Ann Med Res

Current issue list available at AnnMedRes

Annals of Medical Research

journal page: www.annalsmedres.org

Sociodemographic, clinical, biochemical and microbiological analysis of cellulitis patients; investigation of third level single center follow-up results

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ARTICLE INFO

Keywords:
Cellulitis
Morbidity
Predisposing factor
Recurrent attack

Received: Apr 14, 2023
Accepted: Aug 24, 2023
Available Online: 25.08.2023

DOI:
10.5455/annalsmedres.2023.04.095

Abstract

Aim: In this study conducted in a single tertiary care center, it was aimed to examine the sociodemographic, clinical, biochemical, microbiological and follow-up results of cellulitis patients.

Materials and Methods: Demographic characteristics, presence of predisposing factors, cellulitis involvement area, attack characteristics, hospitalization status/duration, agents used in treatment and their durations, tissue/wound/blood culture, biochemistry and ultrasonography characteristics of the patients were examined and the results were compared by grouping the patients according to first attack/recurrent attack, inpatient/outpatient treatment, presence of concomitant diabetes and obesity.

Results: In the recurrent attack group, the frequency of diabetes, obesity, venous insufficiency, lymphedema and onychomycosis were significantly higher than in the initial attack group (p values; <0.001, <0.001, 0.025, <0.001, 0.002, respectively). The prevalence of obesity, diabetes mellitus and changing the initial antibiotic was significantly higher in the inpatient group compared to the outpatient group (p values; <0.001, 0.004, <0.001, respectively).

Conclusion: Diabetes, obesity, venous insufficiency, lymphedema, and conditions that impair skin integrity are important predisposing factors for both the development and recurrence of cellulitis.

Introduction

Cellulitis is an acute bacterial infection of the skin involving the deep dermis and subcutaneous adipose tissue, which is common in the community and in the hospital and can cause severe complications, morbidity and mortality, often with comorbid conditions. Cellulitis is most commonly seen in the lower extremities, but it can also develop in different parts of the body such as the face, periorbital or perianal areas [1, 2].

The most common microorganisms causing cellulitis are *Staphylococcus aureus* (S.aureus) and *Streptococcus pyogenes* (S.pyogenes). While local symptoms such as pain, swelling, erythema and tenderness are usually observed in cellulitis; in some special cases, severe clinical pictures progressing to systemic findings, sepsis or necrotizing fasciitis can be seen [3, 4].

Although the prevalence of cellulite in the community is reported to be approximately 1.64-2.46%, it is stated that this prevalence increases especially in the elderly and male gender [5]. Skin trauma is often involved in the etiology and cellulitis can develop in any situation where skin integrity is compromised [6].

Cellulitis recurrence is observed with a frequency of 8-20% in one year. The main reason for the high frequency of recurrence is that the lymphatic obstruction that occurs during the cellulitis attack predisposes to reinfection [2].

If cellulitis is left untreated or in the presence of other underlying diseases which can spread through the lymphatic pathway and cause many clinical pictures such as osteomyelitis, endocarditis, thrombophlebitis and reactive arthritis [7, 8]. The main predisposing factors that cause cellulitis to progress rapidly and spread easily are smoking and alcohol consumption, obesity, low socioeconomic status, lymphedema, venous insufficiency, bites, tinea pedis, penetrating injuries, surgical operation, saphenous venectomy, cancer, radiotherapy, inflammatory dermatoses, presence of another focus of infection in the body and previous cellulitis attack [9].

Although cellulitis is one of the most common skin dis-

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eases with high recurrence rates and can cause mortality and morbidity in the presence of comorbidities, there are no large-scale studies on this subject in our country. In order to prevent morbidity, early complications and frequent recurrences, it is very important to understand the risk factors of the disease and the sociodemographic structure of the society and to read the clinical and microbiological parameters well.

In our study, we aimed to retrospectively examine the results of sociodemographic, clinical, biochemical and microbiological analysis of cellulitis patients in a tertiary care single center follow-up.

Materials and Methods

This study was conducted in the skin and venereal diseases clinic of our hospital with the permission of the institutional ethics committee dated 16.12.2021 and numbered 46418926 (Gulhane Training and Research Hospital Ethics Committee, Decision No: 2021-417).

