

Characteristics of patients admitted to a dermatology emergency unit in Tehran, Iran, during the COVID-19 pandemic

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Background: With the emergence of the coronavirus disease 2019 (COVID-19) pandemic, many people were affected worldwide. This study evaluated patients' characteristics and skin diseases at a Dermatology Emergency Unit (DEU) of a university skin hospital in Tehran, Iran, during the COVID-19 pandemic. We also compared the results with those of a previous study performed at the same DEU in 2017.

Methods: The data of all patients presented to the DEU during the first four months of the pandemic in Iran (February to June 2020) were studied, and variables such as age, sex, complaints, and final diagnosis were collected.

Results: A total of 3,745 patients (50.3% male) were studied. Infections (32.4%), dermatitis (20.5%), and urticaria (16.8%) were the most prevalent diagnoses in both genders. Infections were significantly more frequent in males ($P < 0.001$), while urticaria was more common in females ($P < 0.001$). The highest number of visits occurred between 12:00–18:00 (34.0%) and most patients were between 18–44 years old (48.8%).

Conclusion: With the growing number of COVID-19 cases, the DEU of our skin hospital was involved as part of the medical community in screening COVID-19 patients. Compared to the previous study, the general framework of common causes of DEU visits was very similar to that of the non-pandemic era, although a significant increase in the proportion of dermatitis cases was observed. Likewise, the proportion of non-skin complaints was significantly higher, reflecting the public concern about the COVID-19 pandemic.

Keywords: COVID-19, skin diseases, emergencies, infections, pandemics

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INTRODUCTION

The first cases of the novel coronavirus were reported in Wuhan, Hubei Province, China, in

December 2019 and January 2020 ^{1,2}. The World Health Organization (WHO) announced the COVID-19 outbreak as a pandemic on March 11, 2020 ³. The

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pandemic affected many countries and many individual aspects of the world economy ⁴. In Iran, the first cases of COVID-19 were officially reported on February 19, 2020 ⁵. Although Iranian dermatologists were not on the frontline, they had to participate in the fight against COVID-19 to prevent healthcare workers from being overburdened.

Although dermatological diseases are mainly managed in outpatient settings, 4–8% of all emergency department visits are for dermatological conditions ⁶. Although most of these diseases are not life-threatening, patients seek immediate attention and keep presenting to emergency departments due to their frustrating signs and symptoms, such as wheals or pruritus ⁷. Meanwhile, a few potentially life-threatening skin conditions, such as severe cutaneous drug reactions and angioedema, require urgent evaluation by a dermatologist at an emergency department ⁸.

Many studies have evaluated the characteristics of patients presenting to emergency departments with dermatological complaints ⁹⁻¹³. To our knowledge, none have been performed during the COVID-19 pandemic. Hence, we evaluated patients' characteristics and skin diseases at a Dermatology Emergency Unit (DEU) of a university skin hospital in Tehran, Iran, during the first months of the COVID-19 pandemic. This hospital also screened COVID-19 patients in a separate part of the emergency unit to reduce the burden on other hospitals. These patients did not necessarily have skin manifestations. We also compared our results with those of a previous study performed at the same DEU before the pandemic ⁸.

METHODS

This cross-sectional study was conducted at the DEU of Razi Hospital, the largest tertiary referral dermatology hospital in the country. The study was approved by the Tehran University of Medical Sciences Ethics Committee. The medical records of all patients who visited the DEU between February and June 2020 (the first four months of the COVID-19 epidemic in Iran) were reviewed, and variables including age, gender, the date and time of entrance, the chief complaint of the patients, the final diagnosis, hospitalization of patients, and COVID-19 status of patients were extracted.

