

ORIGINAL ARTICLE

Factors Associated with Cellulitis of Lower Limbs among Patients Attending Madina Hospital in Mogadishu, Somalia

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ABSTRACT

Background: Cellulitis is an acute bacterial infection causing inflammation of the deep dermis and surrounding subcutaneous tissue without an abscess or purulent discharge. The risk factors of cellulitis can be classified into general and local factors. General risk factors include obesity, diabetes mellitus, and history of cellulitis, immunosuppression, lymphedema and peripheral vascular disease while local risk factors include neglected wounds, toe-web intertrigo and leg ulcers. **Objective:** To evaluate factors associated with cellulitis of lower limbs among patients attending Madina hospital in Mogadishu Somalia. **Methods:** The study design was cross-sectional study design which involved use of quantitative measures associated with cellulitis of lower limbs. **Results:** A total of 133 patients were evaluated and their data was analyzed. Of them, 78 (58.65%) were male, 55 (41.35%) were female and 63 (47.37%) were between 51-60 years of age. It was observed that 38 (28.57%) of the patients were overweight. There was a history of diabetes mellitus in 55 (41.35%) and heart disease in 33 (17.29%) patients, 66 (49.62%) of the patients had a low-income level. In the study, 76 (57.14%) cellulitis developed on the right leg and 57 (42.86%) cellulitis developed on the left leg. In terms of educational level, 74 (55.64%) of the patients were illiterate and 97 (72.93%) of the patients lived in urban areas. **Conclusion:** Cellulitis is an acute bacterial infection of the dermis and subcutaneous tissue. Diabetes mellitus, overweight, low-income level are the most risk factors for cellulitis.

Keywords: Cellulitis, diabetes mellitus, overweight

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INTRODUCTION

Cellulitis is a widespread infection involving the skin and subcutaneous tissue that presents with erythema, swelling, warmth and pain that can lead to life-threatening complications. Identification of risk factors and timely intervention in lower extremity cellulitis have a positive effect on cellulitis morbidity and mortality¹. Approximately 88% of cellulitis is localized in the lower extremities, mostly in middle-aged and older adults. There is no statistically significant

difference in the incidence of cellulitis when comparing men and women², it has a high disease burden in sub-Saharan Africa³.

The causative microorganism may be of normal skin flora or exogenous origin. It mostly develops from external sources such as fractures, cracks, ulcerations, cuts, bite wounds or from hospital-acquired procedures such as surgical wounds or intravenous cannulae. The lower extremities are the most affected areas and are very susceptible to injury. Diabetic patients are the most vulnerable

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population in terms of foot ulcer incidence and lower extremity cellulitis due to their immunocompromised state with neuropathy and vasculopathy secondary to sensory loss and poor peripheral circulation⁴. Neglected wounds, foot-intertrigo and leg ulcers are also predisposing factors⁵. Early cellulitis in non-diabetics can be managed in the outpatient unit with oral antibiotics, analgesics and treatment of the primary cause. However, more severe cellulitis requires hospitalization, parenteral antibiotics, and surgical treatment when associated with complications such as myositis and fasciitis⁶. The main reason for conducting this study was to evaluate the factors associated with cellulitis in the lower extremities among patients admitted into a tertiary level hospital in Somalia.

METHODS

The study used a cross-sectional approach and included quantitative parameters associated with lower-limb cellulitis. The study was carried out at Madina Hospital in Wadajir District, Mogadishu, Somalia. Among the patients admitted to Madina hospital in Mogadishu, Somalia from December 2021 to April 2022. Patients diagnosed with cellulitis during the data collection period were included in the study, and patients with cellulitis who did not want to participate were excluded from the study.

Quantitative data collection technique was used. The quantitative data was obtained using pre-tested structured questionnaire to gather information on socio-demographics factors and other risk factors associated with cellulitis in Mogadishu, Somalia through guided questionnaire which was written in English language but was facilitated/ translated into Somali language during interviewing.

Descriptive statistics were employed to characterize the data, and a bivariate analysis was performed to describe associations between dependent and independent variables using odds ratios with a significance level of p -value ≤ 0.05 . Variables with p -value ≤ 0.05 were deemed statistically significant. In the multivariable analysis, logistic regression with p -value ≤ 0.05 was used to find independent predictors of cellulitis.

RESULTS

The study included 133 patients: 78 (58.65%)

males and 55 (41.35%) females. 63 (47.37%) of the patients were between 51-60 years of age, 97 (72.93%) of the patients lived in urban areas and 36 (27.07%) in rural areas, 66 (49.62%) of the patients had a low-income level. In terms of educational level, 74 (55.64%) of the patients were illiterate. Sociodemographic characteristics of the patients are shown in Table 1.

