## **ORIGINAL ARTICLE**



# Public interest in dermatologic symptoms, conditions, treatments, and procedures during the COVID-19 pandemic: Insights from Google Trends

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#### **Abstract**

Coronavirus disease 2019 (COVID-19) pandemic had substantial effect both on daily life and medical practice. Internet data have been used to analyze the trends in public interest in various medical conditions and treatments. The aim of this study is to analyze the public interest in dermatologic symptoms, conditions, treatments, and procedures during the COVID-19 pandemic. Google Trends was queried for a total of 120 dermatological search queries. Three periods of 2020 ([March 15-May 9], [May 10-July 4], and [July 5-October 31]) were compared with the previous 4 years (2016-2019). A significantly decreased interest in skin cancers and certain dermatologic conditions (eg, pityriasis rosea and scabies) was observed throughout the study period. Whereas a significant increase of interest in dry skin, hair shedding, oily hair, atopic dermatitis, and hand eczema was detected during the study. An initial decrease in interest was followed by a significant increase for acne, comedones, melasma, rosacea, botox, dermaroller, and peeling. The study demonstrated a significant impact of the COVID-19 pandemic on the public interest in dermatology. The present results would help to create healthcare policies and information sources, which can meet the public demand. The reasons for the observed trends and their effect on patient outcomes might be of interest for future studies.

## KEYWORDS

COVID-19, dermatology, Google, internet, public interest, skin disorders

## 1 | INTRODUCTION

The coronavirus disease 2019 (COVID-19), a novel infectious respiratory disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), first emerged in December 2019. The rapid and worldwide spread of the disease led to the declaration of a pandemic by WHO in March 2020. The number of confirmed cases has reached up to 60 million in 220 countries by 25th of November, 2020. The global efforts to slow the spread of disease, including lockdown measures, have impacted the daily life, as well as the medical practice including dermatology. The main challenges encountered by the dermatologists and the patients during the pandemic include the

reduction of face-to-face consultations, the uncertainties about the monitoring of the patients with ongoing biologic and immunosuppressive treatments, the lack of information about the effect of dermatologic conditions and treatments on the risk of COVID-19, and the difficulties on the follow-up of the patients with chronic diseases or skin cancer.<sup>2</sup>

During recent years, internet data have been increasingly used to analyze the public behavior and interest in various medical conditions.<sup>3-8</sup> Google Trends is the most popular tool and has been used to explore the interest in dermatologic conditions before and during the COVID-19 pandemic.<sup>8-15</sup> Previous studies in dermatology have investigated the public interest in common dermatological conditions (eg,

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acne, seborrheic dermatitis, and warts), cosmetic dermatology procedures, and COVID-19-related acral symptoms during the early phases of the outbreak.<sup>11-14</sup> In the present study we aimed to analyze the public interest in a wide range of dermatologic symptoms, conditions, treatments, and procedures using a very detailed set of search terms and a longer period of investigation for providing information on impact of different stages of pandemic on the public interest in dermatology. Therefore, the insights generated from this study would expand the knowledge produced in previous studies and increase our understanding in this new pandemic.

## 2 | METHODS

Google Trends, a freely available tool, provides information on frequencies of queries that people search on Google search engine. It normalizes the frequency of a search query to all queries, and presents results as a relative search volume ranging from 0 to 100; with larger scores denote greater popularity for the search query.

We determined search queries representing a wide spectrum of dermatologic symptoms, conditions, treatments, and procedures. Three different dermatologists (K.E.S., Ö.A.Ç., and A.S.) have discussed and decided the search terms through working on a shared online document. The terms were selected from the most frequent conditions, treatments and procedures using dermatology textbooks. The complete list of a total of 120 search queries is presented in Table 1. For each query, Google Trends was queried applying filters of "United States," "01/01/2016-11/17/2020," and "All categories." The Google Trends weekly data were exported for analysis.

Statistical analysis of data was carried out using SPSS version 21.0 (IBM Corp., Armonk, New York). Three periods of 2020 ([March 15-May 9], [May 10-July 4], and [July 5-October 31]) were compared with similar periods of the previous 4 years (2016-2019) to assess public interest in different stages of COVID-19 pandemic. Generalized estimating equations with gamma model were used in comparisons. A *P* value of less than .05 was considered to indicate statistical significance.

## 3 | RESULTS

The relative search volume for the dermatologic symptoms, conditions, treatments, and procedures was statistically significantly decreased for 52, 28, and 19 search terms during the first (March 15-May 9), second (May 10-July 4), and third (July 5-October 31) stages of the outbreak compared with similar periods in the preceding 4 years, respectively. On the contrary, there was a statistically significant increase in the relative search volume for 18, 36, and 36 search terms during these periods compared with the previous 4 years, respectively.

The relative search volume was statistically significantly decreased in all three periods for 14 search terms (erythema, angioedema, basal cell carcinoma, skin candida, *Demodex*, erythema

multiforme, melanoma, pityriasis rosea, scabies, skin cancer, tinea, Sklice + Soolantra, temovate + diprolene + dermovate + elocon + taclonex + calcitrene, and elidel). The relative search volume was statistically significantly increased in all three periods for 13 search terms (dandruff, dry skin, hair shedding, hyperpigmentation, oily hair, purple skin, atopic dermatitis, hand eczema, dupixent, ivermectin, tacrolimus ointment, pimecrolimus cream, and skin care).

The relative search volume for 15 search terms (callus, comedones, hair loss, skin irritation, wound, acne, dermatitis, melasma, rosacea, shingles, corticosteroid cream, Botox, Dermaroller, peeling, and skin) was increased significantly during the second and third stage while it was statistically significantly decreased or remained unchanged during the first stage of the outbreak (March 15-May 9).

Table 1 shows the changes in the relative search volume during three different periods (March 15-May 9, May 10-July 4, and July 5-October 31) in detail.