The study included 629 patients aged 3-103 years who were admitted to our clinic with a diagnosis of cellulitis between 01.11.2016 and 19.08.2021. The files of all patients were retrospectively analyzed. Demographic characteristics of the patients such as age, gender, body mass index (BMI), presence of predisposing factors (diabetes mellitus, obesity, venous insufficiency, lymphedema, homeless/living alone, presence of conditions that disrupt skin integrity, tinea pedis, history of trauma, history of skin lesions), date of onset of cellulitis, Body region involved, side, number of attacks, number of attacks, hospitalization status, duration of hospitalization, agents used in treatment, duration of treatment, tissue culture, wound swab culture, blood culture, biochemistry and doppler USG/surface tissue USG results were recorded.

Patients were divided into groups according to attack characteristics (1. first attack, 2. recurrent attack), reasons for hospitalization (1. no hospitalization, 2. diagnosed with cellulitis while hospitalized for another reason, 3. hospitalized for cellulitis) and presence of predisposing factors (1. diabetes mellitus, 2. obesity) and demographic characteristics, presence of predisposing factors, cellulitis involvement characteristics, hospitalization status, duration of hospitalization, treatment and laboratory characteristics were compared.

Statistical analysis

Statistical analysis was performed using IBM SPSS Statistics for Windows, Version 25 (IBM Corp., Armonk, NY, USA). Descriptive statistics were presented as number, percentage, mean ± standard deviation (SD), and median (minimum-maximum value). The conformity of continuous variables to normal distribution was evaluated using visual (histograms and probability plots) and analytical methods (Kolmogorov-Smirnov/Shapiro-Wilk tests). To compare nominal values, AVOVA test for parametric data and Kruskal-Wallis test for nonparametric data were applied. Bonferroni Correction was applied when applying these tests. Accordingly, results with $p<0.017$ were considered significant and two group comparisons were made. For this purpose, independent sample T test was used for the comparison of normally distributed data between two independent groups, and Mann-Whitney U test was used for variables that did not show normal distribution. Chi-square tests were used to compare categorical variables in independent groups. Statistical significance level was accepted as $p<0.05$.

Results

Patient population

Demographic characteristics of the patients are presented in Table 1.

Among the patients included in the study, 32.4% had DM (Diabetes Mellitus), 25% had obesity, 25.1% had venous insufficiency, 9.2% had lymphedema, 0.2% were homeless, and 74.9% had conditions that compromised skin integrity. It was observed that 46.3% of the participants had right body plane involvement, 39.9% had left body plane involvement, 13.8% had bilateral involvement, 50.9% had leg involvement and 21.5% had foot involvement. Of the attacks analyzed, 85.2% were the first, 10.7% the second and 2.4% the third cellulitis attack. The mean number of attacks was 1.2±0.6. It was determined that 27.7% of the participants were hospitalized and 68.4% of them were hospitalized for cellulitis. The median number of hospitalization days was 11 (1-76). The frequency of changing the antibiotic initially used was 31.3%. Tissue cultures were performed in 7.6% of the patients and 64.6% of these patients had growth. *Pseudomonas aeruginosa* was grown in 23.3%, *Stenotrophomonas maltophilia* in 23.3% and Enterobacter cloacae in 10% of the tissue cultures. Wound swab culture was performed in 6.4% of the participants and growth was found in 60% of these patients. Wound swab cultures grew 15% *Pseudomonas aeruginosa*, 10% *Enterobacter* cloacae and 7.5% *Escherichia coli*. Blood cultures were performed in 5.2% of the patients and 78.8% of these patients had growth. *Staphylococcus aureus* was detected most frequently (6.1%) in blood culture. Doppler USG/surface tissue USG was performed in 49.3% of the patients and 56% of these patients had findings compatible with cellulitis.

Comparison of first attack and recurrent attack groups

The frequency of female gender was higher in the recurrent attack group (57%) compared to the first attack group

Table 1. Demographic characteristics of the patients.

Parameters (n=629)	
Gender, n (%)	
Female	293 (46.6)
Male	336 (53.4)
Age Mean±SD	57.4±19.4
BMI (n=298), n (%)	
Thin (<18.5)	3 (0.5)
Normal (18.5-24.9)	64 (10.2)
Overweight (25-29.9)	83 (13.2)
Obese (≥30)	148 (23.5)

BMI: Body Mass Index, SD: Standard Deviation.

Table 2. Evaluation of some demographic characteristics according to the reason for hospitalization.