The DEU of the hospital is always open and

provides care for patients with emergent or urgent life-threatening skin conditions. The primary diagnoses in the medical records were categorized into 19 groups, including drug reactions, cutaneous neoplasms, genodermatoses, psychocutaneous diseases, cutaneous rheumatologic diseases, infections, infestations and bites, diseases of hair and nails, vesiculobullous diseases, disorders due to physical agents, papulosquamous and eczematous dermatoses, urticarias, erythema and purpuras, adnexal diseases, atrophies and disorders of dermal connective tissues, metabolic and systemic diseases, pigmentary disorders, skin surgery, vascular disorders, non-skin diseases, and unknown diagnosis. This categorization was based on our previous study performed at the same DEU ⁸.

Statistical analysis was performed using IBM SPSS Statistics v17.0 software. The frequency is reported for qualitative variables, and mean \pm standard deviation is reported for quantitative variables. A comparison among the subgroups was performed using the chi-squared test. P-values below 0.05 were considered significant.

RESULTS

A total of 3,745 patients were visited in the dermatology emergency unit (DEU) during the study period. Roughly half the patients ($n = 1,885$; 50.3%) were male. The mean age was 37.70 ± 19.38 years (range: 1 day–96 years).

The most common diagnoses among DEU attendees were infections, infestations, and bites, with a total of 1213 cases (32.4%), followed by dermatitis (766 cases, 20.5%) and urticaria/angioedema (628 cases, 16.8%). Also, 269 patients (7.2%) had no definite diagnosis in the emergency department setting (Figure 1).

Regarding the infections and infestations group (Figure), viral dermatoses were the most common subgroup with 484 cases (39.9%); among them, shingles were the most frequent viral disease with 318 cases (8.5%). The second most common diagnosis was scabies, with 224 cases (18.5%). The third most prevalent diagnosis was bite reaction (194 cases, 16.0%), followed by bacterial infections (133 cases, 11.0%), fungal infections (119 cases, 9.8%), pediculosis (44 cases, 3.6%), leishmaniasis (10 cases, 0.8%) and abscess (5 cases, 0.4%).

Regarding the drug reactions, the most prevalent

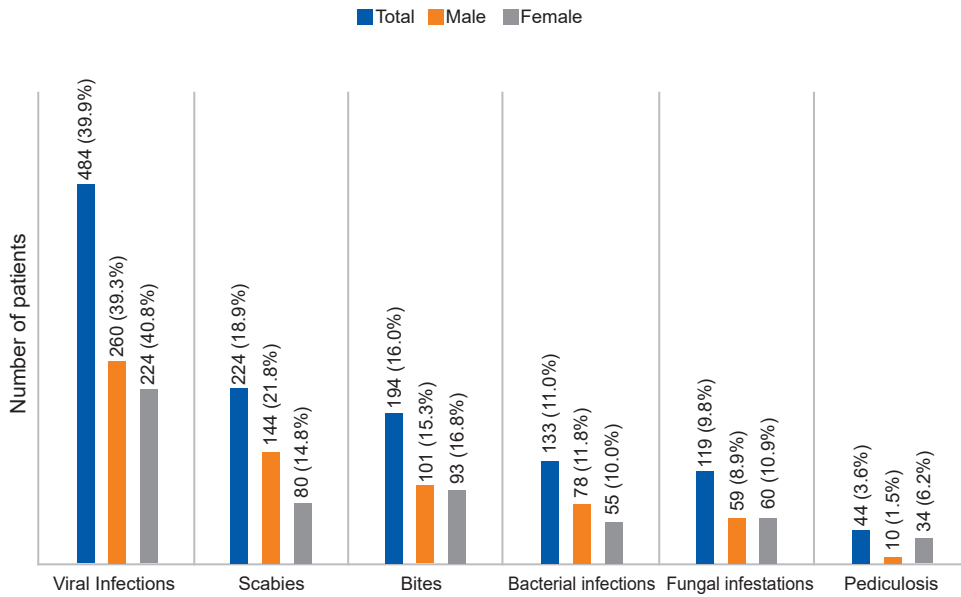


Figure 1. Distribution of infections, infestations, and bites

drug reaction was exanthematous drug eruptions, with a total of 77 cases (72.0%) (Figure 2).

