Impact of the COVID-19 Pandemic on Tertiary-care University Dermatology Outpatient Clinic and Dermatology Procedures

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ABSTRACT

Objective: This study aimed to determine the changes in patient characteristics, disease prevalence, and dermatology procedures during the COVID-19 pandemic.

Materials and Methods: We retrospectively reviewed the demographic data, diagnoses, and dermatology procedures of the patients who visited an outpatient dermatology clinic between March 1, 2018, and December 31, 2021. Changes in the number of patients, the patterns of diagnosis, and the dermatology procedures were analyzed.

Results: The number of patients decreased at the start of each of the 4 COVID-19 waves that occurred during the study period. Older adults increased their dermatology visits during the pandemic. The skin disease with the highest proportional increase in the frequency of visits was cutaneous T-cell lymphoma. The proportion of noncosmetic procedures significantly increased, in contrast to a decrease in the proportion of cosmetic procedures.

Conclusion: The COVID-19 pandemic significantly affected outpatient dermatology by changing the setting and frequency of patient visits to the outpatient clinic, the pattern of the diseases, and the dermatology procedures.

Keywords: COVID-19; Dermatology procedure; Dermatology; Outpatient department (Siriraj Med J 2022; 74: 836-843)

INTRODUCTION

Coronavirus disease 2019 (COVID-19) is a respiratory tract infection caused by Severe Acute Respiratory Syndrome Coronavirus-2. First reported in Wuhan, China, in late 2019,[1] it rapidly spread globally and was declared a pandemic by the World Health Organization in March 2020.[2,3] The first patient in Thailand was reported on January 12, 2020. An outbreak occurred in March 2020 due to several clusters in Bangkok's boxing venues and nightclubs, and the disease began spreading throughout Thailand.[4,5] To control the infection, the Thai government implemented a public health emergency decree on March 26, 2020.[5]

The COVID-19 pandemic has dramatically affected personal lifestyles, governing and political systems, and national economies. It has also greatly impacted healthcare systems through the need to control the disease while allocating finite medical resources to COVID-19 and non-COVID-19-related illnesses.[6-8] Access to medical services sometimes became limited, leading to appointment cancellations, and face-to-face visits have been adversely affected by social distancing and stay-at-home policies introduced by governments and businesses.[9] The various COVID-19 restriction policies have also disrupted the provision of dermatology services.[2,9] Skin diseases are usually nonfatal and involve few emergency conditions.

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Therefore, we anticipated that the COVID-19 pandemic would result in a decline in outpatient visits or a shift to teledermatology, especially with mild cases of skin disease. Previous European studies demonstrated a significant decline in patient visits to dermatology outpatient departments (OPD) and an increase in patients missing appointments during the pandemic.[7,9,10] There were also effects on the prevalence of certain skin diseases[11-13] and the performance of minor versus major dermatology procedures.[14,15] We aimed to evaluate the changes in patient characteristics, disease prevalence, and dermatology procedures during the COVID-19 pandemic in Thailand, which has different medical settings and legislation from Europe.

MATERIALS AND METHODS

Study design and participants

This single-center study was conducted at the Department of Dermatology, Faculty of Medicine, Siriraj Hospital, Mahidol University. The hospital is the largest tertiary care referral hospital in Thailand. Before this research began, the Siriraj Institutional Review Board approved its protocol (COA no. Si 571/2021). We retrospectively reviewed the electronic registration database to identify patients visiting the dermatology OPD between March 1, 2018, and December 31, 2021. All consecutive patients in the study period were selected for the analysis. Details were retrieved of the number of patients, their demographic data (age and sex), skin diagnoses (per the International Classification of Diseases [ICD]-10), and dermatology procedures (per the ICD-9 system). The number of COVID-19 cases in Thailand was obtained from Thailand's Ministry of Public Health website.[16] The primary outcome of the study is the changes in the proportion of visit from common diseases in dermatology outpatient unit before and during COVID-19 era. The secondary outcome is the changes in patients' demographic data, dermatological procedures before and during COVID-19 era.