Demographic Characteristics	G1 (n=455)	G2 (n=55)	G3 (n=119)	p
Gender, n (%)				G1 vs. G2:0.849*
Female	213 (46.8)	25 (45.5)	55 (46.2)	G1 vs. G3:0.908*
Male	242 (53.2)	30 (54.5)	64 (53.8)	G2 vs. G3:0.925*
Age, year				**G1 vs. G2:0.006****
Mean±SD	55.8±19.5	64.3±19.6	60.4±17.7	**G1 vs. G3:0.011****
Median (min.-max.)	57 (3-103)	69 (17-91)	62 (9-95)	G2 vs. G3:0.187**
BMI (n=298), n (%)				
Thin (<18.5)	1 (0.6)	1 (2.3)	1 (1)	**G1 vs. G2:0.029***
Normal (18.5-24.9)	33 (21.3)	13 (30.2)	18 (18)	G1 vs. G3:0.915*
Overweight (25-29.9)	39 (25.2)	17 (39.5)	27 (27)	**G2 vs. G3:0.038***
Obese (≥30)	82 (52.9)	12 (27.9)	54 (54)	

*Chi-square Test **T-Test. G1: No Hospitalization, G2: Group Diagnosed with Cellulitis While Hospitalized for Another Reason, G3: Group Hospitalized for Cellulitis, BMI: Body Mass Index, SD: Standard Deviation.

Table 3. Comparison of predisposing characteristics according to reason for hospitalization vs must be vs.

Predisposing Feature	G1 (n=455)	G2 (n=55)	G3 (n=119)	p
DM, n(%)				G1 vs. G2:0,511
None	322 (70.8)	36 (65.5)	67 (56.3)	**G1 vs G3:0.004**
Available	133 (29.2)	19 (34.5)	52 (43.7)	G2 vs G3:0.329
Obesity, n (%)				**G1 vs G2:0.026**
None	369 (81.1)	37 (67.3)	66 (55.5)	**G1 vs G3:<0.001**
Available	86 (18.9)	18 (32.7)	53 (44.5)	G2 vs G3:0.191
Venous Insufficiency, n(%)				G1 vs G2:0.063
None	341 (74.9)	48 (87.3)	82 (68.9)	G1 vs G3:0.224
Available	114 (25.1)	7 (12.7)	37 (31.1)	**G2 vs G3:0.016**
Lymphedema, n(%)				G1 vs G2:0.306
None	420 (92.3)	48 (87.3)	103 (86.6)	G1 vs G3:0.075
Available	35 (7.7)	7 (12.7)	16 (13.4)	G2 vs G3:1.000
Condition Disrupting Skin Integrity, n(%)				G1 vs G2:1.000
None	117(25.7)	14 (25.5)	27 (22.7)	G1 vs G3:0.576
Available	338 (74.3)	41 (74.5)	92 (77.3)	G2 vs G3:0.836

G1: No Hospitalization, G2: Group Diagnosed with Cellulitis While Hospitalized for Another Reason, G3: Group Hospitalized for Cellulitis, DM: Diabetes Mellitus.

(44.8%) (p=0.029), and the ages were similar (p=0.178). The median BMI was 29.3 (15.3-58.3) and 32 (20.8-52.9) kg/m^2 in patients with first and recurrent attacks, respectively (p<0.001). The frequency of obese individuals in the recurrent attack group (70%) was higher than in the first attack group (44.5%) (p=0.029). The frequency of diabetes, obesity, venous insufficiency, lymphedema and onychomycosis was significantly higher in the recurrent attack group compared to the first attack group (p values; <0.001, <0.001, 0.025, <0.001, 0.002, respectively). The frequency of hospitalization for reasons other than cellulitis was higher in the recurrent attack group (88%) compared to the first attack group (65.1%) (p=0.029). The total duration of outpatient treatment was found to be longer in the first attack group than in the recurrent attack group (p= 0.028). More tissue cultures were obtained in the recurrent attack group (14%) than in the first attack group (6.5%) (p=0.022). Growth in wound swab culture was higher in the recurrent attack group (100%) than in the first attack group (54.3%) (p=018). Doppler or superficial tissue USG findings compatible with cellulitis were more common in the recurrent attack group (100%) than in the initial attack group (54.3%) (p=0.048).

Assessment according to the reason for hospitalization

The comparison results of gender, age and BMI according to the reason for hospitalization are presented in Table 2. Comparison results of predisposing characteristics are presented in Table 3.

There was no significant difference in the frequency of recurrent attacks depending on the reason for hospitalization. The frequency of first episode was higher in the group hospitalized for another reason (94.5%) than in the group hospitalized for cellulitis (81.5%) (p=0.041). The duration of hospitalization was significantly higher in the group hospitalized for another reason than in the group hospitalized for cellulitis (p=0.037). The total duration of

Table 4. Comparison of laboratory findings according to reason of hospitalization.

