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Impacts of the COVID-19 pandemic on the management of cellulitis cases: Descriptive research

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Abstract

The outbreak of a newly recognized coronavirus in China's Hubei province in December 2019 marked the beginning of a new pandemic called coronavirus disease 2019 (COVID-19). We aimed to assess the impact of the COVID-19 pandemics on the cellulitis patients to reveal possible health problems that may be encountered in the future pandemics. We have evaluated the demographics, clinical features, predisposing factors of cellulitis patients admitted to our department during lockdown period (March-July 2020) and the corresponding months of the previous, and following 2 years. The ratio of cellulitis patients to total number of patients was also evaluated. The rate of recurrent attacks was found to be significantly higher in the lockdown period (54.5%) compared to precovid (12.5%), restriction (23.1%) and unrestricted periods (10.8%), (p=0.011).Although the ratio of cellulitis patients to the total number of patients during the lockdown and restriction periods (0.21% and 0.19% respectively) were higher compared to precovid and unrestricted periods (0.14% and 0.13%, respectively), the difference between the groups was not statistically significant. The rate of the recurrent episodes of cellulitis is higher in lockdown period. Patients with a known history of cellulitis should be advised to take proper measures to prevent recurrent episodes in future pandemics.

Keywords: Cellulitis, COVID-19, pandemic

Introduction

The newly recognized coronavirus outbreak in China's Hubei province in December 2019 wasthe beginning of a new pandemic called the Coronavirus Disease 2019 (COVID-19) [1]. Following the pandemic announcement, some regulations such as curfews, closure of schools and common social institutions, flexible working programs in public institutions including hospitals were introduced. In our country lockdown measures were put into effect in March-July 2020 and lasted almost 4 months. Dermatologists and dermatology departments were also affected by these measures. Until the normalization period, outpatient clinics, like all other medical departments, continued to operate in a very limited way. The workload and responsibility of healthcare professionals and physicians have increased during the COVID-19 pandemic all over the world. Dermatologists have also had to adapt to the changing conditions in the new situation and continue their own branch operations without interruption, and in addition, they had to adapt to practices outside of their fields, to help patients affected by COVID 19 [2]. The dermatologic patients were also affected by pandemic conditions and countermeasures such as lockdowns. Future problems in the field of dermatology have been a matter of concern.

Cellulitis is an acute bacterial infection of the skin involving dermis depth and subcutaneous adipose tissue, and can often occur in the community, especially in patients with comorbidities, which may lead to serious complications, morbidity, and mortalityResearch and COVID-19 pandomy has no effect. The illness could not be investigated. Cellulitis is most frequently observed in the lower limbs, but can also develop in various parts of the body, such as the face and periorbital regions [3,4].The prevalence of cellulitis in municipalities was reported at approximately 1.64-2.46%, but this prevalence has been reported to increase, particularly among older adults and male genders [5]. If cellulitis is not treated or treated by other underlying disease, it may spread to the lymphatic pathway and lead to more serious clinical images such as osteomyelitis, endocarditis, tremlock biatis, and reactive

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arthritis there is [6].

Despite the fact that cellulitis is a common skin disease that occurs frequently, has a high recurrence rate and can cause mortality and morbidity in the presence of comorbidities, it is a large-scale skin disease on this topic. There has been limited research on cellulitis during the COVID-19 pandemic. Therefore, its course during this period remains insufficiently explored.

The aim of this study was to compare the data of cellulitis patients before and during the pandemic to determine how the COVID19 pandemics and counter-measures affected patients with cellulitis and to predict future health problems.

Material and Methods

Study Population

The study was approved by the Gulhane Scientific Research Ethics Committee (Date: 11.04.2023, Approval No: 119). This study was conducted according to principles Declaration of Helsinki. This is a single retrospective, cross-sectional study. The population of this study consisted of 97 patients aged 11-90 years who were followed up with a diagnosis of cellulitis during the lockdown period (March-July 2020), and corresponding months of previous year (March-July 2019, precovid period), and following two years namely, March-July 2021 when there were restrictions to movement of people without lockdown (restriction period) and March-July 2022 when all the restrictions to movement of the people were waived (unrestricted period).

Demographic characteristics of patients, including age, gender, body mass index (BMI), presence of predisposition factors (diabetes (DM), obesity, and venous deficiency), lymphedema, presence of conditions impairing skin integrity such as tinea pedis, history of trauma, history of skin lesions, number of attacks, hospitalization status, duration of hospitalization, biochemistry results were recorded. To determine how cellulitis cases compared with other dermatological conditions compared to patients with other skin diseases, the total number of patients included in the department during study time and number of cellulitis cases. We also compared them.

