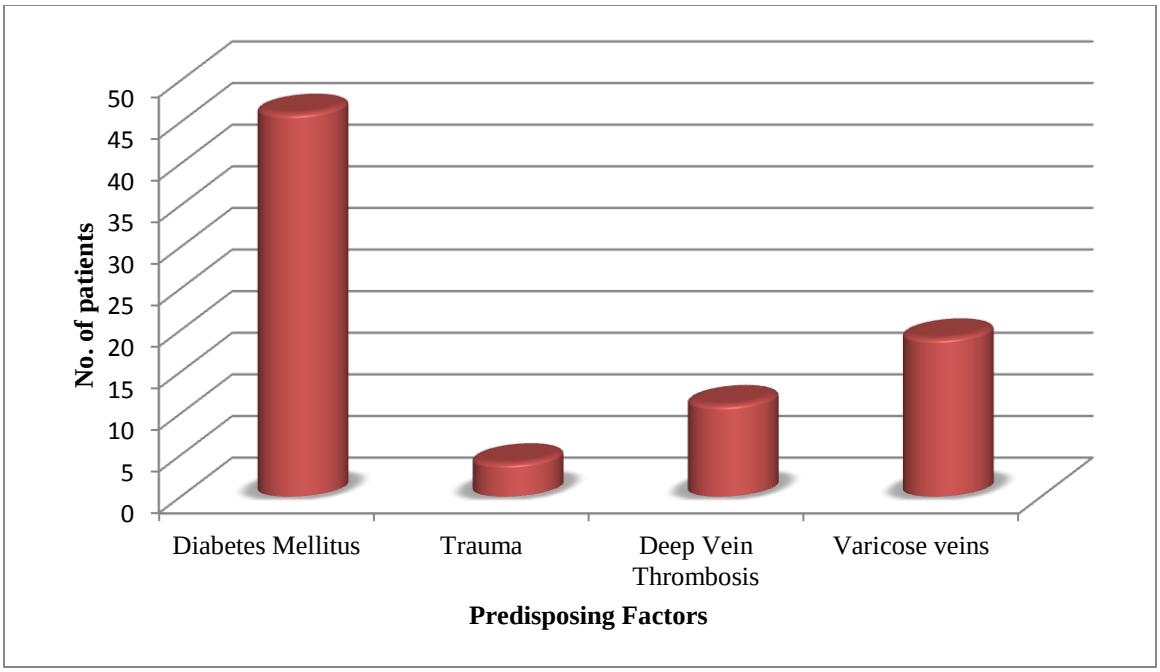

Figure 3: Predisposing factors causing cellulitis

Among 102 patients, the most common predisposing factors leading to cellulitis were found to be suffering with diabetes mellitus 45 %, 10.7 % had deep vein thrombosis, 3.9 % had trauma and 18.6 % had varicose veins.

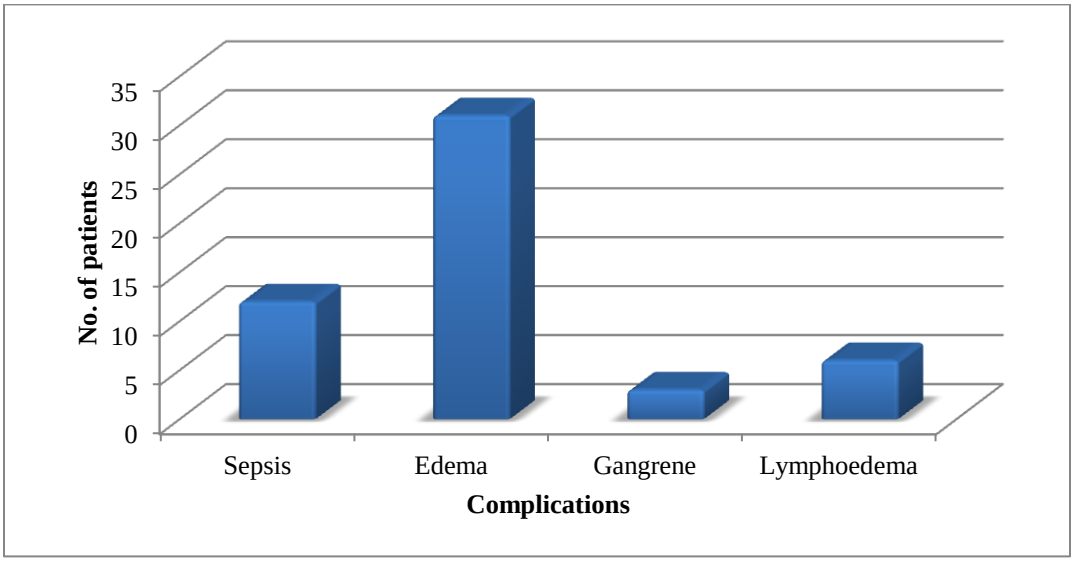

Figure 4: Complications of Cellulitis

Among our study population, cellulitis complications were edema 30.3 %, sepsis 11.7 %, lymphoedema 5.8 % followed by gangrene 2.9 %.