Parameters	G1 (n=455)	G2 (n=55)	G3 (n=119)	p
Hemoglobin, g/dL (n=481)				**G1 vs G2:<0.001***
Mean±SD	13.1±1.9	11.7±2.5	12.3±2.3	**G1 vs G3:0.004***
Platelet, 10^3/μL (n=481)				**G1 vs G2: 0.027***
Mean±SD	261.2±107.7	223.1±110,5	260.3±97.6	**G2 vs G3:0.032***
WBC, 10^3/μL (n=481)				**G2 vs G3:0.001****
Mean±SD	9.6±3.6	9.9±6.3	13.1±10.1	**G1 vs G3:<0.001****
Neutrophil, 10^3/μL (n=481)				**G2 vs G3:0.002****
Mean±SD	6.7±3.4	7.8±5.9	9.7±6.4	**G1 vs G3:<0.001****
Lymphocyte, 10^3/μL (n=481)				**G1 vs G2:<0.001***
Mean±SD	1.8±0.9	1.2±0.7	1.6±0.8	**G1 vs G3:0.005***
Monocyte, 10^3/μL (n=481)				
Mean±SD	0.7±0.3	0.8±0.6	1.5±7.1	**G1 vs G3:0.007****
NLR, (n=481)				**G1 vs G2:<0.001****
Mean±SD	4.9±5.2	7.9±7.1	8.3±9.5	**G1 vs G3:<0.001****
Sedimentation, mm/h (n=357)				
Mean±SD	43.5±28.6	48.1±32.6	56.5±32.8	**G1 vs G3:0.001***
CRP, mg/L (n=415)				**G1 vs G2:0.006****
Mean±SD	56.6±76.6	89.5±92.6	119.4±118.1	**G1 vs G3:0.002****
Procalcitonin, ng/mL (n=62)				**G1 vs G2:0.037****
Mean±SD	1.1±3.8	1.9±3.4	9.5±24.1	**G1 vs G3:0.001****
Glucose, mg/dL (n=361)				**G2 vs G3:0.012***
Mean±SD	127.1±62.9	119.2±86.9	149.5±90.2	**G1 vs G3:0.038***
AST, U/L (n=439)				
Mean±SD	26.1±17.8	50.1±82.2	29.4±30.4	**G1 vs G2:0.003****
LDH, U/L (n=142)				
Mean±SD	287.2±190.2	319.7±182.9	357.7±279.5	**G1 vs G3:0.008***
BUN, mg/dL (n=450)				**G1 vs G2:0.031****
Mean±SD	39.8±26.1	59.7±47.8	49.4±35.1	**G1 vs G3:0.028****
Creatinine, mg/dL (n=453)				**G1 vs G2:0.049****
Mean±SD	1.06±0.5	1.28±0.73	1.23±0.68	**G1 vs G3:0.006****

* T-Test **Mann-Whitney U Test. SD: Standard Deviation, G1: No Hospitalization, G2: Group Diagnosed with Cellulitis While Hospitalized for Another Reason, G3: Group Hospitalized for Cellulitis, NLR: Neutrophil to Lymphocyte Ratio.

outpatient treatment was significantly longer in the group without hospitalization than in the group hospitalized for cellulitis (p=0.027). The frequency of changing the initial antibiotic was lower in the group hospitalized for another reason (56.4%) than in the group hospitalized for cellulitis (78.2%) (p=0.006).

The frequency of tissue culture and wound swab culture was significantly higher in patients hospitalized for cellulitis than in the other two groups. The frequency of blood culture was significantly lower in the non-hospitalized group compared to the other two groups (all p values <0.001). The frequency of USG in patients showed a significant difference between all groups, being highest in patients hospitalized for cellulitis and lowest in outpatients (all p values <0.05). There was no significant difference between the hospitalization status of the participants and the presence of growth in tissue culture, growth in wound swab culture, growth in blood culture and the presence of findings compatible with cellulitis on USG.

The laboratory results showing significant changes according to the reason for hospitalization are presented in Table 4.

Comparison of clinical characteristics of patients according to diabetes and obesity status

The prevalence of obesity, venous insufficiency, lymphedema, tinea pedis and onychomycosis was significantly higher in patients with DM than in patients without DM (p values: <0.001, 0.035, 0.003, 0.048, 0.002, respectively).