While 78 (58.65%) patients had no history of diabetes, 55 (41.35%) had a history of diabetes (Figure 1). Cellulitis developed in the right leg in 76 (57.14%) patients and in the left leg in 57 (42.86%) patients. A history of heart disease was present in 33 (17.29%) patients and absent in 110 (82.71%) patients. A history of dry skin on the legs was absent in 117 (87.97%) and present in 6 (12.03%) patients. Most of the patients, 110 (82.71%) had no history of athlete's foot and 23 (17.29%) had a history of athlete's foot. Two thirds of the patients (66.17%) had no previous recurrent skin rash, while the other third (33.83%) had a previous recurrent skin rash. More than half of the patients (80/133) (60.15%) had no history of kidney disease, while the other 53 (39.85%) had a history of kidney disease. Out of 133 patients, 38 (28.57%) were overweight and 95 (71.43%) were not overweight (Figure 2). While 108 (81.20%) of the patients did not smoke, 25 (18.80%) stated that they smoked. In the study, only 8 patients (6.02%) were homeless, while the majority of the patients 125 (93.98%) had a house. Sociodemographic characteristics of patients with cellullitic legs are shown in Table 2.

Table 1: Sociodemographic characteristics (n=133)

Variable	Category	Frequency	Percentage
Gender	Female	55	41.35
	Male	78	58.65
Age groups	40-50 years old	32	24.06
	51-60 years old	63	47.37
	61-70 years old	22	16.54
	Above 70 years old	16	12.03
Marital status	Single	0	0
	Married	78	58.65
	Divorced	24	18.05
	Widowed	31	23.31

Variable	Category	Frequency	Percentage
Educational level	Illiterate	74	55.64
	Primary	17	12.78
	Secondary	36	27.07
	University	6	4.51
Place of residence	Urban	97	72.93
	Rural	36	27.07
Income level	Low	66	49.62
	Middle	62	46.62
	High	5	3.76

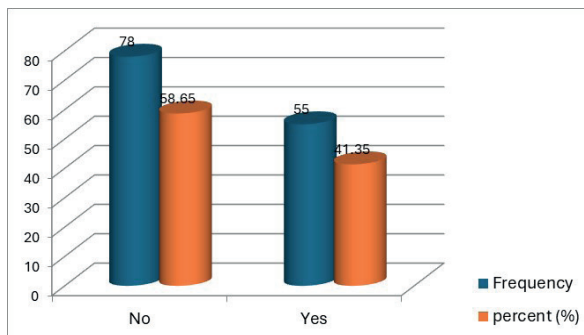


Figure 1: History of diabetes mellitus

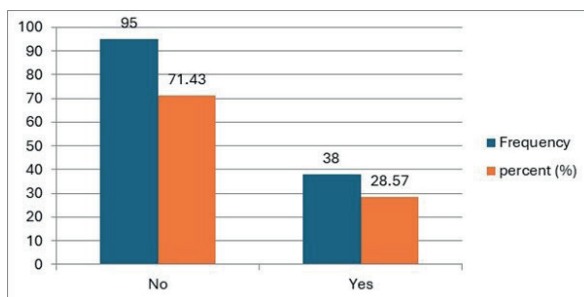


Figure 2: Obesity

DISCUSSION

The skin, together with the external appendages (hair, nails, sebaceous and sweat glands), which form the barrier between the external environment and the internal body structures, form the integumentary system, the largest organ of the body. The functions of this system are diverse and vital. These include protection, homeostasis, immune regulation and sensory roles. Although structurally composed of different areas, the skin is coordinated and integrated to function as a single functional unit⁷.

Cellulitis is an acute bacterial infection that affects the dermis and subcutaneous tissue^{8,9}.

Table 2. Sociodemographic characteristics among cellutitic leg

Variable	Category	Cellutitic leg		Total
		Left leg	Right leg	
Gender	Female	26	29	55
	Male	31	47	78
Age group	40-50 years old	10	22	32
	51-60 years old	30	33	63
	61-70 years old	9	13	22
	Above 70 years old	8	8	16
Marital status	Single	0	0	0
	Married	28	50	78
	Divorced	11	13	24
	Widowed	18	13	31
Educational level	Illiterate	32	42	74
	Primary	8	9	17
	Secondary	16	20	36
	University	1	5	6
Place of residence	Urban	36	61	97
	Rural	21	15	36
Income level	Low	31	35	66
	Middle	26	36	62
	High	0	5	5

The main clinical manifestations of the disease include erythema, swelling, warmth and pain and can occasionally lead to life-threatening complications. Bacterial etiology is decisive in the differential diagnosis from other inflammatory conditions affecting the dermis and hypodermis such as eosinophilic cellulitis, Wells syndrome¹⁰, neutrophilic cellulitis or Sweet syndrome (acute febrile neutrophilic dermatosis)¹¹. In the differentiation of erysipelas from cellulitis, it is meaningful that the lesion has a sharp border that

is slightly higher than the surrounding normal skin. However, in many cases it is not possible to make a clear distinction between erysipelas and cellulitis. Erysipelas can also be defined as a special form of cellulitis affecting the surface of the dermis^{8, 12}. It is a clinical picture that mostly occurs on the skin due to exogenous procedures such as fractures, cracks, ulcerations, cuts, bite wounds or hospital procedures such as surgical wounds or intravenous cannulae.

