Abstract
Coronavirus disease-2019 (COVID-19), which emerged in late 2019 and caused a pandemic, has significantly affected outpatient admissions to dermatology outpatient clinics. There have been changes in the number and composition of the patients who applied to the outpatient clinics. The dermatology outpatient clinic applications have dramatically decreased due to restrictions and prohibitions, and active participation of dermatologists in the field immediately after the pandemic. The composition of the diagnoses has also altered for reasons such as excessive use of hygiene products and types of protective equipment usage related to COVID-19. Intensive precautions have been taken in the first 3 months of the pandemic (March, April, and May). As of 12 May, controlled socialization started with new regulations. This period has been called “the normalization process.” This study aims to evaluate the changes of the patients admitted to dermatology outpatient clinics within the normalization process. Despite the increasing number of COVID-19 patients and related deaths in the whole country with the new normal, the admissions to dermatology outpatient clinics have increased. During this period, acne and related diseases, pigmentation disorders, and viral skin infections had increased; dermatoses, xerosis cutis, and superficial fungal infections had reduced. It seems that nonurgent dermatological complaints affect the quality of life of patients and cause the need for an application. Although restrictions reduce these numbers, measures should be taken to protect patients and society during the ongoing pandemic.

KEYWORDS
COVID-19, dermatology, outpatient, pandemic

1 | INTRODUCTION
Coronavirus disease-2019 (COVID-19) is an illness caused by Severe Acute Respiratory Syndrome Corona Virus 2 (SARS-CoV-2), which was first reported in Wuhan, China, in late 2019. The disease, which spread to the whole world in a short time, was declared as a pandemic by the World Health Organization on 11 March 2020. The first case was reported on 11 March 2020, in Turkey. After the pandemic, every country has started to take some precautions to prevent the spread of the virus all over the world. Interrupting face-to-face education in schools, curfew restrictions for citizens over the age of 65 and under 20 at certain times in specific periods, encouraging the society to stay at home policy with media, the prohibition of collective events, the closing of shopping centers were some of the measures taken in Turkey. During this period, the number of patients attending dermatology outpatient clinics was significantly reduced due to flexible working hours and the involvement of dermatologists in COVID-19 related tasks. The normalization process has started with the regulation of bans and restrictions on 12 May 2020, in Turkey. It was observed that the number of outpatient clinic patients gradually increased with the beginning of this period. This study aims to observe the changes in the number of patients admitted to
dermatology outpatient clinics and the distribution of diagnosis with
the normalization process. At the same time, it is to investigate the
effect of the reported number of COVID-19 new cases and daily
deaths on the number of outpatient dermatology applications.

2 | MATERIAL AND METHODS

2.1 | Study design

The necessary permissions are taken from the Turkey Ministry of
Health before this study. This study is a single-center, retrospective,
non-interventional, and descriptive. It was held in a tertiary health
center in Istanbul (approx. 15 million population) between 1 June
2020, and 1 October 2020. The data of the patients who applied to
the outpatient dermatology outpatient clinic between these dates
were obtained from the hospital computer database. Demographic
characteristics of the patients such as age and gender were recorded.
If a patient applied more than once with the same complaint, it was
accepted as a single application. The diseases were grouped based on
the most common International Classification of Diseases (ICD) diag-
nosis codes. This grouping is based on the classification of the dis-
eases in the Dermatology textbook edited by Bolognia et al.6 Patients
with rare cases were neglected while giving diagnosis-based statistics.
The distribution of the disease groups was analyzed as monthly data
from June to October. It was evaluated how these changed depending
on the daily number of COVID-19 new cases and deaths reported in
the country.

2.2 | Statistical analyses

Statistical analyses were performed with Statistical Package for the
Social Sciences (SPSS.22, IBM SPSS Statistics for Windows, Version
22.0. Armonk, New York: IBM Corp.). Descriptive variables were
presented as number and percentage or mean and SD as
appropriate. Pearson’s chi-squared test was performed for the com-
parison of categorical variables. The assessment of the normality
distribution of the numerical variables was carried out with the
Kolmogorov-Smirnov test. Kruskal-Wallis test was then applied for
the comparison of independent numerical variables. Spearman’s
correlation analysis was used to evaluate the relationship between
continuous variables. A P value of < .05 was considered statistically
significant.