## 4 | DISCUSSION

The current study found that public interest in dermatologic symptoms, conditions, treatments, and procedures has significantly changed during different periods of COVID-19 pandemic when compared with the corresponding periods in the previous 4 years.

The interest in search terms including basal cell carcinoma, skin cancer, melanoma, erythema multiforme, scabies, pityriasis rosea, demodex, tinea, and skin candida has been decreased throughout the study period. Accordingly, a decreased interest in skin cancer during the COVID-19 pandemic has also been reported in Italy, Turkey, and the United States. 11,14 This might be explained by the decrease in hospital/dermatology visits due to a fear to exposure to SARS-COV-2 and the resultant decrease in the diagnosis of these conditions or an increased concern for COVID-19 rather than the dermatologic conditions. A prolonged diagnostic delay might result in more advanced disease, increased morbidity and mortality, particularly in patients with skin cancers (eg, melanoma, non-melanoma skin cancer [NMSC; ie, basal cell carcinoma and squamous cell carcinoma]). 16 In fact, a recent report from the United Kingdom has shown a decrease up to 47% in the number of non-melanoma skin cancer treated and melanoma patients undergoing sentinel lymph node biopsies.<sup>17</sup> Moreover, studies from Italy showed a statistically significant increase in mean Breslow thickness during the post-lockdown phase compared with the pre-lockdown and decreased detection of melanoma during the COVID-19 pandemic. 18,19 Another study from the United Kingdom has reported that the NMSCs excised in 2020 required significantly larger and more complex surgery than in 2019.20 Altogether, these findings suggest an increased delay in the diagnosis of skin cancers, which in turn might result in more advanced disease requiring more complex surgical procedures. Implementation of teledermatology might help, at least partially to overcome these issues and effectively prioritize the patients in whom earlier treatment is needed.<sup>21</sup>

Unlike our study suggesting a decreased interest in scabies and pruritus, recent studies have reported an outbreak of scabies in Spain

(Continues)

 TABLE 1
 Relative search volume (RSV) of dermatologic symptoms, conditions, treatments and procedures