As shown in Table 1, the top four diagnoses among both genders were the same, but there were some important differences. The frequency of infections and infestations was significantly higher in males ($P < 0.001$). On the other hand, females were more

commonly diagnosed with urticaria/angioedema than males (388 (20.9%) vs 240 (12.7%); $P < 0.001$).

The majority of patients were between 18 and 44 years old (48.8%). Infections, infestations, and bites (483 cases, 26.5%), dermatitis (373 cases, 20.4%), and urticaria/angioedema (353 cases, 19.3%) were the most prevalent diagnoses in this age group (Table 2).

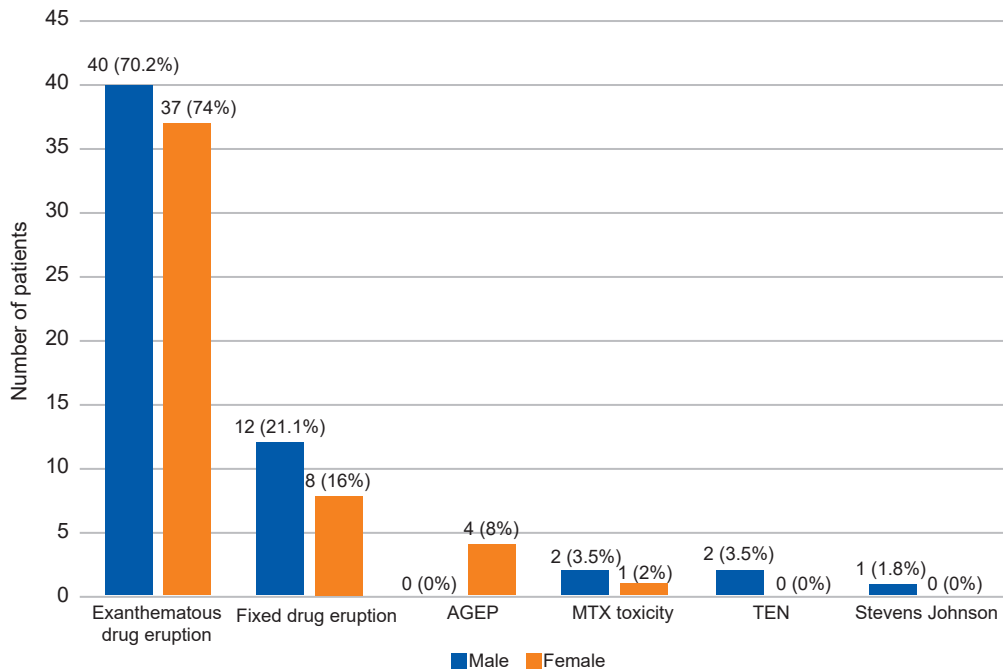


Figure 2. Distribution of drug reactions. AGEP: acute generalized exanthematous pustulosis; MTX: methotrexate; TEN: toxic epidermal necrolysis