Sample size consideration

The sample size was calculated with an equation for detecting the difference of two independent proportions. From the literature review, contact dermatitis is common diseases during COVID-19 pandemic; therefore, the number of visits for contact dermatitis was used for sample size calculation. Using reported frequency of contact dermatitis of 5.8% in 1,165 and 9.9% in 717 outpatient dermatology visits before and during COVID-19 pandemic, respectively[11], alpha error of 5%, the desired power of 90% and a predetermined allocation ratio of 1:1, the estimated sample size is 1,215 before COVID-19 era and 751 visits during COVID-19 era.

Data collection

The proportions of patients, diagnoses, and procedures from the pandemic period (March 2020-December 2021) were compared with the corresponding values for the preceding (March 2018-February 2020). The changes in the monthly number of patients and procedures were evaluated, and collinearity with the number of new COVID-19 cases in Thailand was assessed.

Statistical analysis

Data were analyzed using SPSS version 18 (SPSS Inc. Released 2009. PASW Statistics for Windows. Version 18.0. Chicago: SPSS Inc.). The proportion of visit from diseases and procedures before and during the COVID-19 pandemic were compared using either the Chi-squared or Fisher's exact test. A probability (*P*) value of less than 0.05 was considered statistically significant. Continuous data were reported using mean or median. Categorical data were reported using frequency and percentage.

RESULTS

Between March 2018 and December 2021, 200 368 patients visited the Siriraj dermatology OPD. The average number of patients during the pre-pandemic period-4925 patients/month-declined by approximately 30% to 3423 patients/month during the pandemic. Women patients predominated, with a female-to-male ratio of 2:1; however, the degree of female preponderance significantly decreased during the COVID-19 period. The most common patient age group in both the pre-pandemic and pandemic periods was 18- to 44-year-olds (40.7% and 40.1%, respectively). The proportion of older patients (> 65 years) significantly increased during the pandemic (Table 1).

The relationships between the number of new COVID-19 cases in Thailand and the number of patients and dermatology procedures conducted at the dermatology OPD are illustrated in the Figure. Although patient-case and dermatology-procedure numbers declined significantly in every wave of COVID-19, they returned to near normal approximately 1 month after each COVID-19 peak. Changes in the number of dermatology procedures performed during the pandemic corresponded with the variations in the number of OPD cases.

Table 2 classifies skin diseases according to ICD-10 and details percentage changes in the frequency of OPD visits for treatment before and during the pandemic. The diseases are presented in 3 groups: significantly increased visit frequency, significantly decreased visit frequency, and unchanged visit frequency. In terms of the degree of frequency, the top-3 skin diseases before and during the pandemic were identical: unspecified dermatitis,

TABLE 1. Demographic data of patients visiting Siriraj Hospital's dermatology outpatient department

Demographic data	Before COVID-19 pandemic (n = 118 209)		During COVID-19 pandemic (n = 82 159)	
	n	%	n	%
Sex				
Female	80 264	67.9	54 214	66.0
Male	37 945	32.1	27 945	34.0
Age group (years)				
< 18	3579	3.0	1819	2.2
18–44	48 070	40.7	32 979	40.1
45–64	40 009	33.8	26 962	32.8
> 65	26 551	22.5	20 399	24.8

Abbreviation: COVID-19, coronavirus disease 2019

TABLE 2. Distribution of diagnosed skin diseases before and during COVID-19 pandemic