Statistical Analysis

Statistical analysis was performed using IBM SPSS statistics for Windows, version 25 (IBM Corp., Armonk, NY, USA). Descriptive statistics are displayed as number, percentage, mean±standard deviation (SD) and median (minimum-maximum value). The suitability of the normally distributed continuous variables was assessed using the Shapiro-Wilk test.ANOVA tests were utilized for comparing normally distributed data across all groups, while Kruskal-Wallis tests were applied for variables not exhibiting normal distribution. Bonferroni tests were employed as post hoc tests. Categorical variables for independent groups were compared using the chisquare test.

Statistical significance level was accepted as $p \leq 0.05$.

Result

This study included 97 patients aged 11-90 years who were followed up in our clinic with a diagnosis of cellulitis as outpatients or inpatients. In our Department, in the 4 months of precovid (March-July 2019), lockdown (March-July 2020), restriction (March-July 2021) and unrestricted (March-July 2022) periods 32, 11, 26 and 28 patients were diagnosed with cellulitis, respectively. Demographic data of the patient groups is presented in Table 1.

As seen in Table 1, no significant differences were found between the demographic data distributions for the patient groups.

The results for the patient group are shown in Table 2.There was no statistically significant difference between any of the laboratory results, among the patient groups.

When the patient groups were assessed for the predisposing factors, the prevalence of DM in cellulitis patients, in the precovid, lockdown, restriction and unrestricted periods were 28.1%, 45.4%, 38.4%, and 48.1%, respectively. Differences between groups were not statistically significant (p=0.434).

The prevalence of obesity in cellulitis patients during precovid, lockdown, restriction and unrestricted periods was 21.8%, 30%, and 23.07%. 21.4%. Differences between groups were not statistically significant (p=0.953).

The prevalence of venous deficiency in cellulitis patients was 18.7%, 27.7%, 30.7%, and 32.1% during precovid, lockdown, restriction, and unrestricted periods. Differences between patient groups were not statistically different (p=0.643).

The prevalence of lymphedema was 9.3% 18.1%, 11.5%, and 7.1% in the precovid, lockdown, restriction, and unrestricted periods, respectively, and there was not statistically significant difference between the groups (p=0.774).

The presence of tinea pedis, onychomycosis, history of trauma and skin lesions were investigated as conditions impairing skin integrity. In the precovid, lockdown, restriction and unrestricted periods, 75%, 45.4%, 53.8% and 60.7% of the patients had had conditions that impaired skin integrity, respectively and there were no significant differences between the groups (p=0.229).

The number and ratio of cellulitis patients with first and recurrent episodes are given in Table 3. The ratio of patients admitting for recurrent attack (i.e. who had a previous history of cellulitis) was 12.5% during the precovid period. The ratio of patients having recurrent attacks was 54.5% during the lockdown period, 23.1% in restriction period and 10.7% in unrestricted period. Statistically speaking, patients experiencing recurrent episodes during the lockdown period was found to be significantly higher compared to other periods (p=0.011). The relative frequencies of the first and repeating episodes are shown in Figure 1.

For all periods, lower extremity participation was most observed in patients, with no significant differences in relationships with the relevant regions determined (p=0.457).

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In precovid period 34.3% of the cellulitis patients were hospitalized, this rate was 27.2% in the lockdown period, 30.7% in the restriction period and 39.2% in the unrestricted period. These rates were not statistically different (p=0.875). During the precovid period, patients were hospitalized for an average of 11.4 (4-28) days, during the lockdown period for an average of 10.5 (0-25) days, during the restriction period for an average of 21.3 (7-71) days, and during the unrestricted period for an average of 15.7 (5-33) days. There were no significant differences between the groups from a hospitalization perspective (p=0.336). Total number of patients included in our department (0.21% or 0.19%) during the lockdown and restriction period. However, differences between groups were not statistically significant (p=0.337).