Table 1. Frequency of the most common groups of dermatoses in different genders

Group of dermatoses	Number of cases (%)	Male (%)	Female (%)	P-value†
Infections, infestations and bites	1213 (32.4%)	661 (35.1%)	552 (29.7%)	< 0.001*
Dermatitis	766 (20.5%)	382 (20.3%)	384 (20.6%)	0.777
Urticaria and angioedema	628 (16.8%)	240 (12.7%)	388 (20.9%)	< 0.001*
Unknown diagnosis‡	269 (7.2%)	146 (7.7%)	123 (6.6%)	0.184
Non-skin diseases§	225 (6.0%)	144 (7.6%)	81 (4.4%)	< 0.001*
Papulosquamous disorders	186 (5.0%)	98 (5.2%)	88 (4.7%)	0.548
Drug reaction	107 (2.9%)	57 (3.0%)	50 (2.7%)	0.557
Vesiculobullous diseases	73 (1.9%)	23 (1.2%)	50 (2.7%)	0.001*
Adnexal diseases	67 (1.8%)	34 (1.8%)	33 (1.8%)	1.000
Other skin diseases¶	53 (1.4%)	21 (1.1%)	32 (1.7%)	0.129
Mechanical injuries	28 (0.7%)	16 (0.8%)	12 (0.6%)	0.570
Skin surgery	22 (0.6%)	5 (0.3%)	17 (0.9%)	0.010*
Skin tumors	21 (0.6%)	10 (0.5%)	11 (0.6%)	0.830
Erythema multiforme	19 (0.5%)	10 (0.5%)	9 (0.5%)	1.000
Ulcer	19 (0.5%)	11 (0.6%)	8 (0.4%)	0.647
Hair and nail diseases	16 (0.4%)	12 (0.6%)	4 (0.2%)	0.076
Pigmentary disorders	14 (0.4%)	10 (0.5%)	4 (0.2%)	0.179
Psychocotaneous	11 (0.3%)	5 (0.3%)	6 (0.3%)	0.773
Erythema and purpura	8 (0.2%)	0 (0.0%)	8 (0.4%)	0.004*
Total	3745 (100.0%)	1885 (100.0%)	1860 (100.0%)	

† P-values less than 0.05 are significant and shown with an asterisk symbol (*) in this column.

‡ These patients could not be diagnosed at the time of the first emergency visit, and further examinations were needed to diagnose their disease.

§ This group contains all non-skin diseases, particularly new COVID-19 cases.

¶ This diverse group of skin diseases could not be classified into any of the main categories mentioned in the table.

Table 2. Distribution of groups of dermatoses according to age groups

Group of dermatoses/ age group (years)	≤ 10	10–17	18–44	45–64	≥ 65
Infections, infestations and bites	187 (43.8%)	81 (39.1%)	483 (26.5%)	321 (33.2%)	139 (39.2%)
Dermatitis	100 (25.8%)	39 (18.8%)	373 (20.4%)	182 (18.8%)	72 (20.3%)
Urticaria and angioedema	39 (10.1%)	29 (14.0%)	353 (19.3%)	170 (17.6%)	37 (10.4%)
Unknown diagnosis†	17 (4.4%)	14 (6.8%)	140 (7.7%)	69 (7.1%)	29 (8.2%)
Non-skin diseases‡	11 (2.8%)	10 (4.8%)	150 (8.2%)	47 (4.9%)	7 (2.0%)
Papulosquamous disorders	8 (2.1%)	14 (6.8%)	96 (5.3%)	56 (5.8%)	11 (3.1%)
Drug reaction	1 (0.3%)	6 (2.9%)	57 (3.1%)	30 (3.1%)	13 (3.7%)
Vesiculobullous diseases	0 (0.0%)	0 (0.0%)	21 (1.2%)	26 (2.7%)	26 (7.3%)
Adnexal diseases	6 (1.6%)	4 (1.9%)	40 (2.2%)	16 (1.7%)	1 (0.3%)
Other skin diseases§	6 (1.6%)	5 (2.4%)	22 (1.2%)	15 (1.5%)	5 (1.4%)
Mechanical injuries	1 (0.3%)	1 (0.5%)	19 (1.0%)	3 (0.3%)	4 (1.1%)
Skin surgery	1 (0.3%)	0 (0.0%)	18 (1.0%)	2 (0.2%)	1 (0.3%)
Skin tumors	2 (0.5%)	0 (0.0%)	6 (0.3%)	9 (0.9%)	4 (1.1%)
Erythema multiforme	0 (0.0%)	0 (0.0%)	13 (0.7%)	5 (0.5%)	1 (0.3%)
Ulcer	1 (0.3%)	0 (0.0%)	9 (0.5%)	7 (0.7%)	2 (0.6%)
Hair and nail diseases	2 (0.5%)	3 (1.4%)	6 (0.3%)	4 (0.4%)	1 (0.3%)
Pigmentary disorders	5 (1.3%)	0 (0.0%)	8 (0.4%)	1 (0.1%)	0 (0.0%)
Psychocotaneous	0 (0.0%)	1 (0.5%)	4 (0.2%)	4 (0.4%)	2 (0.6%)
Erythema and purpura	0 (0.0%)	0 (0.0%)	7 (0.4%)	1 (0.1%)	0 (0.0%)
Total	387 (100.0%)	207 (100.0%)	1825 (100.0%)	968 (100.0%)	355 (100.0%)

