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## A RETROSPECTIVE STUDY OF LOWER LIMB CELLULITIS IN A REGIONAL HOSPITAL IN GHANA

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### Abstract

**Background:** Cellulitis is a non-necrotizing inflammation of the dermis of skin and subcutaneous tissues. Lower limb cellulitis is a common cause of hospitalization in Ghana but scarcely reported.

**Objective:** To document management and outcomes of lower limb cellulitis at the Ashanti Regional Hospital in Ghana.

**Materials and Methods:** Retrospective review of patients admitted to the Ashanti Regional Hospital with a diagnosis of lower limb cellulitis from November 2016 to October 2018.

We reviewed patients' clinical records for data on patient demographics, risk factors, clinical presentation, treatment modality and outcome of cellulitis. A p-value of less than 0.05 was considered to be statistically significant.

**Results:** Eighty two (82) patients with lower limb cellulitis were admitted over the study period.

There were 47 (57.3%) females and 35 (42.7%) males. The mean age of patients was 38.8 years (standard deviation 21.6065). Among females, the majority, 10 (21.3%) were in the 6th decade whilst the majority, 9 (25.7%) of males were in the 4th decade.

All the patients presented with swelling of the lower limb involving the left lower limb in 38(46.3%) and right in 44(53.7%) cases. The leg was the most common location involved 60 (73%).

The mean duration of swelling prior to admission was 5.2 days (SD 3.196). Antibiotics treatment resulted in complete resolution in 29 (35.4%) cases and complications in 53 (54.5%), cases requiring surgical treatment in 31(58.5%) patients.

**Conclusion:** Lower limb cellulitis had a high complication rate influenced by duration of symptoms prior to hospitalization and antibiotic therapy.

**Key Words:** Cellulitis, lower limb, patients, Debridement, Ghana

### Introduction

Cellulitis is a non-necrotizing inflammation of the dermis of skin and subcutaneous tissues, mostly from acute bacterial infection. It can occur in many locations of the body but the lower limb is the most common location involved, with reported rates of 58-98%.<sup>1-3</sup>

The incidence of lower limb cellulitis is high and increases significantly with age,<sup>4-7</sup> usually occurring in individuals above 45 years. However, the sex of individuals has no influence on the incidence of cellulitis.<sup>4</sup> Socioeconomic factors may however be associated with the incidence of cellulitis<sup>8</sup>.

Even though cellulitis is usually non-fatal with case fatality rate less than 1% worldwide,<sup>9</sup> high mortality rates have been reported in Africa<sup>3</sup>. It is a common cause of hospitalization with high morbidity, costs and economic loss<sup>10-12</sup>. Delay in reporting is known to account for the frequent hospital admission leading to delay diagnosis and serious complications<sup>8</sup>, and this late reporting behaviour is common among patients in Africa.

A recent publication by the Lancet Commission On Global Surgery indicates that over 5 billion people worldwide lack access to safe, timely and affordable surgical care when needed, with the greatest burden in low and middle income countries<sup>13</sup>. This burden will greatly increase when a preventable disease like cellulitis continues to be a reason for admission to hospitals.

There is scarcity of literature on cellulitis in Africa<sup>5</sup>. Although lower limb cellulitis is a common cause of hospital admissions in Ghana, we found no reported studies on lower limb cellulitis in the country. A review of literature however shows reports on orofacial infections, orbital cellulitis and diabetic soft tissue or foot infections.

The goal of this study was to describe the demographic characteristics of patients admitted with cellulitis of the lower limb, document the clinical presentation, mode of treatment and determine the treatment outcomes of cellulitis

### Methods

#### Study Design

This was a retrospective review of all patients admitted to the medical, surgical and pediatric wards of Ashanti Regional Hospital with a diagnosis of lower limb cellulitis from November 2016 to October 2018.

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Conflict of Interest: None Declared

### Study Area

Ashanti Regional Hospital, formerly Kumasi South Hospital is located in the Asokwa Sub metro, one of the five Sub Metros in the Kumasi metropolis. The hospital has a bed capacity of 126 and accredited for training of House officers and residents in family Medicine.

Ashanti Regional Hospital is the only public hospital in the sub metro; it is centrally situated at the boundaries of three towns i.e. Atonsu, Agogo and Chirapatre, hence occupying lands belonging to all the towns. The Ashanti Regional Hospital, has developed from the former Kumasi South Urban Health Centre, built in 1976 to a District hospital, Kumasi South Hospital and finally upgraded into a Regional Hospital for the Ashanti Region in 2002

The sub metro in which the facility is located is made up of both urban and rural dwellers. The rural dwellers are mostly peasant farmers, petty traders, and others earn their living through constructional work.