	March 15-May 9	6			May 10-July 4				July 5-October 31	31		
	2020	2016-2019	% Change	P value	2020	2016-2019	% Change	P value	2020	2016-2019	% Change	P value
Blistering	44.38 ± 2.02	46.91 ± 1.81	-5.39	.352	74.63 ± 3.22	65.72 ± 2.21	13.56	.023	55.88 ± 3.19	57.93 ± 1.98	-3.54	.585
Bruising	$51 \pm 1.98$	$70.09 \pm 1.18$	-27.24	<.001	75.38 ± 3.06	84 ± 1.48	-10.26	.011	$76.06 \pm 2.20$	76.47 ± 1.12	-0.54	.867
Callus	$51.0 \pm 4.36$	43.47 ± 0.96	17.32	.092	$57.25 \pm 1.38$	$48.13 \pm 0.95$	18.95	<.001	49.82 ± 1.22	$46.04 \pm 1.12$	8.21	.022
Comedones	$59.63 \pm 3.82$	$53.38 \pm 2.31$	11.71	.162	$73.25 \pm 2.07$	$57.34 \pm 2.52$	27.75	<.001	$75.53 \pm 3.03$	$52.88 \pm 1.70$	42.83	<.001
Skin swelling	$60.88 \pm 2.85$	$64.25 \pm 2.43$	-5.25	.367	$72.38 \pm 5.74$	$60.88 \pm 2.37$	18.89	.064	$71.59 \pm 1.94$	$62.13 \pm 1.69$	15.23	<.001
Dandruff	86 ± 3.94	$72.63 \pm 1.54$	18.41	.002	$76.5 \pm 2.26$	$61.78 \pm 0.90$	23.83	<.001	$70.82 \pm 1.26$	$62.79 \pm 0.84$	12.79	<.001
Dry skin	$57.13 \pm 2.13$	$52 \pm 1.28$	9.87	.039	$53 \pm 1.50$	44.69 ± 0.69	18.59	<.001	$48.82 \pm 0.75$	$44.51 \pm 0.67$	89.6	<.001
Erythema	$62.38 \pm 1.77$	$77.97 \pm 1.31$	-19.99	<.001	$67 \pm 3.17$	$79.41 \pm 1.20$	-15.63	<.001	$74.82 \pm 1.2$	$79.5 \pm 0.92$	-5.89	.002
Hair loss	$71.25 \pm 3.29$	$70.28 \pm 0.73$	1.38	.774	$85.25 \pm 1.31$	$74.22 \pm 0.90$	14.86	<.001	$92.06 \pm 1.04$	$79.82 \pm 0.51$	15.33	<.001
Hair shedding	$71.75 \pm 5.89$	48.78 ± 1.39	47.09	<.001	$79.38 \pm 2.17$	$55.06 \pm 1.58$	44.17	<.001	$75.18 \pm 1.28$	$59.63 \pm 1.06$	26.08	<.001
Hives	80.88 ± 0.98	$83.56 \pm 0.95$	-3.21	.048	$87.75 \pm 1.99$	$90.34 \pm 1.14$	-2.87	.258	84.82 ± 2.08	$86.31 \pm 0.87$	-1.73	.509
Sweating	$61.63 \pm 0.79$	$58.75 \pm 1.01$	4.90	.024	$72.38 \pm 2.87$	$72.84 \pm 2.06$	-0.63	.894	$73 \pm 2.73$	$72.29 \pm 1.53$	0.98	.821
Hyperpigmentation	$75.63 \pm 4.91$	$54.75 \pm 1.99$	38.14	<.001	$93.25 \pm 1.46$	$56.47 \pm 1.72$	65.13	<.001	$79.53 \pm 2.59$	$52.01 \pm 1.33$	52.91	<.001
Hypopigmentation	$28.13 \pm 3.87$	$37.44 \pm 1.97$	-24.87	.032	$43.75 \pm 3.45$	$42.16 \pm 2.47$	3.77	707.	$46.71 \pm 2.07$	$46.51 \pm 1.59$	0.43	.941
Skin irritation	$58.63 \pm 3.601$	$59.25 \pm 1.1$	-1.05	898.	$72.25 \pm 2.50$	$61.47 \pm 1.47$	17.54	<.001	$65.76 \pm 1.71$	$60.88 \pm 1.20$	8.02	.02
Itch	$63.5 \pm 1.58$	$59.03 \pm 0.72$	7.57	.01	$82.13 \pm 2.72$	$77.25 \pm 1.82$	6.32	.136	$77.53 \pm 2.56$	$73.49 \pm 1.31$	5.50	.159
Skin mole	57.5 ± 3.03	$65.28 \pm 1.34$	-11.92	.019	83.5 ± 2.39	$79.69 \pm 1.74$	4.78	.197	$71.29 \pm 1.96$	$67.43 \pm 1.29$	5.72	660.
Nail discoloration	$37 \pm 6.03$	$34.75 \pm 2.25$	6.47	.726	$40.75 \pm 4.19$	$35.61 \pm 3.13$	14.43	.326	$41.35 \pm 4.66$	$38.63 \pm 2.18$	7.04	.596
Nail thickening	$38.86 \pm 9.29$	29.04 ± 4.04	33.82	.333	$22.75 \pm 2.41$	$31.88 \pm 2.84$	-28.64	.014	$28.5 \pm 2.60$	$26.91 \pm 1.38$	5.91	.589
Nevi	42.88 ± 3.90	$61.63 \pm 2.38$	-30.42	<.001	53.88 ± 3.85	$63.81 \pm 2.40$	-15.56	.029	$59.82 \pm 2.10$	64.46 ± 1.36	-7.20	.064
Nevus	$50.63 \pm 4.20$	$78.09 \pm 1.52$	-35.16	<.001	$66.13 \pm 2.64$	$77.44 \pm 1.49$	-14.60	<.001	$74.35 \pm 1.70$	$76.94 \pm 1.10$	-3.37	.2
Oily skin	$67.5 \pm 2.63$	$71.66 \pm 1.06$	-5.81	.143	$83.75 \pm 3.56$	$76.16 \pm 1.50$	6.97	.049	$77.71 \pm 1.42$	$76.32 \pm 1.16$	1.82	.45
Oily hair	$78.13 \pm 2.92$	$64.56 \pm 1.16$	21.02	<.001	$78.38 \pm 1.93$	$58.97 \pm 1.01$	32.92	<.001	$79.53 \pm 2.23$	$64.12 \pm 1.03$	24.03	<.001
Onycholysis	$46.38 \pm 4.52$	$47 \pm 2.51$	-1.32	.904	59.5 ± 4.22	$43.28 \pm 2.28$	37.48	.001	$45.24 \pm 3.70$	$49.07 \pm 1.94$	-7.81	.358
Pruritus	$54 \pm 1.81$	$61.31 \pm 1.39$	-11.92	.001	$56.88 \pm 1.56$	$57.28 \pm 1.57$	-0.70	.854	$63.47 \pm 1.37$	$64.59 \pm 1.56$	-1.73	.591
Purple skin	$78.38 \pm 3.62$	$62.53 \pm 1.70$	25.35	<.001	$90.63 \pm 1.31$	$71.66 \pm 2.48$	26.47	<.001	$75.59 \pm 2.12$	$63.41 \pm 1.32$	19.21	<.001
Rash	$63.75 \pm 2.41$	$64.47 \pm 0.82$	-1.12	.778	$83.25 \pm 1.18$	$81.88 \pm 1.56$	1.67	.482	$68.82 \pm 2.88$	$71.62 \pm 1.31$	-3.91	.377
Redness	$73.38 \pm 1.81$	$82.94 \pm 1.36$	-11.53	<.001	$78.25 \pm 1.23$	$79.84 \pm 1.10$	-1.99	.336	$72.71 \pm 1.14$	$75.1 \pm 0.80$	-3.18	.085
Skin scaling	$33.88 \pm 3.18$	$39.66 \pm 3.13$	-14.57	.195	39.63 ± 4.83	$36.69 \pm 3.20$	8.01	.612	$38.35 \pm 3.45$	$41.51 \pm 2.23$	-7.61	.442
Skin discoloration	$65.38 \pm 3.55$	$64.25 \pm 1.76$	1.76	777.	80 ± 2.84	$74.34 \pm 1.80$	7.61	.092	$69.12 \pm 1.63$	$66.9 \pm 1.68$	3.32	.342
Skin ulcer	$57.25 \pm 2.99$	47.44 ± 2.73	20.68	.015	$64.75 \pm 3.18$	$48.13 \pm 2.64$	34.53	<.001	$57.82 \pm 2.43$	$53.87 \pm 1.80$	7.33	.190
Mouth ulcer	$78.5 \pm 2.81$	70.44 ± 1.87	11.44	.017	$76.63 \pm 2.37$	$73.66 \pm 1.74$	4.03	.313	$77.18 \pm 2.22$	$72.99 \pm 1.16$	5.74	.094

TABLE 1 (Continue	ed)											
	March 15-May	6			May 10-July 4				July 5-October 31	1		
	2020	2016-2019 % Chang	e,	P value	2020	2016-2019 % Change P value	% Change	P value	2020	2016-2019 % Change P value	% Change	P value