The frequency of DM, venous insufficiency and lymphedema was significantly higher in obese patients compared to non-obese patients (p values: p<0.001, p=0.004 and p<0.001, respectively). The frequency of recurrent episodes, hospitalization, hospitalization due to cellulitis and initial antibiotic changes were significantly higher in

patients with DM compared to those without DM (p values: <0.001, 0.006, 0.010, 0.016, respectively).

The frequency of recurrent episodes, hospitalization, hospitalization due to cellulitis and initial antibiotic changes were higher in obese patients than in non-obese patients (p values: <0.001, <0.001, <0.001, <0.001, <0.001, respectively).

Discussion

In our study, there was a predominance of middle-aged to elderly patients and we thought that this was due to a higher prevalence of diseases that are predisposing factors for cellulitis [10]. In previous studies, gender and age did not make a significant difference in terms of cellulite attacks [11, 12]. In our study, while the majority of those who had a first episode were male, female gender was more common in those who experienced recurrent episodes. According to the reasons for hospitalization, the gender distribution of the groups was similar and consistent with the study by Volz et al. [13].

Garg et al. found that almost half of their cellulitis patients were obese, whereas we found that 25% were obese and the frequency of recurrent attacks increased in obese patients [14]. Obesity is considered a predisposing factor especially for recurrent lower extremity cellulitis [15]. In our patients, as in similar studies, lower extremity involvement was most common [16, 17]. In our findings, it is noteworthy that hospitalization due to cellulitis is more common in obese individuals. In the study by Cheong et al. it was noted that both the frequency of cellulitis and hospitalization increased in obese individuals [18].

Karppelin et al. reported that diabetes is a risk factor for recurrent cellulitis [19]. Approximately one third of the participants in our study had diabetes. Similar to the results of previous studies, outpatients had significantly lower age, diabetes and obesity prevalence than inpatients [10, 14]. Since failure to respond to treatment or complications is more common in advanced age and diabetes, hospitalization is more preferred in these groups.

The majority of the participants had a condition that disrupted skin integrity in accordance with the literatüre [20, 16, 17]. Diabetes, obesity, lymphedema, previous leg surgery, onychomycosis, venous insufficiency is important predisposing factors for recurrence [5, 21]. Disruption of skin integrity is considered a risk factor for both acute and recurrent attacks and supports our results [22]. Koutkia et al. reported that 40% of inpatients with cellulitis had peripheral vascular disease [23]. Venous insufficiency is an important predisposing factor for the development of cellulitis [24]. In this respect, a higher rate in patients hospitalized for cellulitis is an expected result.

Recurrence is a common condition in cellulitis patients. In a study by Karppelin et al. it was found that 20% of cellulitis patients experienced recurrent attacks [25]. In our study, this rate was 15% and it was more common in the group that developed cellulitis while hospitalized for another reason. It was also observed that the length of hospitalization was longer in this group. It was thought that the comorbidities of patients hospitalized for other reasons may have increased the total length of hospitalization. In addition, this group may be more prone to subsequent attacks due to their illness. Recurrent attacks occur more frequently in comorbidity conditions that cause predisposing factors. It is noteworthy that the total duration of outpatient treatment is shorter in cases of recurrent attacks. The reason for this was thought to be the learning of disease management due to previous experience of the disease.

It is observed that not many cultures are performed in the literature because the most common microorganisms causing cellulitis are known and culture is not a cost-effective approach. In this study, cultures were performed more frequently because it was a tertiary care center and more complicated patients were included in the study. Although the causative microorganisms detected in the study were generally similar to the literature, it is noteworthy that β-hemolytic streptococcus growth was low [26]. This was due to the fact that cultures were not performed in outpatients.

It was determined that more tissue cultures were taken in the recurrent attack group and more growth was found in the wound swab culture. There was no difference between the groups in terms of blood culture. More wound swab cultures and tissue cultures were performed in the group hospitalized for cellulitis compared to the other groups. Blood culture was almost negligible in outpatients. There was no difference between the 3 groups in terms of culture growth. In a study by Bauer, it was reported that blood culture was performed more frequently in cases of recurrent cellulitis [27]. In the study conducted by Callozos et al. it was found that the recurrence and first attack situations were similar in terms of growth in wound culture, blood culture and presence of growth in blood culture [28]. In a study by Lazzarini et al. it was reported that blood culture was obtained from one third of those hospitalized for cellulitis, wound swab culture was obtained from half of them and tissue culture was obtained from only one [29]. In skin-soft tissue infections, in patients with rare pathogens, in patients with recurrence and in cases where there is no successful response to treatment, further investigations and obtaining materials for culture are options that should always be considered.