### Data Collection

We identified all cases of Cellulitis admitted to the various wards from the admission and discharge books. Clinical records were then retrieved using Biostatistics Index Cards and electronic data entered at the records department. All patients with a discharge diagnosis of lower limb cellulitis were included in the study. Patients with cellulitis of other regions apart from the lower limb were excluded from the study. We reviewed patient history, physical examination as well as laboratory records and obtained data on patient demographics, risk factors, clinical presentation, treatment modality and outcome of cellulitis using a data abstraction form.

### Data Processing and Analysis

Data obtained was entered into a Microsoft access database and analyzed using PASW Statistics for Windows, Version 18.0. Chicago: SPSS Inc. The result of data analysis was reported as proportions using frequencies and percentages. Pearson Chi square test was used to determine the degree of significant relationship between some variables. A p-value of less than 0.05 was considered to be statistically significant

### Ethical Consideration

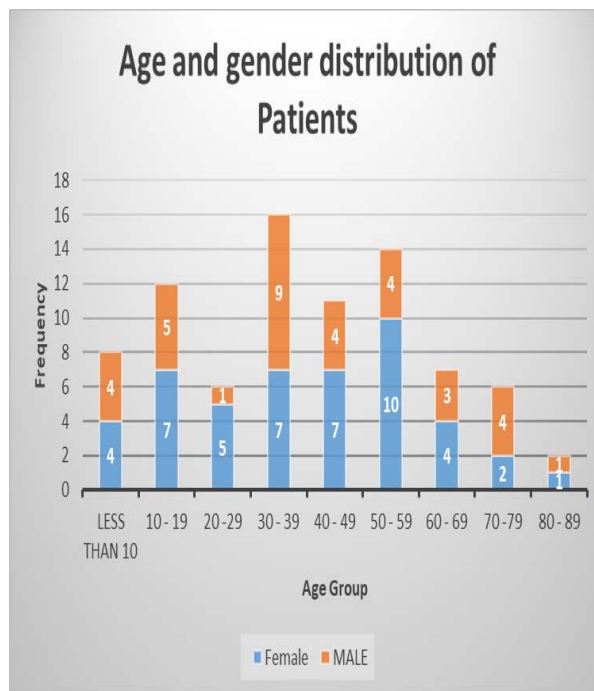
Permission was obtained from the hospital's research and ethics committee to collect secondary data for the study. There was no direct contact or intervention with any patient

## Results

Eighty two (82) patients with lower limb cellulitis were admitted over the study period. There were 47 (57.3%) females and 35 (42.7%) males giving a female to male ratio of 1.3: 1.

The mean age was 38.8 years and a median of 39 years. Among females, the majority, 10 (21.3%) were in the 6<sup>th</sup> decade whilst the majority, 9 (25.7%) of males

were in the 4<sup>th</sup> decade. Figure 1 shows the age and gender distribution of patients.



**Fig 1.** Age and Gender Distribution of Patients

**Table 1.** Sociodemographic Characteristics

Variable n = 82	Frequency	Percentage (%)
<b>Occupation</b>		
Artisan	14	17.1
Farming	8	9.8
Teacher	1	1.2
Trading	23	28
Students	15	18.3
Unemployed	9	11
Pensioners	2	2.5
Others	10	12.2
<b>Educational background</b>		
None	27	32.9
Others(infants)	6	6.1
Basic	34	23.2
Secondary	13	17.1
Tertiary	2	2.5
<b>Marital Status</b>		
Divorced	3	3.7
Married	41	50.0
Single	16	19.5
Widowed	2	2.4
Others (children)	20	24.4

The majority, 23 (28.0%) of the patients were traders and only 8 (9.8%) were farmers as shown in Table 1.

Forty one (50.0%) patients were married and there were 20(24.4%) children below the legal marriage age of 18 years. The marital status of patients is shown in Table 1.

Almost one third (32.9%) of the patients had no formal education and only 2 (2.4%) had tertiary education as shown in Table 1.

### Clinical Presentation

All the patients presented with swelling of the lower limb involving the left lower limb in 38(46.3%) and right in 44 (53.7%) cases. The commonest region of the lower limb involved was the leg in 60 (73%) followed by the foot in 21 (25.6) and only one in the thigh.

All the patients had pain in the affected lower limb. Fifty seven (69.5%) of the patients presented with redness but was absent in 25 patients. This is shown in table 2.