	March 15-May 9	6			May 10-July 4				July 5-October 31	31		
	2020	2016-2019	% Change	P value	2020	2016-2019	% Change	P value	2020	2016-2019	% Change	P value
Wheal	28.0 ± 1.49	$30.91 \pm 1.29$	-9.41	.14	31.88 ± 2.21	$30.22 \pm 1.40$	5.49	.527	31.06 ± 2.43	34.82 ± 1.41	-10.80	.179
Wound	$77.38 \pm 1.05$	$78.72 \pm 1.05$	-1.70	.364	$87.50 \pm 2.05$	82.44 ± 1.4	6.14	.041	$93.47 \pm 0.89$	$83.71 \pm 0.91$	11.66	<.001
Acne	$86.5 \pm 3.22$	$87.44 \pm 0.86$	-1.08	.778	$94.88 \pm 1.40$	$86.5 \pm 0.79$	69.6	<.001	$91.82 \pm 0.93$	$86.76 \pm 0.68$	5.83	<.001
Actinic keratosis	47.88 ± 2.88	$64.91 \pm 2.04$	-26.24	<.001	$62.63 \pm 2.75$	$69.0 \pm 2.13$	-9.23	790.	$64.29 \pm 1.81$	64.84 ± 1.41	-0.85	.812
Angioedema	$35.13 \pm 1.67$	$46.44 \pm 1.05$	-24.35	<.001	$38.88 \pm 1.32$	$46.84 \pm 1.09$	-16.99	<.001	$41.82 \pm 1.20$	$50.38 \pm 1.13$	-16.99	<.001
Apthous stomatitis	$32.0 \pm 0.0$	$47.43 \pm 5.23$	-32.53	.003	$33.0 \pm 0.47$	$43.2 \pm 0.51$	-23.61	<.001	$46.67 \pm 9.54$	$46.93 \pm 3.38$	-0.55	.980
Atopic dermatitis	49.63 ± 7.29	$32.28 \pm 1.71$	53.75	.020	$42.0 \pm 1.43$	$33.19 \pm 1.85$	26.54	<.001	$39.18 \pm 0.96$	$33.38 \pm 1.17$	17.38	<.001
Basal cell carcinoma	$50.38 \pm 2.22$	$77.19 \pm 1.61$	-34.73	<.001	$65.13 \pm 2.23$	$77.56 \pm 1.87$	-16.03	<.001	$75.71 \pm 1.86$	$80.13 \pm 1.14$	-5.52	.042
Skin candida	$23.88 \pm 3.32$	$38.28 \pm 2.75$	-37.62	.001	$26.75 \pm 2.41$	$35.0 \pm 1.49$	-23.57	.004	$26.59 \pm 1.68$	$32.87 \pm 1.14$	-19.11	.002
Chickenpox	$47.38 \pm 2.21$	$40.59 \pm 3.17$	16.73	.079	$38.88 \pm 1.92$	$37.47 \pm 1.43$	3.76	.557	$44.18 \pm 1.21$	$38.62 \pm 0.95$	14.40	<.001
Contact dermatitis	$71.5 \pm 1.75$	$64.78 \pm 1.64$	10.37	.005	$78.13 \pm 1.66$	$70.97 \pm 1.72$	10.09	.003	$72.35 \pm 1.70$	$70.44 \pm 1.36$	2.71	.381
Cosmetic allergy	$25.5 \pm 0.35$	$43.81 \pm 4.60$	-41.79	<.001	46.0 ± 4.95	$43.0 \pm 4.70$	86.9	099.	$46.83 \pm 8.21$	$36.33 \pm 1.18$	28.90	.205
Demodex	$21.88 \pm 1.53$	$25.53 \pm 0.75$	-14.30	.031	$22.5 \pm 0.83$	$30.31 \pm 2.15$	-25.77	.001	$23.12 \pm 0.87$	$25.96 \pm 0.38$	-10.94	.003
Dermatitis	$83.63 \pm 3.46$	$77.59 \pm 1.68$	7.78	.116	90.88 ± 0.65	$80.53 \pm 1.79$	12.85	<.001	$86.12 \pm 0.84$	$81.38 \pm 1.29$	5.82	.002
Diaper dermatitis	$32.75 \pm 4.93$	$44.16 \pm 3.07$	-25.84	.050	$34.88 \pm 3.62$	$34.86 \pm 2.82$	90.0	866.	$38.24 \pm 3.58$	$40.33 \pm 2.53$	-5.18	.633