3 | RESULTS

Between June and September, 6967 patients admitted to the derma-
tology outpatient clinic in total. There was no difference by gender
between months (P = .184). The mean age was calculated as
31.6 ± 17.4 in June, 30.1 ± 16.5 in July, 30.9 ± 16.5 in August, and
29.9 ± 16.1 in September, respectively. A statistically significant ten-
dency to decrease in the mean age by months was noticed (P = .019).
When the age distribution was analyzed separately, a noteworthy
decrease in the frequency of >65 year applicants was observed
(P < .001). The demographic features of the dermatology outpatient
clinic applicants are demonstrated in Table 1.

The total and 4-month period numbers of dermatology outpatient
clinic applications, new countrywide COVID-19 patients, and deaths
due to COVID-19 were presented in Table 2. A significant increase in
the numbers gradually from month to month was observed for each
category. The number of dermatology applications was 992 (14.2%) in
June, 1374 (19.7%) in July, 1597 (22.9%) in August, and 3004 (43.1%)
in September, respectively. The increasing trend was more remarkable
in dermatology outpatient clinic applications and COVID-19 related
deaths, especially in September.

A statistically significant positive correlation was found between
the number of COVID-19 patients and deaths in the country and the
number of patients requesting a dermatology outpatient clinic visit
(P value = < .001 and < .001, respectively; correlation coeffi-
cient = 0.578 and 0.526, respectively) (Figures 1-3).

TABLE 1 The demographic features of the dermatology outpatient clinic applicants

| Features       | June (n = 992) | July (n = 1374) | August (n = 1597) | September (n = 3004) | P value |
|----------------|---------------|----------------|-------------------|----------------------|---------|
| Gender         |               |                |                   |                      |         |
| Female         | 529 (53.3%)   | 754 (54.9%)    | 919 (57.5%)       | 1663 (55.4%)         | .184    |
| Male           | 463 (46.7%)   | 620 (45.1%)    | 678 (42.5%)       | 1341 (44.6%)         |         |
| Age (mean ± SD)| 31.6 ± 17.4   | 30.1 ± 16.5    | 30.9 ± 16.5       | 29.9 ± 16.1          | .019    |
| Age distribution|              |                |                   |                      |         |
| 0-8 y          | 48 (4.8%)     | 107 (7.8%)     | 92 (5.8%)         | 168 (5.6%)           | .010    |
| 8-18 y         | 128 (12.9%)   | 176 (12.8%)    | 198 (12.4%)       | 435 (14.5%)          | .172    |
| 18-65 y        | 747 (75.3%)   | 1027 (74.7%)   | 1236 (77.4%)      | 2289 (76.2%)         | .360    |
| >65 y          | 69 (7%)       | 64 (4.7%)      | 71 (4.4%)         | 112 (3.7%)           | <.001   |

Note: x² Pearson chi-square test/k Kruskal-Wallis test.
During the 2020 summer 4-month period of the pandemic, the changes in the disease frequency of the patients applied to the dermatology outpatient clinic were showed in Tables 3 and 4. A statistically significant difference was detected between months in the following diseases: acne and associated disorders, dermatitis, xerosis cutis, superficial fungal infections, viral skin infections, and pigmentation disorders.

The change in the disease frequencies of the dermatology applicants was summarized in Table 4. There was a statistically significant increase in frequency toward acne and associated disorders, pigmentation disorders, and viral infections of the skin; whereas, a decrease in dermatitis, xerosis cutis, and superficial fungal infections.

### TABLE 2 Dermatology outpatient clinic applications, COVID-19 patients, and COVID-19 related deaths between June and September 2020

|                          | June       | July       | August     | September  | P value |
|--------------------------|------------|------------|------------|------------|---------|
| Dermatology outpatient clinic applications (n = 6967) | 992 (14.2%) | 1374 (19.7%) | 1597 (22.9%) | 3004 (43.1%) | <.001   |
| COVID-19 patients (n = 154 695) | 35 937 (23.2%) | 30 967 (20%) | 39 261 (25.4%) | 48 530 (31.4%) | <.001   |
| COVID-19 related deaths (n = 3656) | 591 (16.2%) | 561 (15.3%) | 679 (18.6%) | 1825 (49.9%) | <.001   |

Note: $x^2$ Pearson chi-square test.
Abbreviation: COVID-19, Coronavirus disease-2019.

### 4 DISCUSSION

The number of dermatology outpatient applications have dramatically decreased immediately after pandemic. As of 12 May, new regulations were made to ban and restrictions due to COVID-19 in Turkey. This period was called “the normalization process.” With the normalization process, the increase in the number of applications to dermatology outpatient clinics was remarkable. The importance of self-protection has increased with this process.