† These patients could not be diagnosed at the time of the first emergency visit, and further examinations were needed to diagnose their disease.

‡ This group contains all non-skin diseases, particularly new COVID-19 cases.

§ This diverse group of skin diseases could not be classified into any of the main categories mentioned in the table.

Among infections and infestations in patients between 18 and 44 years old (Table 3), viral dermatoses (172

cases, 35.6%) prevailed. Besides, the prevalence of viral dermatoses was directly related to the age of

Table 3. Distribution of infection and infestation subgroups in different age groups

Subgroup of infections/age group (years)	≤ 10	10–17	18–44	45–64	≥ 65
Viral dermatoses†	39 (20.9%)	23 (28.4%)	172 (35.6%)	167 (52.0%)	81 (58.3%)
Bacterial infections	41 (21.9%)	13 (16.0%)	46 (9.5%)	27 (8.4%)	6 (4.3%)
Bites	56 (29.9%)	21 (25.9%)	77 (15.9%)	33 (10.3%)	7 (5.0%)
Scabies	11 (5.9%)	9 (11.1%)	120 (24.8%)	58 (18.1%)	26 (18.7%)
Fungal infestations	21 (11.2%)	11 (13.6%)	41 (8.5%)	30 (9.3%)	16 (11.5%)
Pediculosis	17 (9.1%)	4 (4.9%)	18 (3.7%)	4 (1.2%)	1 (0.7%)
Leishmaniasis	2 (1.1%)	0 (0.0%)	6 (1.2%)	2 (0.6%)	0 (0.0%)
Abscess	0 (0.0%)	0 (0.0%)	3 (0.6%)	0 (0.0%)	2 (1.4%)
Total	187 (100.0%)	81 (100.0%)	483 (100.0%)	321 (100.0%)	139 (100.0%)

† Viral infections include shingles, chickenpox, herpes, hand-foot-mouth disease, etc.

patients (Figure 3).

As illustrated in Figure 4, the highest number of DEU visits was between 12:00 and 18:00, and the lowest number of visits was between 0:00 and 6:00. Urticaria and angioedema were the most common diagnoses between 0:00 and 6:00. The pattern of skin conditions presenting to the DEU during other hours of the day was similar to the general pattern shown in Table 1. (Figure 4)

Only a small minority of patients were hospitalized (60 cases; 1.6% of all). The highest rate of hospitalization occurred among the non-skin diseases group (23 cases, 38.3%; 20 cases of COVID-19, 2 trauma cases, and 1 anemia), followed by drug

reactions (10 cases, 16.7%, 1 methotrexate toxicity, 2 acute generalized exanthematous pustulosis, 2 toxic epidermal necrolysis, 1 Stevens-Johnson syndrome, and 4 exanthematous drug reactions). Furthermore, the ratio of hospitalizations between 12:00 and 18:00 was the highest, followed by visits between 6:00 and 12:00 (40.0% and 35.0% respectively).

Notably, 109 patients with COVID-19 were visited in the DEU (2.9% of all patients), and 3 of them also had dermatological manifestations (2 urticarias and 1 bite).