Drug allergy	$40.5 \pm 2.59$	$44.31 \pm 1.94$	-8.60	.239	$33.63 \pm 1.49$	$40.13 \pm 2.13$	-16.20	.012	$39.0 \pm 2.57$	$36.54 \pm 1.10$	6.73	.379
Drug eruption	$31.88 \pm 6.31$	$40.23 \pm 2.97$	-20.76	.231	$33.25 \pm 3.38$	$40.9 \pm 3.24$	-18.70	.102	$35.41 \pm 3.36$	$39.49 \pm 2.18$	-10.33	.309
Erythema multiforme	$37.63 \pm 3.28$	$55.94 \pm 2.23$	-32.73	<.001	$42.0 \pm 2.09$	$51.72 \pm 2.05$	-18.79	.001	$43.76 \pm 1.79$	$54.93 \pm 1.44$	-20.33	<.001
Eczema	$79.0 \pm 2.63$	$80.06 \pm 1.71$	-1.32	.735	$84.38 \pm 1.37$	$79.0 \pm 1.68$	6.81	.013	$73.94 \pm 0.89$	$72.63 \pm 1.08$	1.80	.351
Fungal skin infection	$46.25 \pm 3.26$	$49.88 \pm 1.90$	-7.28	.337	57.88 ± 3.21	$61.28 \pm 2.44$	-5.55	.398	$56.24 \pm 1.63$	$60.44 \pm 1.78$	-6.95	.081
Hand eczema	$71.75 \pm 4.25$	$46.5 \pm 2.11$	54.30	<.001	67.38 ± 4.20	$49.88 \pm 2.01$	35.08	<.001	$58.0 \pm 2.60$	$47.37 \pm 1.56$	22.44	<.001
Herpes zoster	$63.25 \pm 2.55$	$70.59 \pm 1.70$	-10.40	.016	66.38 ± 2.54	$69.19 \pm 1.69$	-4.06	.356	$70.47 \pm 1.81$	$71.71 \pm 0.97$	-1.73	.547
Hyperhidrosis	$11.63 \pm 0.75$	$14.38 \pm 0.56$	-19.12	.003	$17.38 \pm 0.75$	$19.03 \pm 1.81$	-8.67	.398	$21.06 \pm 4.82$	$17.85 \pm 0.84$	17.98	.512
Ichthyosis	$17.25 \pm 1.28$	$20.66 \pm 1.21$	-16.51	.054	$14.0 \pm 0.90$	$24.09 \pm 2.90$	-41.88	.001	$16.06 \pm 1.08$	$18.04 \pm 0.78$	-10.98	.136
Melanoma	$41.63 \pm 1.62$	$65.03 \pm 1.79$	-35.98	<.001	$55.13 \pm 1.47$	$68.06 \pm 0.86$	-19.0	<.001	$54.71 \pm 0.76$	$62.59 \pm 0.76$	-12.59	<.001
Melasma	47.75 ± 4.45	$41.72 \pm 1.27$	14.45	.193	$83.13 \pm 4.70$	$55.47 \pm 1.78$	49.86	<.001	$70.18 \pm 3.61$	$49.03 \pm 1.54$	43.14	<.001
Miliaria	$47.75 \pm 7.51$	$39.91 \pm 2.40$	19.64	.320	$58.5 \pm 2.86$	$58.44 \pm 3.08$	0.10	.988	$46.24 \pm 4.10$	$50.84 \pm 2.43$	-9.05	.334
Milium	$26.13 \pm 2.19$	$25.97 \pm 2.31$	0.62	096.	$32.38 \pm 1.02$	$30.16 \pm 2.33$	7.36	.383	$24.24 \pm 2.10$	$33.18 \pm 1.98$	-26.94	.002
Molluscum	$62.0 \pm 2.33$	$77.38 \pm 1.32$	-19.88	<.001	$81.0 \pm 2.41$	$84.91 \pm 1.34$	-4.60	.157	$71.53 \pm 1.77$	$77.6 \pm 1.21$	-7.82	.005
Mycosis fungoides	$18.63 \pm 1.72$	$19.44 \pm 1.04$	-4.17	789.	$19.75 \pm 2.11$	$20.19 \pm 0.88$	-2.18	.848	$19.94 \pm 1.13$	$20.26 \pm 0.74$	-1.58	.811
Pediculosis	$46.63 \pm 4.30$	$56.09 \pm 2.41$	-16.87	.055	46.75 ± 4.87	$43.97 \pm 2.33$	6.32	209.	$51.71 \pm 4.04$	$50.13 \pm 2.26$	3.15	.734
Pemphigoid	$6.25 \pm 0.42$	9.47 ± 0.34	-34.0	<.001	9.38 ± 0.43	$10.13 \pm 0.50$	-7.40	.254	$10.53 \pm 0.40$	$10.56 \pm 0.31$	-0.28	.954