Diagnosis (ICD-10)	Number of visits				Percentage change
	Before COVID-19 pandemic (n = 158 154)		During COVID-19 pandemic (n = 153 386)		
	n	%	n	%	
Diseases with significantly increased visit frequency					
CTCL, unspecified (C84.8)	25	0.02	68	0.04	180.46
Kaposi sarcoma (C46.0)	9	0.01	22	0.01	152.04
SPTCL (C86.3)	7	0	17	0.01	150.41
Other bullous disorders (L13)	99	0.06	191	0.12	98.93
Mycosis fungoides (C84.0)	1754	1.11	2985	1.95	75.47
Pemphigus (L10)	911	0.58	1499	0.98	69.66
Pemphigoid (L12)	821	0.52	1255	0.82	57.61
Infection due to other mycobacteria (A31)	225	0.14	314	0.2	43.89
Statis dermatitis (L83.1)	576	0.36	754	0.49	34.97
Drug reaction (L27)	835	0.53	1023	0.67	26.32
Herpes zoster (B02)	2129	1.35	2533	1.65	22.67
Atopic dermatitis (L20)	2596	1.64	3082	2.01	22.41
Other non-scarring hair loss (Telogen effluvium) (L65)	1097	0.69	1296	0.84	21.81
Exfoliative dermatitis (L26)	302	0.19	349	0.23	19.16
Urticaria (L50)	7363	4.66	8267	5.39	15.77
Psoriasis (L40)	13 211	8.35	14 821	9.66	15.67
Actinic keratosis (L57.0)	805	0.51	879	0.57	12.59
Nail disorders (dystrophy) (L60)	1842	1.16	2009	1.31	12.46
Androgenic alopecia (L64)	9695	6.13	10 457	6.82	11.21
Seborrheic dermatitis (L21)	6401	4.05	6894	4.49	11.05
Xerosis cutis and xerotic eczema (L85.3)	5385	3.4	5740	3.74	9.91
Dermatophytosis (B35; except 35.1)	2286	1.45	2425	1.58	9.38
Unspecified dermatitis (L30)	19 765	12.5	20 461	13.34	6.74

TABLE 2. Distribution of diagnosed skin diseases before and during COVID-19 pandemic (Continued)

Diagnosis (ICD-10)	Number of visits				Percentage change
	Before COVID-19 pandemic (n = 158 154)		During COVID-19 pandemic (n = 153 386)		
	n	%	n	%	
Diseases with significantly decreased visit frequency					
Mastocytosis (Q82.2)	70	0.04	22	0.01	-67.59
Sweet syndrome (L982)	47	0.03	18	0.01	-60.51
Leprosy (A30)	209	0.13	87	0.06	-57.08
Hemangiomas (D18.0)	265	0.17	118	0.08	-54.09
Varicella (B01)	139	0.09	63	0.04	-53.27
Panniculitis (M793)	123	0.08	84	0.05	-29.58
Anogenital herpes (A60)	1066	0.67	733	0.48	-29.1
Melasma (L81.1)	6774	4.28	4779	3.12	-27.26
Acne (L70)	11 335	7.17	8208	5.35	-25.34
Seborrheic keratosis (L82)	3743	2.37	2742	1.79	-24.47
Candidiasis (B37)	2024	1.28	1538	1	-21.65
Epidermal cyst (L720)	1132	0.72	892	0.58	-18.75
Unspecified contact dermatitis (L25)	391	0.25	319	0.21	-15.88
Vitiligo (L80)	13 227	8.36	10 792	7.04	-15.87
Syphilis (A51-53)	716	0.45	586	0.38	-15.61
Pityriasis versicolor (B36.0)	400	0.25	329	0.21	-15.19
Alopecia areata (L63)	5146	3.25	4349	2.84	-12.86
Cicatricial alopecia (L66)	967	0.61	819	0.53	-12.67
Lichen simplex chronicus and prurigo (L28)	4485	2.84	3824	2.49	-12.09
Other disorders of pigmentation (L81; except 81.1)	5543	3.5	4783	3.12	-11.03
Tinea ungiuum (B35.1)	3331	2.11	2887	1.88	-10.64
Irritant contact dermatitis (L24)	1333	0.84	1156	0.75	-10.58
BCC, SCC (C44)	1288	0.81	1128	0.74	-9.7
Viral wart (B07)	3051	1.93	2789	1.82	-5.75
Diseases without a significant change in visit frequency					
Malignant melanoma (C43)	40	0.03	28	0.02	-27.82
Scleroderma (M34)	374	0.24	321	0.21	-11.5
Scabies (B86)	120	0.08	104	0.07	-10.64
Lichen planus (L43)	480	0.3	421	0.27	-9.57
Erythema multiforme (SJS/TEN) (L51)	126	0.08	116	0.08	-5.07
Anogenital wart (A630)	207	0.13	193	0.13	-3.87
Herpes simplex infections (B00)	826	0.52	787	0.51	-1.76
Pityriasis rosea (L42)	179	0.11	171	0.11	-1.5
Lupus erythematosus (L93)	1367	0.86	1341	0.87	1.15
Vasculitis (L95)	2105	1.33	2084	1.36	2.08
Bacterial skin/mucosa diseases (L00-L08)	3416	2.16	3408	2.22	2.87
Allergic contact dermatitis (L23)	1887	1.19	1887	1.23	3.11
Dermatomyositis or inflammatory (M33)	118	0.07	118	0.08	3.11
Melanocytic nevus (D22)	1569	0.99	1588	1.04	4.36
Cutaneous tuberculosis (A18.4)	19	0.01	20	0.01	8.54
Pediculosis and phthriasis (B85)	21	0.01	23	0.01	12.93
Rosacea (L71)	356	0.23	390	0.25	12.96