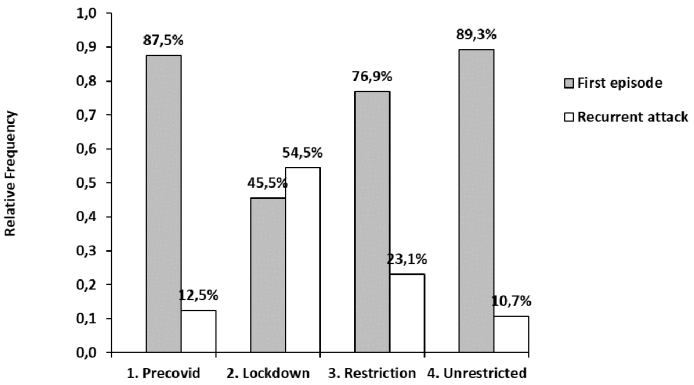

Figure 1. The relative frequency of patients with first and recurrent episodes

Table 1. Demographic data of the patients

Demographic Features	Precovid	Lockdown	Restriction	Unrestricted	p values
Gender	16 M/16 F	6 M/5 F	14 M/12 F	9 M/19 F	0.344
Age	61±19	60±23	62±21	62±20	0.983
Weight	80±18	77±14	78±15	83±20	0.889
Height	168±6	163±8	168±7	173±7	0.841
BMI	27.2±4.7	29.4±6.7	27.6±4.8	28.4±6.8	0.706

M: male, F: female, BMI: Body mass index

Table 2. Laboratory parameters of the patient groups

Laboratory Parameters	Precovid	Lockdown	Restriction	Unrestricted	p values
HGB (g/dL)	12.8±1.9	14±2	11.7±2.2	12.6±2.6	0.148
PLT (10^3/µL)	234±87	332±181	202±89	243±106	0.235
WBC (10^3/µL)	8.6 (2.7-36.7)	8.6 (6.2-12.75)	6.65 (0.4-23.3)	6.9 (0.8-17.6)	0.094
NEU (10^3/µL)	6 (2.1-31.2)	6.1 (2.9-10.58)	4.2 (0.1-19.6)	4.7 (0.2-14.7)	0.107
LEN (10^3/µL)	1.2 (0.3-3.4)	1.9 (0.76-3)	1.43 (0.1-3.1)	1.45 (0.5-2.7)	0.592
NLR	4.8 (1.5-40.4)	3.5 (0.9-13.9)	2.68 (0.5-38)	3.5 (0.4-12)	0.179
ESR (mm/h)	43.5 (4-95)	35.5 (2-85)	35.5 (1-93)	31.5 (7-123)	0.835
CRP (mg/L)	27.13 (0.04-339.7)	12.92 (2.9-151.9)	18.29 (0.2-389.8)	35.8 (1.2-354)	0.793

HGB:hemoglobin, PLT:platelet, WBC: White Blood Cell, NEU: neutrophil, LEN: lymphocyte, NLR: Neutrophil Lymphocyte Ratio, ESR: Erythrocyte Sedimentation Rate, CRP: C-Reactive Protein

Table 3. The number and ratio of patients with first and recurrent episodes of the disease

Period	Total number of cellulitis patients (n)	Patients with first episode number (n) and ratio	Patients with recurrent episodes number (n) and ratio
Precovid	32	28 (87.5%)	4 (12.5%)
Lockdown	11	5 (44.5%)	6 (54.5%)
Restriction	26	20 (76.9%)	6 (23.1%)
Unrestricted	28	25 (89.3%)	3 (10.7%)
Total	97	78 (80.4%)	19 (19.6%)

Table 4. The number of total admissions and cellulitis patients

Period	Number of total admissions (n)	Number of cellulitis patients (n)	Ratio of cellulitis patients (%)
Precovid (March-July 2019)	22224	32	0.144
Lockdown (March-July 2020)	5186	11	0.212
Restriction (March-July 2021)	13392	26	0.194
Unrestricted (March-July 2022)	21424	28	0.131

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Discussion

In our study, the age and gender distribution of assessed patients across all groups was statistically similar (p values: 0.983 and 0.344, respectively). Maze et al., it was reported that the gender distribution of cellulitis patients was nearby in New Zealand [7]. As well as the mean age of patients in our study, Halpern et al. England 2008 [8]. Although there are no significant differences between genders in the literature in general, it has been observed that there are more cellulitis patients in both men and women. This was assumed to be due to the high prevalence of comorbidities as a predisposition to these age groups. In our study, there were no significant differences between groups in terms of obesity, but obesity rates were the highest during the lockdown period. The results show that hospital admissions due to cellulitis caused by comorbidities such as obesity continue during the lockdown period (Table 4).