TABLE 1 (Continued)

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(Continues)

	March 15-May 9	•			May 10-July 4				July 5-October 31	1		
	2020	2016-2019	% Change	P value	2020	2016-2019	% Change	P value	2020	2016-2019	% Change	P value
Pemphigus	44.5 ± 3.61	48.22 ± 1.48	-7.71	.340	43.13 ± 1.97	50.34 ± 1.51	-14.32	.004	49.12 ± 1.65	53.31 ± 1.49	-7.86	.059
Pityriasis rosea	$54.5 \pm 2.28$	$77.5 \pm 1.74$	-29.68	<.001	$66.75 \pm 1.86$	$73.28 \pm 1.98$	-8.91	.016	$56.29 \pm 1.49$	$67.43 \pm 1.15$	-16.52	<.001
Psoriasis	$71.0 \pm 1.21$	$75.56 \pm 1.48$	-6.03	.017	75.0 ± 0.88	$74.22 \pm 1.37$	1.05	.632	$71.0 \pm 1.08$	71.5 ± 0.75	-0.70	.704
Rosacea	$72.0 \pm 2.91$	$82.13 \pm 1.49$	-12.33	.002	$72.75 \pm 1.68$	$67.5 \pm 1.32$	7.78	.014	$63.24 \pm 0.77$	$60.16 \pm 0.81$	5.12	900:
Scabies	$37.0 \pm 1.02$	$60.03 \pm 1.69$	-38.36	<.001	41.63 ± 0.98	$63.81 \pm 0.90$	-34.76	<.001	$41.06 \pm 0.70$	63.79 ± 0.87	-35.63	<.001
Seborrheic dermatitis	$76.88 \pm 3.12$	$75.28 \pm 1.65$	2.13	.652	79.5 ± 1.87	$75.13 \pm 1.73$	5.82	980.	$77.94 \pm 1.76$	73.96 ± 1.12	5.38	.056
Seborrheic keratosis	$43.13 \pm 1.90$	$62.03 \pm 1.87$	-30.47	<.001	63.25 ± 3.0	67.56 ± 1.70	-6.38	.211	69.65 ± 1.59	67.82 ± 1.60	2.70	.418
Skin cancer	$55.88 \pm 2.64$	$78.38 \pm 1.39$	-28.71	<.001	$77.63 \pm 2.05$	$87.56 \pm 0.93$	-11.34	<.001	$70.41 \pm 1.26$	$74.96 \pm 1.20$	-6.07	600.
Shingles	$66.75 \pm 1.93$	73.69 ± 1.19	-9.42	.002	79.13 ± 1.29	$75.91 \pm 1.00$	4.24	.049	$91.94 \pm 1.09$	$78.21 \pm 0.81$	17.56	<.001
Squamous cell carcinoma	29.25 ± 0.70	39.41 ± 1.72	-25.78	<.001	36.5 ± 1.38	38.28 ± 0.82	-4.65	.267	40.76 ± 1.31	40.53 ± 1.14	0.57	.892
Stevens Johnson syndrome	$37.5 \pm 3.27$	40.53 ± 2.01	-7.48	.430	35.38 ± 1.95	42.5 ± 2.82	-16.75	.038	36.35 ± 2.02	43.65 ± 1.43	-16.72	.003
Syphilis	$23.88 \pm 0.12$	$26.34 \pm 0.45$	-9.34	<.001	$24.75 \pm 0.46$	24.09 ± 0.36	2.74	.259	$23.71 \pm 0.33$	24.24 ± 0.28	-2.19	.221
Tinea	$51.25 \pm 1.86$	$64.66 \pm 1.18$	-20.74	<.001	$66.88 \pm 2.13$	$73.69 \pm 1.37$	-9.24	.007	$66.53 \pm 1.37$	$74.12 \pm 1.09$	-10.24	<.001
Varicella	$46.75 \pm 1.92$	$61.63 \pm 1.54$	-24.14	<.001	$52.75 \pm 2.21$	$65.75 \pm 1.43$	-19.77	<.001	$64.59 \pm 1.50$	$68.01 \pm 1.20$	-5.03	.075
Vasculitis	$29.5 \pm 1.36$	$38.47 \pm 0.66$	-23.32	<.001	$37.75 \pm 0.98$	40.69 ± 2.04	-7.23	.194	$34.94 \pm 0.88$	$38.69 \pm 0.53$	-9.69	<.001
Verruca	$26.63 \pm 3.66$	$27.63 \pm 1.11$	-3.62	.794	$33.88 \pm 2.92$	$29.78 \pm 1.80$	13.77	.232	$37.18 \pm 1.44$	$35.35 \pm 1.65$	5.18	.405
Vitiligo	$40.13 \pm 2.30$	$46.53 \pm 1.27$	-13.75	.015	$57.0 \pm 3.70$	$55.09 \pm 1.46$	3.47	.631	$55.82 \pm 1.53$	$56.91 \pm 1.29$	-1.92	.586
Urticaria	$54.38 \pm 2.62$	$56.09 \pm 1.23$	-3.05	.552	$56.0 \pm 1.34$	$55.13 \pm 1.09$	1.58	.612	$55.53 \pm 0.93$	58.44 ± 1.22	-4.98	.059
Wart	$68.88 \pm 2.65$	$73.06 \pm 0.76$	-5.72	.129	$83.13 \pm 1.44$	$82.78 \pm 1.03$	0.42	.846	$76.88 \pm 1.56$	$78.81 \pm 1.14$	-2.45	.318
Zoster	$63.25 \pm 1.60$	$73.31 \pm 1.61$	-13.72	<.001	$70.75 \pm 3.03$	76.44 ± 1.91	-7.44	.112	$76.88 \pm 1.83$	$76.32 \pm 1.25$	0.73	.801
Acitretin	$34.5 \pm 4.21$	$42.22 \pm 2.84$	-18.29	.128	$32.5 \pm 2.57$	48.94 ± 2.89	-33.59	<.001	$41.88 \pm 2.62$	$45.93 \pm 1.87$	-8.82	.209
Soriatane	$21.86 \pm 3.76$	$31.8 \pm 2.10$	-31.26	.021	$33.0 \pm 5.67$	$34.08 \pm 2.55$	-3.17	.863	$28.81 \pm 3.39$	$29.61 \pm 2.06$	-2.70	.840
Dupilumab	$17.63 \pm 2.65$	$20.0 \pm 1.69$	-11.85	.449	$22.63 \pm 1.33$	$17.59 \pm 1.34$	28.65	800.	$23.0 \pm 2.05$	$20.97 \pm 1.53$	89.6	.428
Dupixent	$62.0 \pm 3.00$	$29.75 \pm 3.65$	108.40	<.001	$65.25 \pm 3.19$	$28.5 \pm 3.00$	128.95	<.001	$75.06 \pm 2.48$	$37.94 \pm 2.70$	97.84	<.001
Emollients	$24.63 \pm 2.44$	$23.88 \pm 1.77$	3.14	.804	$25.43 \pm 3.52$	$25.35 \pm 3.08$	0.32	.987	$25.12 \pm 1.83$	$23.61 \pm 1.37$	6.40	.510
Isotretinoin	57 ± 3.24	$54.97 \pm 2.3$	3.69	609.	$57.63 \pm 2.34$	$51.38 \pm 2.33$	12.16	.058	$57.18 \pm 2.36$	$51 \pm 1.46$	12.12	.026
Accutane + Absorica + Amnesteem + Claravis + Myorisan	61.63 ± 1.25	66.63 ± 0.97	-7.50	.002	68.63 ± 1.59	65.16 ± 1.23	5.33	.085	68.65 ± 0.748	64.59 ± 0.89	6.29	<.001
Ivermectin	$27.5 \pm 10.49$	$5.88 \pm 0.12$	367.69	.039	$10.88 \pm 0.57$	$5.97 \pm 0.13$	82.24	<.001	$12.18 \pm 1.06$	$5.49 \pm 0.10$	121.86	<.001
Stromectol	28.38 ± 10.36	$11.31 \pm 1.08$	150.93	.101	$14.63 \pm 1.39$	$10.81 \pm 0.73$	35.34	.015	12.44 ± 1.51	$11.13 \pm 0.67$	11.77	.429

TABLE 1 (Continued)