* A *P* value < 0.05 indicates statistical significance (chi-squared test).

Abbreviations: BCC, basal cell carcinoma; COVID-19, coronavirus disease 2019; CTCL cutaneous T-cell lymphoma; ICD, International Classification of Diseases; SCC, squamous cell carcinoma; SJS, Stevens–Johnson syndrome; SPTCL, subcutaneous panniculitis-like T-cell lymphoma; TEN, toxic epidermal necrolysis

vitiligo, and psoriasis. The skin disease with the highest percentage increase in frequency was cutaneous T-cell lymphoma, followed by Kaposi sarcoma, subcutaneous panniculitis-like T-cell lymphoma, other bullous disorders, and mycosis fungoides. Conversely, the diseases with the highest reductions in visit frequency were mastocytosis, sweet syndrome, leprosy, hemangioma, and varicella.

Regarding dermatology procedures, there was a marked decrease in the number of procedures conducted at the OPD following the COVID-19 outbreak. Overall, there was a 37% decline, from a mean of 2211 to 1382 procedures/month (Table 3). However, the fall was not uniform across all procedures. The proportion of noncosmetic procedures significantly rose (85.27% to 86.67%), whereas the proportion of cosmetic procedures fell (14.73% to 13.33%). The noncosmetic procedure with the highest frequency increase was radical excision of skin lesions, while the melanocyte-keratinocyte transplantation procedure demonstrated the largest frequency decline. Regarding cosmetic procedures, platelet-rich plasma injections saw the greatest frequency increase, and the use of iontophoresis fell the most.

DISCUSSION

This study demonstrated the influences of the COVID-19 pandemic on the number of patient visits and procedures performed at a dermatology OPD. The total number of patients visiting the OPD decreased,