It has been observed that 28.1% of patients with precovid period DM, 45.4% of lockdown period and 38.4% were shown in the restriction period and 48.1% were shown in the unrestricted period. In this study, we found that one quarter of cellulitis patients had DM [9]. There was no significant difference in the incidence of DM between our study groups (p=0.434). This result shows that DM is another important comorbidity of cellulitis, causing hospital admissions even during the lockdown period In all groups, tinea Pedis was the most common disease affecting skin integrity (48.5%). Seo et al. in Korea, 41.9% of cellulitis patients reported 23.3% and 20.9% of previous skin infections suffered a history of trauma, while 76% suffered from diseases that disrupt skin integrity [10]. None of the cellulitis patients in our study were subjected to trauma analysis during the lockdown period. This can be due to a decline in social life and activity outside the home during the lockdown period.

Carratala et al. in Spain in 2003, it was found that one-third of patients with cellulitis had a disease that disrupts skin integrity and suffered from 20% lymphedema or venous deficiency [11]. In another study by Peterson et al. in 2014, it was reported that 43.5% of patients had skin disease, 56.1% of historical cellulitis, 18.9% DM, 18.5% lymphedema, and 10.7% of patients with venous deficiency [11]. In our study, 10.3% of all participants suffered from lymphedema and 26.8% of the participants suffered from intravenous deficiency. There was no statistically significant difference between lymphedema rate and venous deficiency among the groups in our study (p values: 0.774 and 0.643, respectively). In cellulitis, microorganisms usually pass through areas where skin integrity is affected. Furthermore, the presence of several local and systemic predispositions also promotes the formation of cellulitis. It is observed that in both this study and in the literature the risk of cellulitis is also increased in the presence of the above factors.

One of Karppelin et al. in the US, it was found that 20% of cellulitis patients had repeated episodes [12]. In our study, 18.59 out of 97 patients repeated episodes of cellulitis. This rate was similar to other studies in the literature.

However, in our study, the proportion of patients with recurrent disease during the lockdown period was much higher, with differences being statistically significant. This was the most prominent finding in our study. Only 12.5% of cellulitis patients recorded during this period had a history of cellulitis. After a significantly higher repetitive episode at a lockdown period of 54.5%, this percentage was 23.1% for the restriction period and 10.8% for the unrestricted period, similar to the provisional time. This finding indicates that patients with cellulitis known in their history of the pandemic are at a higher risk of developing new episodes of the disease when they are in the lockdown period.

All patients who received recurrent challenge in all groups had at least one coexisting condition (DM, obesity, lymphedema, lack of venous). It is a known fact that recurrent attack on cellulitis is observed in patients with additional comorbidities. This result is not surprising as this group of patients is hospitalized for non-cellulitis comorbidities.

A study conducted by Demirubao reported that about a third of cellulitis patients received inpatient treatment [13]. Cox et al. they reported that intermediate hospitalization for cellulitis patients who received inpatient treatment was 10 days [14]. In our study, 34.3% of the provisional time of predecessor at the time of completion, 30.7% of the restriction period and 39.2% of the unreserved period were hospitalized. Patients were hospitalized for an average of 11.4 (4-28) days for precovid period, 10.5 (0-25) days for the lockdown period, 21.3 (7-71) days for the restriction period, and 15.7 (5-33) days for the restriction period. There were no significant differences between groups in relation to inpatient treatment rates and length of hospital stay (p values; 0.875 and 0.336, respectively). However, the minimum hospital stay and lockdown periods in this study were expected to stay in the hospital due to prioritization of covid patients during this period.

The proportion of cellulitis patients among total admissions during the lockdown and restriction periods (0.21% and 0.19%, respectively) was compared with previously unpriority periods and unrestricted periods (0.14% or 0.13%). It was a difference, but there was a difference. It is not statistically significant. According to these results, lockdown and limitations may affect the inclusion of cellulite patients among other dermatology patients. However, further research is needed to clarify this issue.

Conclusion

Our study shows that, lockdown conditions during pandemics causes the ratio of recurrent attacks of cellulitis to increase. Patients with a known history of cellulitis should be advised to take proper measures to prevent recurrences during lockdown conditions. More studies are needed to elucidate if the lockdown and restrictions affect the admissions of cellulite patients less than other dermatological patients.

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Conflict of Interests
The authors declare that there is no conflict of interest in the study.

Financial Disclosure
The authors declare that they have received no financial support for the study.

Ethical Approval
The study received ethical approval from the Gulhane Scientific Research Ethics Committee (Date: 11.04.2023, Approval No: 119).

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