	March 15-May 9	6			May 10-July 4				July 5-October 31	31		
	2020	2016-2019	% Change	P value	2020	2016-2019	% Change	P value	2020	2016-2019	% Change	P value
Sklice + Soolantra	$41.63 \pm 2.85$	$50.13 \pm 2.50$	-16.96	.025	37.88 ± 2.37	51.81 ± 1.71	-26.89	<.001	43.65 ± 2.77	50.56 ± 1.30	-13.67	.024
Omalizumab	$31.13 \pm 4.19$	34.44 ± 2.24	-9.61	.486	$32.38 \pm 3.41$	$32.28 \pm 2.13$	0.31	.981	$38.47 \pm 3.79$	$34.62 \pm 1.72$	11.12	.355
Xolair	$57.5 \pm 2.46$	$65.44 \pm 2.31$	-12.13	.019	$57.63 \pm 2.0$	$66.0 \pm 2.70$	-12.68	.013	$67.76 \pm 2.32$	$66.62 \pm 1.78$	1.71	.695
Sunscreen	$31.63 \pm 4.44$	$39.66 \pm 2.37$	-20.25	.110	$75.38 \pm 4.29$	$71.13 \pm 2.53$	5.97	.393	$37.29 \pm 4.09$	$28.5 \pm 1.97$	30.84	.053
Sun protection	$41.75 \pm 4.7$	$48.78 \pm 1.91$	-14.41	.166	73.88 ± 3.80	$73.13 \pm 2.12$	1.03	.863	$41.06 \pm 4.92$	$37.1 \pm 2.19$	10.67	.462
Corticosteroid cream	$58.25 \pm 6.21$	$45.63 \pm 2.49$	27.66	.059	$75.75 \pm 4.47$	48.34 ± 3.07	56.70	<.001	$60.88 \pm 2.12$	49.94 ± 2.07	21.91	<.001
Temovate + diprolene + dermovate + elocon + taclonex + calcitrene	44.75 ± 2.51	62.41 ± 2.31	-28.30	<.001	56.0 ± 2.77	62.5 ± 2.30	-10.40	.071	55.29 ± 2.95	62.51 ± 1.41	-11.55	.027
Tacrolimus ointment	$55.0 \pm 3.72$	$38.94 \pm 3.08$	41.24	.001	$72.38 \pm 3.59$	47.16 ± 2.77	53.48	<.001	$75.94 \pm 2.95$	46.93 ± 2.09	61.82	<.001
Protopic	$38.88 \pm 4.84$	$52.0 \pm 3.08$	-25.23	.022	49.25 ± 2.96	52.28 ± 2.57	-5.80	.440	49.24 ± 3.40	$55.54 \pm 1.71$	-11.34	860.
Pimecrolimus cream	$43.0 \pm 4.71$	$22.38 \pm 1.68$	92.14	<.001	$38.13 \pm 5.02$	$26.27 \pm 2.63$	45.15	.036	$53.47 \pm 4.36$	$27.87 \pm 1.79$	91.86	<.001
Elidel	$45.0 \pm 2.78$	$71.84 \pm 2.24$	-37.36	<.001	$51.63 \pm 3.61$	$66.69 \pm 2.40$	-22.58	.001	$51.35 \pm 1.89$	$66.22 \pm 1.63$	-22.46	<.001
Botox	$32.88 \pm 2.17$	$51.94 \pm 1.36$	-36.70	<.001	$58.13 \pm 1.87$	$49.16 \pm 1.10$	18.25	<.001	$63.41 \pm 0.79$	$48.82 \pm 0.96$	29.89	<.001
Dermapen	$36 \pm 2.62$	$59.38 \pm 2.47$	-39.37	<.001	50.63 ± 2.44	$55.31 \pm 2.78$	-8.46	.205	$45.65 \pm 2.76$	$53.84 \pm 1.50$	-15.21	600.
Dermaroller	$55.5 \pm 5.84$	$60.34 \pm 1.69$	-8.02	.426	64.5 ± 3.73	$53.47 \pm 1.66$	20.63	.007	$51.47 \pm 3.46$	$51.34 \pm 1.38$	0.25	.972
Dermal filler	$36.75 \pm 5.64$	$44.69 \pm 2.60$	-17.77	.201	$53.75 \pm 6.86$	46.78 ± 2.68	14.90	.344	$64.35 \pm 4.50$	44.18 ± 1.75	45.65	<.001
Fractional Laser	$16.13 \pm 2.03$	$39.84 \pm 2.57$	-59.51	<.001	$31.5 \pm 3.47$	$31.97 \pm 1.33$	-1.47	.900	$31.35 \pm 1.81$	$35.57 \pm 1.62$	-11.86	.082
Laser epilation	$30.88 \pm 4.01$	$38.52 \pm 2.73$	-19.83	.115	$32.5 \pm 2.98$	$35.56 \pm 2.64$	-8.61	.442	$36.36 \pm 4.03$	$42.25 \pm 2.52$	-13.94	.215
Peeling	$66 \pm 4.19$	$58.56 \pm 0.88$	12.70	.083	89.38 ± 2.66	$72 \pm 1.56$	24.14	<.001	$73.06 \pm 2.80$	64.46 ± 1.46	13.34	900.
Patch testing	$52.25 \pm 6.97$	46.69 ± 3.43	11.91	.474	$52.75 \pm 6.27$	$42.22 \pm 2.31$	24.94	.115	$62.41 \pm 4.40$	$44.1 \pm 1.83$	41.52	<.001
Skin Prick test	$25.17 \pm 5.72$	$32.83 \pm 3.25$	-23.33	.244	$30.38 \pm 6.26$	$27.3 \pm 2.30$	11.28	.644	29.38 ± 2.49	$23.81 \pm 1.20$	23.39	.044
Skin allergy test	$31.13 \pm 1.95$	$51.78 \pm 2.88$	-39.88	<.001	$43.25 \pm 3.05$	52.38 ± 2.7	-17.43	.025	48 ± 3.00	$46.41 \pm 1.67$	3.43	.644
Phototherapy	$61.13 \pm 5.03$	$58.22 \pm 1.81$	5.0	.587	$52.5 \pm 3.55$	$51.81 \pm 1.26$	1.33	.855	$57.88 \pm 3.22$	$53.46 \pm 1.35$	8.27	.204
PRP	$51.13 \pm 1.60$	$68.97 \pm 2.13$	-25.87	<.001	69.63 ± 1.89	$66.72 \pm 1.82$	4.36	.268	$80.82 \pm 1.40$	$68.81 \pm 1.44$	17.45	<.001
Mesotherapy	$25 \pm 2.40$	$50.5 \pm 2.39$	-50.5	<.001	$50.88 \pm 3.36$	48.84 ± 2.84	4.18	.645	$59.06 \pm 3.92$	$46.1 \pm 1.55$	28.11	.002
Skin	84.38 ± 3.38	$79.72 \pm 0.72$	5.85	.178	96.25 ± 0.93	$83.47 \pm 0.95$	15.31	<.001	$88.59 \pm 1.23$	79.03 ± 0.88	12.10	<.001
Skin care	$83.63 \pm 5.17$	$70.63 \pm 0.84$	18.41	.013	90.88 ± 2.06	$68.31 \pm 1.24$	33.04	<.001	$79.71 \pm 1.30$	66.32 ± 0.78	20.19	<.001
Dermatologist	43 ± 2.34	79.03 ± 0.94	-45.59	<.001	75.88 ± 2.91	83.25 ± 1.04	-8.85	.017	80.35 ± 0.68	80.94 ± 1.10	-0.73	.649
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Notes: Plus-minus values are means  $\pm$  standard error (generalized estimating equations). Abbreviation: PRP, platelet rich plasma.