**Table 2.** Clinical Presentation of cellulitis

Characteristics n= 82	Frequency	Percentage (%)
<b>Leg Swelling</b>		
Yes	82	100
No	0	0
<b>Laterality</b>		
Left	38	46.3
Right	44	53.7
<b>Part of lower limb</b>		
Thigh	1	1.2
Leg	60	73.2
Foot	21	25.6
<b>Pain</b>		
Present	82	100
Absent	0	0
<b>Redness</b>		
Present	57	69.5
Absent	25	30.5
<b>Loss of function</b>		
Yes	57	69.5
No	25	30.5
<b>Duration of Symptoms (Days)</b>		
1-5	60	73.2
6-10	15	18.3
11-15	4	4.9
16 - 20	1	1.2
21 -25	2	2.4
<b>Mode of Entry</b>		
Cut	28	34.2
Insect bite	2	2.4
Ruptured blister	15	18.3
Scratch	23	28.0
Spontaneous	6	7.3
Others	8	9.8
<b>RBS (mmol/L) n = 62</b>		
<11	56	90.3
<b>11.1- 21</b>	<b>2</b>	<b>3.2</b>
<b>&gt;21.1</b>	<b>4</b>	<b>6.5</b>

The mean duration of swelling prior to admission was 5. 2(SD 3.196) days. Sixty patients (73%) presented within 1 to 5 days of noticing swelling of the lower limb, 15 (18.3%) patients presented between 6 to 10 days of noticing swelling. Seven (8.5%) patients presented to the hospital after ten days of noticing symptoms.

Fifty seven (69.5%) could not walk on the affected limb whilst 25 of them could use the affected limb.

The commonest risk factor for developing cellulitis was a breach in the integrity of the skin from trauma. Amongst these were cuts, 28 (34.1%), scratch 23 (28.0%), and ruptured blisters 15 (18.3%).

Only 9 (11.0%) patients had cellulitis spontaneously without any identifiable local risk factor.

Ten of the patients were known diabetics. Random blood sugar (RBS) levels were tested on 62 patients whilst on admission and table 4 shows that the majority 56 (90.3%) of patients had RBS less than 11 mmol/l.

### Treatment and Outcomes

The commonest antibiotic used in the treatment of cellulitis was Clindamycin in 53 cases and Amoxicillin /Clavulanic acid in 26 cases with or without Metronidazole. A combination of Cefuroxime and Gentamycin and Penicillin and Gentamycin was used in a patient each. This result is presented in table 4.

On treatment with antibiotics, 29 (35.4%) cases resolved completely without any complication whilst 53 (54.5%) had complications. Highest amongst the complications were ulceration 25(47.1%), followed by tissue necrosis or gangrene 20 (37.7%), and abscess in 8 (15%) of cases, as presented in Table 3

Surgical treatment was carried out in 31(58.5%) patients who had complications whilst the rest resolved with dressing alone or with enzymatic or autogenous debridement, as seen in table 4. The surgeries carried out included debridement 21(67.7%), incision and drainage 8(25.8) and minor (Ray) amputations 2(6.5%). Gangrene is one of the complications of cellulitis which was observed in two patients who underwent Ray amputation of the 2<sup>nd</sup> and 4<sup>th</sup> toes of the left foot respectively.

The mean length of hospital was 7.52 days (SD 5.029).

**Table 3:** Duration of symptoms <sup>versus</sup> educational background, treatment outcomes and complications

Variable	Duration of Symptoms (Days)					Total
	1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	
<b>Educational background</b>						
None	19	4	2	1	1	27
Others	6	0	0	0	0	6
Basic	22	10	1	0	1	34
Secondary	12	0	1	0	0	13
Tertiary	1	1	0	0	0	2
<b>Treatment outcome</b>						
Recovered	27	1	1	0	0	29
Recovered with complications	33	14	3	1	2	53
<b>Complications</b>						
No complications	27	1	1	0	0	29
Abscess	4	2	1	1	0	8
Tissue necrosis/gangrene	13	4	2	0	1	20
Ulcer	16	8	0	0	1	25

**Table 4.** Treatment and Outcome

Antibiotic treatment	Recovered	Recovered with complications	Total
Amoxicillin/clavulanic acid	10	5	15
Amoxicillin/clavulanic acid + Metronidazole	0	11	11
Cefuroxime/Gentamycin	1	1	2
Clindamycin	18	35	53
Penicillin/gentamycin	0	1	1
total	29	53	82
<b>Treatment of complications</b>			
Surgical	31	58.5	
Non-Surgical	22	41.5	
<b>Total</b>	<b>53</b>	<b>100</b>	
<b>Type of surgical treatment</b>			
Incision and drainage	8	25.8	
Debridement	21	67.7	
Minor Amputations( Ray)	2	6.5	