Different studies on the incidence of erysipelas or cellulitis have revealed very similar results¹³⁻¹⁵. A study from Belgium revealed that the incidence of erysipelas increased during 1994-2004. Moreover, the incidence was found to be higher in patients aged 75 years and older¹⁴. In our study group, there were more patients in the age range of 51-70 years. In a Dutch study, an incidence of 179.6 per 100,000 inhabitants per year was found for lower extremity cellulitis or erysipelas¹³. Only 7% of the cases were hospitalized. In a population-based study covering the year 1999 in the United States of America, the incidence of leg cellulitis was found¹⁵.

Erysipelas and cellulitis are clinical conditions with similar predispositions, symptoms and etiology¹⁶⁻¹⁸. Erysipelas has also been defined as a specific type of cellulitis¹⁹. French authors have found it appropriate to define it as bacterial dermohypodermatitis or acute bacterial dermohypodermatitis instead of erysipelas or non-necrotizing cellulitis because it anatomically indicates the location of inflammation. Histologically, lymphatic dilatation, fibrin-rich edema, and neutrophil infiltration in the dermal layer are evident^{19,20}. In this clinical condition, bacteria may not be clearly seen in the gram stain of the specimen. There is no difference between erysipelas and cellulitis in terms of bacterial localization¹⁶.

The presence of diabetes is a very important predisposition for cellulitis. The lower extremities are the most affected areas in patients with cellulitis and are very susceptible to injury. Patients with diabetes are the most susceptible patient group to foot ulcers and lower extremity cellulitis due to neuropathy and vasculopathy resulting from loss of sensation and poor peripheral circulation and impaired immune system⁴. In addition, neglected

wounds, foot intertrigo and leg ulcers are also predisposing²¹. In our study group, 41.35% of the patients had a history of diabetes mellitus.

Cellulitis in non-diabetic patients can be managed in an outpatient clinic unit with oral antibiotics, analgesic drugs and treatment directed to the primary agent in the early period. However, the presence of a higher degree of cellulitis requires hospitalization, parenteral antibiotics and surgical treatment when complications such as myositis and fasciitis develop⁶.

The common clinical definition for cellulitis and erysipelas is a diffuse skin infection with regional lymph node enlargement and fever of 38°C or higher, accompanied by widespread areas of skin redness, edema, and/or induration^{22,23}. The term chronic cellulitis is most often used to describe recurrent cellulitis and refers to changes in the skin secondary to venous insufficiency or lymphedema²⁴.

Obesity has been shown to be independently associated with acute cellulitis in more than one study in the literature^{14,20,25}. However, the mechanisms behind cellulitis and susceptibility to other infections in overweight individuals have not been fully elucidated²⁶. Another thesis is impaired lymphatic flow, excessive production or inadequate drainage^{27,28}. In our study group, 28.57% of the patients were obese. Although the use of compression stockings is common in patients with acute cellulitis in the presence of significant chronic edema, the effectiveness of these nonpharmacological measures has not been scientifically proven.

Antibiotic prophylaxis has been known since the first results of penicillin's efficacy in this indication²⁹. There is no consensus on the drug of choice and duration of use for prophylaxis. However, individuals with a history of two episodes of cellulitis, high BMI, and persistent edema are more likely to have recurrence of cellulitis despite prophylaxis than other individuals³⁰. More research is needed to determine the safety and efficacy of extended prophylactic antibiotic treatments, proper treatment distribution, and the best timing to begin prophylaxis.

CONCLUSION

Cellulitis is a disease in which many factors such as diabetes mellitus, overweight, smoking, history of kidney disease are effective in its formation and course. We believe that properly managed diabetes mellitus, a diet to prevent overweight, adequate physical exercise and prevention of smoking will be effective in preventing the development of cellulitis.

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of interest to declare.

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Authors' contribution: Study design: MYM, AOF, MYH, OA; Data collection, compilation and analysis: MYM, MAA, MSO, TE; Writing, editing and approval of final draft of manuscript: MYM, MAA, MSO, MYH, AOF, TE, OA

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