During the normalization process, increases in the number of patients were detected in all age groups compared to the previous month. A decrease was found in the average patient age who applied to the outpatient clinic. The frequency of admission continued to decrease only in the patient group over 65 and 0 to 8 compared to other age groups. A multicenter study from Turkey showed that the frequency of patients over the age of 65 was 9.2% during the post-pandemic episode. In our study, the percentage of patients who applied to the clinic had decreased to very low levels such as 3.7% in September. COVID-19 infection is very severe in elderly patients. Therefore, it creates a greater fear in these patients. Older patients may be more careful about self-protection.

The reason for the increase in the number of applications to clinics with the normalization process may be that people apply to the hospital more easily for nonurgent and delayed complaints. The increase in the number of COVID-19 patients and associated deaths does not appear to affect the number of hospital admissions for non-emergency complaints. Despite the serious increase in the number of
COVID-19 cases especially in September, there was no decrease in the number of outpatient clinic visits. In a tertiary hospital from Turkey, the number of patients admitted to the dermatology clinic was 738 in April, and 1016 in May. In our study, the number of patients increased every month, and 3004 patients were admitted in September. Prohibitions and restrictions appear to be effective in reducing nonemergency cases admitted to hospitals.

The first five diseases that applied to the outpatient clinic after the normalization process was acne and related diseases, dermatitis, xerosis cutis, superficial fungal infections, and hair disorders. Before the normalization process, acne, dermatitis, and fungal infections were in the first three places in some studies. In another multicenter
| Author     | Study design                              | N: Pre-pandemic/post-pandemic | Duration               | The three most common diseases in the post-pandemic period                                                                 | Diseases that increase in the post-pandemic period  | Diseases that decrease in the post-pandemic period |
|------------|-------------------------------------------|------------------------------|------------------------|------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|--------------------------------------------------|
| Altun E.11 | Single center, cross-sectional, retrospective-study | −/486                        | 30 March-30 April 2020 | Adult**: Acne (N: 89, 20.9%) Types of dermatitis (N: 64, 15.1%) Superficial fungal infections (N: 36, 8.5%) Pediatric**: Acne (N: 10, 16.4%) Scabies (N: 4, 6.6%) Atopic dermatitis (N: 5, 8.2%) | –                                                   | –                                                |
| Cengiz et al5 | Single center, cross-sectional, retrospective-study | −/390                        | 11 March-18 March 2020 | Acne (N: 94, 24%) Types of dermatitis (N: 55, 14%) Superficial fungal infections (N: 29, 7%)                            | –                                                   | –                                                |
| Tanacan et al12 | Single center, cross-sectional, retrospective-study | 1165/717                     | 01 March-31 May 2019 and 01 March-31 May 2020 | Acne (N: 141, 19.7%) Contact dermatitis (N: 71, 9.9%) Dermatophytosis (N: 51, 7.1%) | Contact dermatitis Acne accompanying dermatitis Cicatricial hair loss Lichen planus Zona zoster infection | Acne Dermatophytosis Benign neoplasms of the skin |
| Kutlu et al.3 | Single center, cross-sectional, retrospective-study | 2442/738 (April) 4506/1016 (May) | 01 April-31 May 2019 and 01 April-31 May 2020 | – | Scabies Contact dermatitis Psoriasis Pityriasis rosea Urticaria Alopecia areata Telogen effluvium Acne vulgaris Xerosis cutis | Dermatophytosis Warts Molluscum contagiosum Recurrent aphthous stomatitis |
| Turan et al4 | Single center, cross-sectional, retrospective-study | 6820/2711                    | 12 February-8 May 2020 | Acne (N: 234, 45.2%) Verruca vulgaris (N: 59, 11.4%) Various eczematous dermatitis (N: 28, 5.4%) | Idiopathic generalized pruritus Pityriasis rosea Alopecia areata Bacterial skin/ mucosa diseases Zona zoster/ post-zoster neuralgia | Hyperpigmentation Verruca vulgaris Skin tags Melanocytic nevus Seborrheic keratosis/ solar lentigo |
| Kartal et al8 | Multicenter, cross-sectional, retrospective-study | 133 131/31 747               | 12 January-March 12 May, 2020 | Dermatitis (N: 8403, 26.47%) Acne (N: 4631, 14.59%) Psoriasis (N: 3221, 10.15%) | Urticaria Angenital warts Zona zoster/ post-zoster neuralgia Dermatophytosis Scabies Cutaneous infection diseases Contact dermatitis Lichen simplex chronicus Dermatitis | Warts, Benign, in situ and malignant neoplasms Neoplasms with uncertain behavior Endocrine and metabolic diseases Diseases of the circulatory system including diseases of capillaries Bullous diseases |