**Table 5.** Relationship between duration of symptoms and educational background, treatment outcome, complications (chi square)

Variable	Pearson Chi Square	p-value
Educational Background	12.779a	0.887
Treatment Outcome	9.671a	0.046
Complications	23.231	0.026

## Discussion

Cellulitis is a non-necrotizing infection of the skin and subcutaneous tissues. It is commonest in the lower limbs and usually affects older people with the incidence significantly increasing with age<sup>1, 6, 10, 14</sup>. However, in Sub Sahara Africa, it affects relatively young patients<sup>15-17</sup>. In this study, the commonest age group with lower limb cellulitis was 30-39 years with a mean age of 38.8

years. The relatively young age of patients in this study is similar to the findings from other parts of sub Saharan Africa<sup>15-17</sup>.

In contrast with findings from Sierra Leone<sup>18</sup>, the majority of patients in this study either had basic education or no formal education at all. People of low socio economic status tend to present late to hospital as was observed in this study and this usually results in high complication rates.

All the patients in this study presented with unilateral swelling of the lower limb, over half of them on the right. The leg was the most common location of the lower limb with cellulitis similar to findings by Kenche et al in rural India<sup>19</sup>.

Break in skin barrier has been identified as the most important local risk factor for developing cellulitis<sup>2, 16</sup>. Similarly, in this study only 9.8 % of patients had no identifiable break in skin barrier. The average duration of noticing symptoms to presentation at the hospital was 5.2(SD 3.916) days and over a quarter of patients (26.8%) reported after 5 days of noticing symptoms. Late presentation is a major reason for high complication rate and a cause of frequent hospital admission. Outpatient management of cellulitis is less expensive and preferred by patients<sup>9</sup>, and this outpatient management has been advocated for in some studies<sup>7,9</sup>. However, this can only be possible if patients report early and there is prompt treatment.

Indications for admission and parenteral therapy with antibiotics include patients with associated Systemic Inflammatory Response Syndrome (SIRS), haemodynamic instability, changes in mental status, poor compliance and failure to respond to oral antibiotics<sup>20</sup>. Parenteral Clindamycin was the most common antibiotic used in the treatment of cellulitis in this study whilst Amoxicillin /Clavulanic acid was used in almost a fifth of the patients. The Practice Guidelines for the Diagnosis and Management of Skin and Soft Tissue Infections 2014 clearly categorize patients with cellulitis and suggest antibiotic therapy for the various categories<sup>20</sup>. Penicillin is recognized worldwide for use as the first line treatment of cellulitis if other factors do not preclude its use<sup>21-23</sup>. In the treatment of cellulitis the use of antibiotics other than penicillin has not resulted in any added advantage<sup>21</sup>, as seen with the routine use of Clindamycin in this study. It's been shown that adherence to antibiotic guidelines is associated with better outcomes<sup>22</sup>. This is consistent with the high complication rate in the clindamycin group (p value 0.01) found in this study. Various hospitals should have a common protocol in line with international standards.

There was no recorded mortality in this study, consistent with the very low case fatality of cellulitis in many studies<sup>9, 23</sup>.

Almost two thirds of the patients developed local complications and 35% of cases resolved without complications. These complications were ulcers, tissue necrosis, abscesses and gangrene. Complication rate for cellulitis is generally between 8.9 to 47.4% worldwide.<sup>5</sup> Our complication rate was higher than reported in previous studies<sup>5,15,24</sup>. The delay in seeking medical treatment has been identified as a cause of worse outcomes in cellulitis<sup>8</sup>, as was observed in this study (p-Value 0.046).

More than half of the patients underwent surgical treatment for their complications and highest amongst them was surgical debridement. Our findings are consistent with other findings where surgery was

indicated for majority of cases with cellulitis<sup>16,24</sup> but contrary to that of Mzabi et al who reported a very low rate of surgical management<sup>1</sup>. This is probably due to the relative late reporting of patients in this study for treatment.

The average length of hospital stay in this study was 7.5 days. Many studies have reported four to eleven days as the average length of hospital stay of patients admitted for cellulitis<sup>2,3,25</sup>. The length of stay was affected by the duration of symptom before hospitalization (p value 0.008). It is therefore important that patients report early to hospital to promote short hospital stay, reduce health cost and morbidity.

## Conclusion

Lower limb cellulitis is more common in relatively younger people, in females and people of low socioeconomic status. The complication rate of cellulitis was high and is significantly affected by duration of symptoms prior to hospitalization and antibiotic therapy. We recommend early reporting to hospital to reduce the morbidity and costs associated with cellulitis.

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