DISCUSSION

This study evaluated patients’ characteristics and

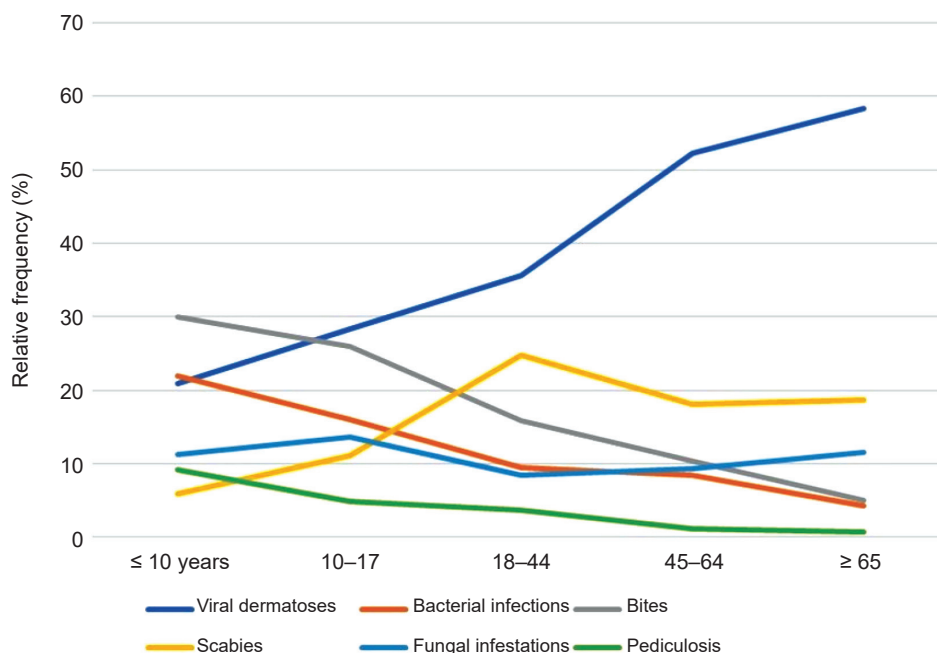


Figure 3. Distribution of infections and infestations in different age groups (years)

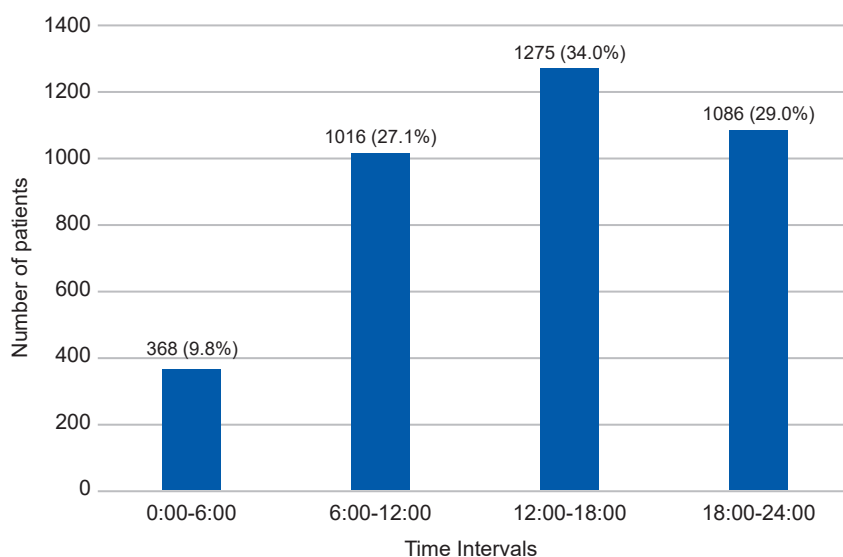


Figure 4. Frequency of visits during different time intervals of the day

skin diseases at a Dermatology Emergency Unit (DEU) of a university skin hospital in Tehran, Iran, during the first four months of the COVID-19 pandemic. Infections, urticaria, and dermatitis were the most common dermatological diagnoses. Most patients were between 18 and 44 years old. Infections and infestations were the most frequent diagnoses in both genders and all age groups. The highest percentage of hospitalization was related to non-skin diseases followed by drug reactions. Furthermore, 109 cases suspicious of COVID-19 were visited.