Table1: Anatomical location of cellulitis

S.No	Site of infection	%
1	Upper Limbs	2.9 %
2	Lower Limbs	91.1 %
3	Genital	5.8 %

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In our study the most common site of involvement is lower limb 91.1 % (n=93), upper 31.4 % (n=3) limbs and genital area is 5.8 % (n=6).

Table2: Staging of cellulitis [8]

S.No	Stages	Clinical description	No. of patients	%
1	Stage 1	Cellulitis without abscess or skin necrosis	84	82.3 %
2	Stage 2	Cellulitis with either localized abscess or skin necrosis	10	9.8 %
3	Stage 3	Necrotizing fasciitis without myonecrosis	8	7.8 %
4	Stage 4	Necrotizing fasciitis with myonecrosis	0	0 %

Among cellulitis patients 82.3 % (n=84) were found to have stage 1, 9.8 % (n=10) were in stage 2 and 7.8 % (n=8) were found to have Stage 3 cellulitis.

Table 3: Type of surgery for cellulitis

S.no	Type of surgery	%
1	Fasciotomy	27.4 %
2	Debridement	13.7 %
3	Amputation	0 %

Fasciotomy is a surgical procedure where the fascia is removed to relieve pressure to treat the loss of blood circulation to an area of tissue or muscle. Debridement is the removal of dead, damage or infected tissue to improve circulation. Amputation is the surgical removal of limb. Among the study population 27.4 % has undergone fasciotomy and 13.7 % has undergone debridement surgery.

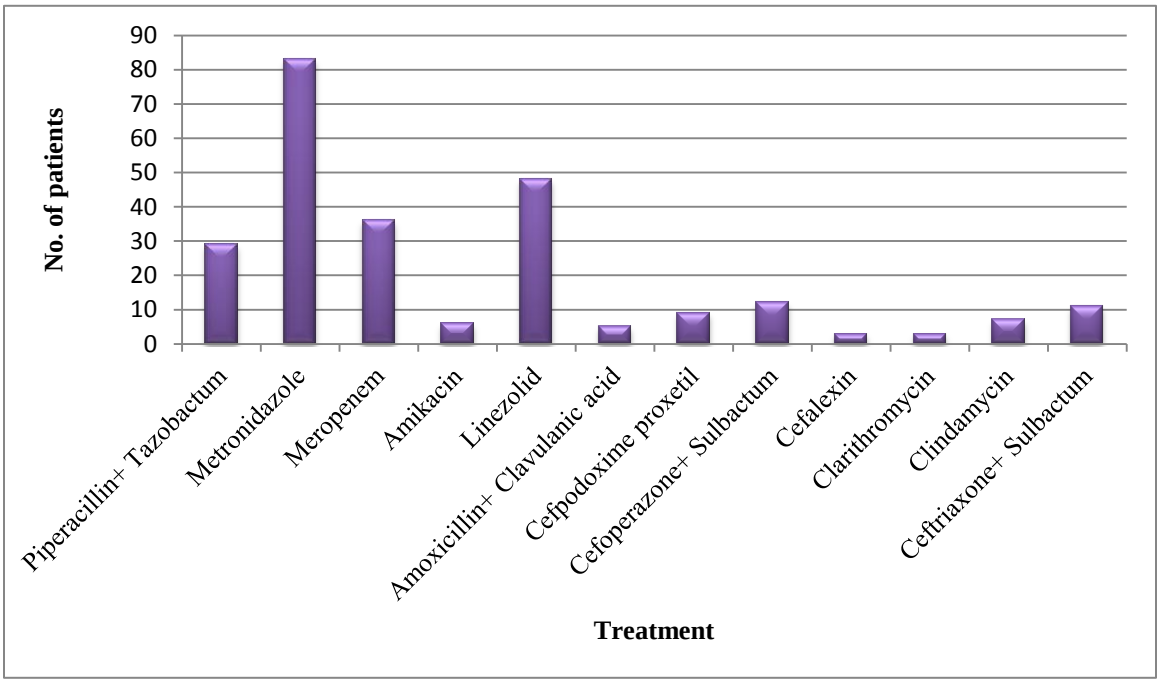

Figure 5: Antimicrobial therapy for cellulitis

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Among the study population metronidazole (n=83) was highly prescribed followed by linezolid (n=48) and meropenem (n=36).