TABLE 3. Number of dermatology procedures before and during COVID-19 pandemic

Procedure (ICD-9)	Number of procedures				Percentage change
	Before COVID-19 pandemic (n = 53 075)		During COVID-19 pandemic (n = 33 161)		
	n	%	n	%	
Noncosmetic procedures	*45 257*	*85.27*	*28 740*	*86.67*	*1.64*
Radical excision of skin lesion (864)	2	0.00	20	0.06	1500.52
Nail extraction (8623)	29	0.05	48	0.14	164.91
Wound care (dressing and wound debridement) (8622, 9357)	1739	3.28	1283	3.87	18.08
Biopsy (8611)	2514	4.74	1853	5.59	17.97
Ultraviolet light therapy (9982)	20 072	37.82	14 356	43.29	14.47
Aspiration, incision, and drainage (8601, 8604)*	249	0.47	162	0.49	4.13
Intralesional injection (steroid, 5-FU, MTX) (9923, 9925)	8037	15.14	4747	14.32	-5.47
Ablative treatment (863)	6169	11.62	3461	10.44	-10.21
Chemosurgery of skin (8624)	6311	11.89	2761	8.33	-29.98
Debridement of nail, nail bed, or nail fold (8627)*	92	0.17	40	0.12	-30.41
Sclerotherapy (3992)*	27	0.05	8	0.02	-52.58
Melanocyte-keratinocyte transplantation procedure (8660)	16	0.03	1	0.00	-90.00
Cosmetic procedures	*7818*	*14.73*	*4421*	*13.33*	*-9.49*
Platelet-rich plasma injection (9907)	80	0.15	153	0.46	206.10
Botulinum toxin, filler injection (including complication management) and injection or tattooing of skin lesion or defect (8602, 9929,9957)	1535	2.89	1188	3.58	23.87
Laser (8625)	4845	9.13	2684	8.09	-11.34
Hair transplantation (0863, 8664)*	91	0.17	49	0.15	-13.82
Comedone extraction (8603)	1173	2.21	345	1.04	-52.93
Iontophoresis (9927)	94	0.18	2	0.01	-96.59

***, Not statistically significant**

Abbreviations: 5-FU, 5-fluorouracil; COVID-19, coronavirus disease 2019; ICD, International Classification of Diseases; MTX, methotrexate

consistent with reports from other countries.[10,17] In addition, another study showed a more pronounced loss of patients from a hospital's dermatology OPD than its other departments.[18] The explanation could be that, given most dermatology conditions' nonfatal and nonemergency nature, the risk of acquiring a COVID-19 infection outweighed the perceived necessity for an OPD visit.[10,18] The Thai government's COVID-19 prevention policies also included interregional travel restrictions. The policies impeded or prevented patients in rural areas from accessing face-to-face medical consultations at tertiary healthcare centers in other provinces. Moreover, international surveys revealed that over 50% of dermatologists had been reassigned from dermatology departments to fields more directly related to COVID-19 to mitigate staff shortages resulting from the pandemic. However, the relocations of dermatologists created staff shortfalls in dermatology OPDs.[9,19] For a limited period, Thailand's COVID-19 prevention policies also placed severe restrictions on the conduct of cosmetic procedures throughout many areas of Thailand, including Bangkok, where our hospital is situated.

The COVID-19 pandemic also influenced the age and sex distribution of patients visiting the dermatology OPD. The proportion of older adults became significantly higher during the pandemic, which accords with another study.[5,12] However, the majority of patients at our dermatology clinic were teenagers and adults, who could be asymptomatic carriers of COVID-19. Therefore, to minimize the risk of COVID-19 transmission, nonemergency dermatology visits should be temporarily suspended or serviced through alternative methods, such as teledermatology.[20,21] Moreover, the number of female patients significantly decreased during the pandemic. This dissimilarity might reflect different levels of awareness among men and women of the hazards of COVID-19.

Certain skin conditions saw an increase in the frequency of visits during the pandemic. This was particularly the case with diseases with high severity or urgent situations, such as cutaneous T-cell lymphoma (ICD-10; C84.8, C86.3, C84) and vesiculobullous diseases (ICD-10; L10-13). Among the most commonly diagnosed diseases, the frequency of dermatitis, psoriasis, and urticaria significantly increased during the pandemic. For urticaria and psoriasis, the increase in prevalence might have been related to COVID-19-associated stress and anxiety, which would have precipitated these diseases.[12,22,23] Psychological stress affects or exacerbates many skin disorders, including psoriasis and urticaria but also atopic dermatitis, seborrheic dermatitis, vesiculobullous disorder (pemphigus, pemphigoid), and viral infections (herpes zoster).[24-26] Our results also revealed an increase in the frequency of these diseases after the pandemic, consistent with previous studies.[5,13] Moreover, the increased frequency of urticaria and dermatitis might have been related to mass vaccination programs against COVID-19. Urticaria is the most common cutaneous adverse reaction (34.44%) associated with COVID-19 vaccine administration, followed by eczematous skin reaction (6.95%).[27] Eczema levels might also rise due to the extended mask wearing and increased attention to hand hygiene occurring during the COVID-19 era.[10-13] Reactivation of varicella-zoster virus has been reported in association with COVID-19 infections because of weakened immune systems and the administration of different COVID-19 vaccines.[28,29] There are also many literature reports of acute telogen effluvium after recovery from COVID-19 infection.[30] Our findings showed an increased telogen effluvium frequency, supporting previous observations.