During our study, staying home was highly encouraged, and we expected fewer patients presenting with skin complaints and a change in the distribution of diseases. As such, the percentage of infections and infestations decreased (32.4%) compared to our previous study (41.9%). The percentage of urticaria and angioedema was similar in both studies; however, this group was ranked second in prevalence in 2017. In this study, most patients were visited between 12:00 and 18:00, but in the previous study, most patients were visited between 18:00 and 24:00⁸. This alteration in the peak of visiting hours may be explained by the flexible working hours established due to COVID-19, leading to more free time for the patients during the days and thus encouraging them to come earlier to the hospital.

In this study, we found that the diagnosis of dermatitis was higher during the four months of the pandemic compared with our previous study (766

(20.5%) and 336 (13.2%), respectively)⁸. Likewise, other researchers reported a significant increase in these cases compared with the non-pandemic period^{14,15}. The probable reason for this is the frequent use of disinfectants and detergents such as liquid soaps. It is possible to reduce admission of these cases in DEU with some considerations such as minimizing the irritant component in disinfectants, decreasing their use, moisturizing the skin more frequently, informing people properly, and reducing exposure to suspicious items. Gloves and alcohol-based disinfectants have also increased hand dermatitis in healthcare workers¹⁶.

Regarding the most common dermatological conditions at our DEU compared to other emergency departments, in a study by Ansoerge *et al.* in Germany, the four most frequent diagnoses were unspecified dermatitis (9.7%), urticarias (7.0%), scabies (5.4%) and atopic dermatitis (5.1%)¹³. Another research among children with skin infections in Argentina illustrated that the three most common infectious diseases were bacterial infections (55.5%), impetigo (22.4%), and furuncles (14.4%); all of them were classified under the bacterial infections subgroup in our study¹⁷. Pelloni *et al.* found that the most frequent visits to their DEU in Switzerland were flares of atopic dermatitis (13.3%), bacterial infections (12.7%), and viral infections (11.7%)¹⁸. In a study in Italy, the most common diagnosis was the infections group (27.1%), followed by non-specific diagnoses

(22.5%), skin conditions caused by mechanical or physical agents (13.1%), and eczematous diseases (10.5%)¹⁹.

In a study by Kiss *et al.*, many patients felt that their skin problems needed immediate attention, even if it was not justified²⁰. One study concluded that during the pandemic, the number of dermatology consultations requested at the emergency department dramatically decreased²¹. In another study, the number of patients who attended emergency department consultations during the first year of the COVID-19 pandemic was compared with the same period in the previous year; patients were more likely to appear at their appointments during the pandemic²². In emergency department and intensive care unit consultations, the number of suspected COVID-19 cases was significantly higher than in outpatient clinic consultations. Hence, this finding indicates that it is especially important for dermatologists to be cautious during pandemics, especially in emergency departments and intensive care units²³.

To our knowledge, this is the first study to evaluate dermatological presentations to a DEU during the COVID-19 pandemic. However, our study assessed only the first four months of the pandemic, which can be considered as a limitation. Another limitation is that we only evaluated the patients who presented to the DEU and did not assess those who presented to our clinics. For the future, we recommend long-term studies evaluating both DEU and clinic patients.

CONCLUSION

In conclusion, the general framework of common causes of DEU visits was closely similar to before the COVID-19 pandemic, although a significant increase in the proportion of dermatitis patients as the second major cause was observed. Likewise, the proportion of non-skin complaints was significantly higher due to our hospital's duty as a screening center for COVID-19. Our study highlights the roles of dermatologists in the pandemic and emphasizes the need for better and continuous general medical training for dermatologists.

Authors contributions

Sina Shahabi collected and analyzed data and wrote the draft. Ifa Etesami revised the draft. Amirhossein Shahabi collected data. Yasamin Kalantari wrote the

draft. Robabeh Abedini conceptualized the study. Maryam Daneshpazhooh revised the draft and conceptualized the study.

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