DISCUSSION:

Age: In present study population the mean age was found to be 55.9 years (n=102) which is similar to study conducted by *Lauren Strazzula et al.,* (2014) in which the mean age was found to be 56.20 years in patients with cellulitis [9].

Gender: According to Jeffrey Cannon *et al.,* (2018), cellulitis was observed in 58 % male and 42 % female. Similarly in our study 61.7 % male and 38.2 % female were diagnosed with cellulitis [10].

Diabetes Mellitus: Among the study population 45 % (n=46) were found to be suffering with diabetes mellitus which is similar to study conducted by Chun-Yuan Lee *et al.,* (2015) in which 25.9 % are suffering from Diabetes [11].

DVT: Among the study population 10.7 % (n=11) were found to have Deep Vein Thrombosis which is similar to study conducted by Michael J Maze *et al.,* (2013) in which 17 % (n=34) were found to have DVT [12].

Trauma: According to our study, 3.9 % (n=4) were found to have trauma in their past medical history which is contrast to study conducted by K. Mistry *et al.,* (2016) were 20 % (n=24) had history of trauma [13].

Varicose veins: According to our study population 18.6 % (n=19) were found to have varicose veins which is contrast to study conducted by Jeffrey Cannon *et al.,* (2018) in which 2.3 % were found to have varicose veins [10].

Edema: According to Julio Collazos *et al.,* (2018) 27.7 % cellulitis patients were found to develop edema. Similarly in our study 30.3 % were found to develop edema [14].

Sepsis: According to Julio Collazos *et al.,* (2018) 10.7 % cellulitis patients were found to progress to sepsis. Similarly in our study 11.7 % were found to progress sepsis [14].

Lymphoedema: According to our study, 5.8 % (n=6) were found to develop lymphoedema which in contrast to study conducted by Jeffrey Cannon *et al.,* (2018) where 0.3 % were found to develop lymphoedema [10].

Fasciotomy & Debridement: According to Gopal S., Santosh M. P. (2017), a study on analysis of cellulitis in diabetic lower limb has shown that 10.3 % has undergone fasciotomy and 61.5 % has undergone debridement surgery as initial treatment of cellulitis [8]. In our study 27.4 % has undergone fasciotomy and 13.7 % has undergone debridement surgery.

Site of infection: In our study, the most common site of involvement is lower 91.1 % (n=93), upper 31.4 % (n=3) extremities and genital area is 5.8 % (n=6). Similarly in a study conducted by Julio Collazos *et al.,* (2018) and Mohammad Nassaji *et al.,* (2016), the most common site of involvement were the lower (74.8%), upper (13.5%) extremities and genitals is 2 % [2, 14].

Stages of cellulitis: In our study, 82.3 % were found to have stage 1, 9.8 % were in stage 2 and 7.8 % were found to have Stage 3 cellulitis. Accordingly in a study conducted by Gopal S., Santosh M. P. (2017), around 13 patients (33.3%) were found to have stage 1 cellulitis, 5.1% were in stage 3 category. Stage 2 cellulitis was the most common in their study 41% [8].

Smoking: According to Anis Mzabi *et al.,* (2017) 32.3 % were smokers, which is similar to our study population in which 27.4 % (n=28) were smokers [15].

CONCLUSION:

The prevalence of cellulitis was more in male than female. The overall prevalence was highest in the age group of 40 - 60 years. The most common predisposing factors of cellulitis are Diabetes mellitus, Deep Vein Thrombosis, trauma, smoking and varicose veins. Therefore, it is recommended that protection against trauma, controlling of blood glucose levels, and smoking cessation may lead to reducing incidence of cellulitis. The site if infection for majority of population was found to be lower limb. The complications of cellulitis are found to be edema, sepsis and lymphoedema followed by gangrene so, there should be early identification and initiation of antibiotic therapy to prevent occurrence of complications. Most of the patients were prescribed with metronidazole, linezolid followed by penicillins.

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Pharmacist has a major role in educating patients on appropriate use of antibiotics to prevent antibiotic resistance, wound care, early identification or diagnosis of disease and improving physical activity. Clinical pharmacist should review patients chart for compliance, choice of antibiotic, route, frequency, dose of antibiotics, also can educate nurse and medical staff at ward level about use of antibiotics.

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