Parameters indicating the presence of active infection such as CRP, WBC, NLO, sediment and procalcitonin were increased in both groups regardless of the first attack or recurrence status. In the outpatient group, NLO, CRP, procalcitonin and BUN levels were lower than the other groups, while hemoglobin and lymphocyte values were higher. In a study conducted by Brindle et al. in cellulitis patients, it was reported that there was a strong positive correlation between procalcitonin and CRP and NLO values and that these are parameters that can be used to determine disease severity in cellulitis [11]. Since inpatients have more severe cellulitis attacks than outpatients, it is expected that the infection parameters in laboratory results would be higher.

Approximately half of the antibiotics initially started were amoxicillin-clavulanic acid. The 2nd most common antibiotic was ampicillin-sulbactam and the 3rd most common was ciprofloxacin. One third of the patients needed to change the initial antibiotic. The most frequently switched

antibiotic was amoxicillin-clavulanic acid. In the study conducted by Lazzarini et al. the most frequently used antibiotics were amoxicillin-clavulanic acid as single agent and clindamycin-penicillin as combination therapy [29]. Callozos et al. reported that 37.1% of the patients received more than one antibiotic treatment, 42.7% received amoxicillin-clavulanic acid treatment, and approximately one third of the patients changed the antibiotic initially used [28]. Empirical treatment is given to patients with cellulitis and treatments are similar worldwide. Changing the antibiotic used at the beginning of treatment is more common in the group hospitalized for cellulitis. Considering that more complicated or treatment failure groups are treated as inpatients, it is usual to change the antibiotic used at the beginning of treatment.

Doppler USG/surface tissue USG was performed in approximately half of the participants and 56% had findings consistent with cellulitis. In addition, doppler USG/surface tissue USG was performed more in patients hospitalized for cellulitis than in other groups. In a study conducted by Tunalı, it was stated that doppler USG was performed in all participants [30]. Doppler ultrasound is usually one of the first tests performed in suspected cellulitis [7]. Doppler USG is also used in the differential diagnosis of deep vein thrombosis in cellulitis patients [31].

There are some limitations in our study. In this retrospective study, the findings we presented in terms of the distribution of predisposing factors are limited to the records. It was observed that the number of patients diagnosed with cellulitis and the number of patients hospitalized and treated for cellulitis decreased significantly during the pandemic period. It is obvious that the frequency of cellulitis did not decrease during this period due to problems in accessing health services due to the risk of transmission and restrictions, but there was a relative decrease in the frequency of the disease due to the decrease in hospital admissions. Our data belong to a tertiary hospital that meets the patient density of Ankara and neighboring provinces. Although our sample is large, our results cannot be generalized to all cellulitis patients in Turkey, but they will be similar. The literature is lacking in terms of studies comparing cellulitis patients receiving outpatient treatment, patients hospitalized for cellulitis and patients diagnosed with cellulitis while hospitalized for non-cellulitis reasons. Further studies on this subject are needed. Our study is a unique and comprehensive study in this respect.

Diabetes, obesity, venous insufficiency, lymphedema, and conditions that impair skin integrity are important predisposing factors both in terms of cellulitis development and recurrence. 29.9% of the patients developed cellulitis while hospitalized for a non-cellulitis reason. In order to reduce this frequency, awareness of this issue can be increased by providing in-service trainings to hospital staff. Since recurrent attacks occur more frequently in comorbidity conditions that cause predisposing factors, it should be taken into consideration that they occur more frequently in the case of hospitalization for non-cellulitis reasons. The fact that patients are usually treated with amoxicillin-clavulanic acid suggests that the prevalence of resistant microbiologic strains in the community is low. The importance of CRP, NLO and procalcitonin parameters, which are the current infection markers used in cellulitis or other infectious conditions, should be considered both in determining the severity of the disease and in deciding on hospitalization. Diabetes and obesity increase the need for inpatient treatment. Cellulitis patients can be trained according to their special conditions. For example, foot hygiene for diabetic patients, wearing compression stockings for patients with venous insufficiency or lymphedema, healthy lifestyle and nutrition education for obese individuals can be given.

Ethical approval

The study was obtained from Gulhane Training and Research Hospital Ethics Committee (Decision date/no: 16.12.2021/2021-417).

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