(Continues)
study, acne, dermatitis, and psoriasis were the three most common diseases. Acne always seems to be the most common reason for admission before the pandemic, before and after the normalization process. Along with the normalization process, there has been a gradual increase in acne and related diseases, pigmentation disorders, and viral infections of the skin. Most of the acne patients are under the age of 20. The reason for the increase in acne patients may be that they reach the hospital more easily after the reduction of restrictions on patients under 20 age. In addition, patients in this age group may be less afraid of the risks associated with COVID-19. Another reason may be the increase in mechanical acne due to the use of masks. The increase in pigmentation disorders may be due to the sun-related melasma patients during the summer months. Another reason may be the increase in emotional stress-related cases due to COVID-19 in vitiligo patients. The reason for the increase in viral skin infections such as verruca vulgaris, anogenital warts, herpes zoster, and molluscum contagiosum may also be due to stress-related immunosuppression. Verruca vulgaris and anogenital warts may necessitate hospital admission due to their negative effects on quality of life.

Viral skin infections are known to trigger papulosquamous diseases such as pityriasis rosea. Also, psoriasis is a disease that can be triggered by infections. It is estimated that subclinical infections such as Human Herpes Virus-6 and 7 increased in parallel with the increase in viral infections observed clinically in this study. Some authors have argued that increased frequency of infections during COVID-19 period leads to an increase in the frequency of pityriasis rosea. In our study, despite the increase in patient numbers, no change was observed in the frequency of papulosquamous diseases.

Durations that decrease in the post-pandemic period

**TABLE 5** (Continued)

| Author | Study design | N: Pre-pandemic/post-pandemic* | Duration | The three most common diseases in the post-pandemic period | Diseases that increase in the post-pandemic period | Diseases that decrease in the post-pandemic period |
|--------|--------------|--------------------------------|----------|----------------------------------------------------------|-----------------------------------------------|-------------------------------------------------|
| Dursun et al16 | Single center, cross-sectional, retrospective study | 1503/1286 | 16 March-15 June 2019 and 16 March-15 June 2020 | Acne (N: 163, 12.7%) | Urticaria & Angioedema (N: 118, 9.2%) | Acne |
| | | | | Psoriasis (N: 114, 8.9%) | | Other eczematous dermatitis |
| | | | | | Urticaria & Psoriasis | Verruca |
| | | | | | Allergic/irritant contact dermatitis | Androgenic alopecia |
| | | | | | Scabies | Melanocytic nevus |
| | | | | | Lichen planus | |
In studies conducted in the post-pandemic period, acne is among the top three diseases in all studies. The diseases with increased and decreased frequency differ in each study (Table 5). The reason for this may be due to differences in the design of the studies, the number of COVID-19 patients in the city where the study was conducted and the time interval, diagnosis code-based screening. Many of the studies have been conducted right after the pandemic. Our study especially reflects the period after the normalization process. We would like to emphasize the importance of individual and social protection, as it shows a positive correlation between the daily number of COVID-19 patients and deaths and outpatient clinic visits.

5 | CONCLUSION

With the normalization process, the applications to dermatology outpatient clinics, although not urgent, indicate the demand of people for dermatological examination. The increase in the number of COVID-19 cases does not seem to be effective in decreasing these numbers. Perkins et al argued that acne, psoriasis, eczema, rashes, rosacea, and lesions of concern were particularly amenable to teledermatology. These diseases constitute more than half of the outpatient clinic admissions. Teledermatological examination is not yet used widely in Turkey. This may be needed in the future. New measures seem to be needed to protect both patients and the community from the spread of the infection in new normal days.

CONFLICT OF INTEREST
The authors declare no conflict of interest in this study.

AUTHOR CONTRIBUTIONS

Ceyda Çaytemel: Study design, literature review, data collection, preparation of the original draft, manuscript writing, and critical review.
Ozan Erdem: Statistical analysis, data collection, and manuscript writing.
Şenay Ağırğöl: Literature review and manuscript writing.
Zafer Türkoğlu: Supervision and manuscript writing.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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