and Turkey.<sup>22,23</sup> The increase of scabies was attributed to the increased transmission due to closer contact among family members and delay in diagnosis during the lockdown. This discrepancy could be attributed to the differences in the socioeconomic status of the study populations or merely to the lack of correlation between the incidence of scabies and public interest in these search terms. Considering the increased global burden of scabies,<sup>24,25</sup> the future studies investigating the changes in scabies epidemiology during COVID-19 pandemic would be of benefit to prevent potential scabies outbreaks during the lockdowns in the future.

Another important finding of the present study was the increased interest in dry skin, atopic dermatitis, hand eczema, tacrolimus ointment, pimecrolimus cream, and skin care all through the study period. In line with our findings, a previous study from the United Kingdom has reported a similar trend for hand eczema during the COVID-19 pandemic. 12 It seems possible that these results are due to more strict hygiene practices, that is, more frequent use of soaps and alcoholbased hand sanitizers which might lead to the development of contact dermatitis. 26 Indeed, an increased incidence of dermatitis associated with the hygiene practices and the use of personal protective equipment (PPE) during the pandemic has been reported. 27,28 Despite the efforts for the prevention of contact dermatitis associated with hygiene practices, 29 there still seems to be room for improvement in community education on safe and effective hygiene practices.

The current study found a continuous increase of interest in dandruff, oily hair, and hair shedding which are most commonly associated with seborrheic dermatitis and telogen effluvium. This result can be well-expected considering that these conditions might exacerbate in response to elevated levels of psychological stress<sup>30</sup> which is a well-characterized impact of COVID-19.<sup>31</sup> The stable increase in the interest for the term "purple skin" is also of interest, despite being foreseeable. Among the various dermatologic manifestations of COVID-19, pseudochilblain lesions involving acral areas (also described as COVID toes) and livedo-like lesions might present as purplish discoloration of the skin.<sup>32</sup> Accordingly with our results, an increased public interest in acral lesions (ie, coronavirus toes, coronavirus fingers) has also been demonstrated in a prior study from France.<sup>13</sup>

Another finding of this study was the initially decreased interest in "comedones, acne, melasma, rosacea, Botox, Dermaroller, peeling, and skin" followed by an increased interest. The initial decrease of interest may be anticipated as the public interest was more focused on COVID-19 rather than the dermatologic conditions or cosmetic procedures. There are several possible explanations for the subsequent increase of interest in these terms. First of all, the extended duration of lockdown and stay-at-home policies might have caused visible and frequent facial lesions such as acne, rosacea, comedones, and melasma to draw greater attention. Accordingly, a recent report showed an increase in appearance-focused behaviors (eg, mirror checking, appearance comparisons) in patients with higher dysmorphic concern during the COVID-19 pandemic due to the closure of beauty services.<sup>33</sup> Moreover, another study reported an association between COVID-19-related stress negative body image in adults.<sup>34</sup> The subsequent increase of interest in cosmetic procedures such as botulinum toxin injections, dermaroller, and chemical peeling may also be explained by these findings. Another possible explanation is the exacerbation of acne and rosacea induced by the use of protective masks.<sup>35</sup> Previous studies have reported a similar trend for cosmetic procedures<sup>11,12,14</sup> but in the United Kingdom there was an increased interest in acne during the initial phases of the pandemic which was attributed to public desire for self-treatment of acne.<sup>12</sup>

Some limitations of the present study need to be acknowledged. First, the results should be interpreted cautiously before extrapolating to the general population because the source of data was confined to the population with access to the internet and Google searches. Nonetheless, the fact that Google's search engine market share of 88%<sup>36</sup> and the internet usage rate among US adults of 90%.<sup>37</sup> enables our study to cover a major segment of the general population. Another limitation is the lack of information on the reasons for the observed trends in the public interest. Future prospective studies are warranted to determine the reasons for the change in interest. Finally, although three experienced dermatologists have discussed and selected the search terms, some of the relevant dermatologic terms might not have been included in the analysis. The key strengths of this study are the analysis of a longer period comprising different stages of pandemic and comparison with the mean interest over the previous for years. Previous similar studies have compared either consecutive periods within a year 12,14 or a relatively shorter period during the pandemic with only the previous year. 11 Another strength of our study is the comprehensive list of search terms representing a wide range of dermatologic symptoms, conditions, treatments, and procedures.

In conclusion, the study demonstrated a significant impact of the COVID-19 pandemic on the public interest in dermatology. The present results would help to create healthcare policies and information sources, which can meet the public demand. The reasons for the observed trends and their effect on patient outcomes might be of interest for future studies.

## **CONFLICT OF INTEREST**

The authors declare no conflict of interest.

# **DATA AVAILABILITY STATEMENT**

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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