Particular skin conditions showed significantly lower visit frequencies. The decreases were possibly due to the nature of the diseases (not emergent, gradual onset, or rare). Alternatively, the skin conditions might have mainly had cosmetic issues, so hospital visits could be suspended. Vitiligo and acne were among the most commonly diagnosed skin diseases that had significantly decreased visit frequencies during the pandemic. Moreover, patients might have felt more comfortable seeking treatment for these conditions at primary or secondary healthcare facilities than at a crowded tertiary healthcare center, where they would have a higher risk of contracting COVID-19. Teledermatology is another treatment channel that had a significant uptake during the pandemic. Commonly occurring ambulatory dermatoses like dermatitis and acne were reported to be more amenable to being assessed and managed via teledermatology.[31] Furthermore, in Thailand, patients can easily buy medications for skin conditions over the counter without a prescription. Our study also found that the frequency of sexually transmitted diseases (STDs) such as syphilis and anogenital herpes infection significantly decreased during the pandemic. Previous studies in several countries reported lower incidences of STDs during the pandemic.[32-34] Possible factors contributing to the apparent fall in STD-case numbers are the introduction of strict social distancing measures (which reduced sexual risk behaviors) and a decline in STD screening services and resources for controlling STDs.[33,34]

In our study, the number of overall dermatology procedures decreased, and this occurred for both noncosmetic and cosmetic procedures. Similarly, there was a reduction

Fig 1. Changes in the number of patients and dermatology procedures during the COVID-19 pandemic
Abbreviations: COVID-19, coronavirus disease 2019; OPD, outpatient department

in scheduled and performed procedures in Italy after its lockdown, resulting from appointment cancellations by patients or the development of COVID-19 infections.[15] During the COVID-19 period, health authorities were obliged to prioritize medical activities and decrease nonurgent visits because healthcare systems had rapidly become overwhelmed. Most dermatology activities were suspended. However, life-saving or time-dependent dermatology procedures (such as radical excisions of skin lesions, biopsies, and resections of malignant lesions) continued to be performed at high levels. Conversely, the melanocyte-keratinocyte transplantation procedure for vitiligo was the least performed procedure, possibly because vitiligo is a prolonged condition. The present study found a proportional increase in noncosmetic procedures, with a corresponding fall in the number of cosmetic procedures. This change in proportions resulted from the hospital's protocol of limiting nonurgent procedures at our center, such as laser and hair transplantation. Among cosmetic procedures, the number of platelet-rich plasma injections had the highest increase, given that they were a substitute for hair transplantation surgery. However, the number of botulinum toxin and filler procedures significantly rose during the pandemic. The increasing levels of virtual socializing might have led to dissatisfaction of individuals with their onscreen appearance, resulting in a heightened interest in some cosmetic procedures.[35] A similar situation was observed with the demand for facial plastic surgery procedures.[36]

There are some limitations to the study. First, since the data was collected from a single tertiary center, it may lack generalizability on the national scale or in other settings such as primary or secondary care. Second, due to the study's retrospective nature, some data relating to patients' decisions to avoid OPD visits may not have been captured.

In conclusion, the COVID-19 pandemic affected outpatient dermatology by changing the setting and numbers of patients visiting the OPD, the pattern of the diseases, and the dermatology procedures. The study presents Thailand's COVID-19 circumstances that affected our dermatology practices.

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