

## SHORT PAPER

# Contributions of dermatologists to COVID-19 research: A brief systematic review

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**Abstract**

Coronavirus disease 2019 (COVID-19) has been declared a pandemic. We conducted a systematic review to reveal the contribution of dermatologists in COVID-19 research. Two hundred and ninety-eight articles were included and classified into cutaneous manifestations of COVID-19, operating experience against COVID-19, mechanisms and treatment of COVID-19, disinfection and personal protective equipment (PPE)-related skin diseases, and other topics. The value of these articles and their impact on clinical impact were discussed and we hope that dermatologists can have a better understanding of these areas from this study.

**KEYWORDS**

coronavirus, COVID-19, dermatologist, skin, systematic review

## 1 | INTRODUCTION

Coronavirus disease 2019 (COVID-19), first emerged in Wuhan, China, rapidly spread all over the world. Up to now, the number of confirmed cases has reached over 4 million. Dermatologists have contributed a lot to COVID-19, such as cutaneous manifestations of COVID-19, teledermatology, and management on patients with inflammatory skin diseases.<sup>1,2</sup> Here, we systematically reviewed what dermatologists contributed to COVID-19 research.

## 2 | METHODS

The literature search was conducted on PubMed database on May 14, 2020. The searching strategy was (COVID\* or coronavirus\*) and (dermatol\* or skin\* or cutaneous\*), and language was restricted to English. The inclusion criteria were (a) articles published in dermatologic journals based on InCites Journal Citation Reports or (b) articles published in journals of other categories with the first author from the department of dermatology.

## 3 | RESULTS

Five hundred and twenty-nine articles were identified in PubMed. After independent selection by two authors, 298 articles were included in the systematic review. Seventy articles focused on cutaneous manifestations of COVID-19 (n = 70), followed by the management on patients with common skin diseases (n = 68), operating experience against COVID-19 (n = 49), mechanisms and treatment of COVID-19 (n = 34), disinfection and personal protective equipment (PPE)-related skin diseases (n = 27), and other topics (n = 50). The detailed classification was shown in Table 1. Two hundred and twelve articles were comments, 73 were case reports or case-series, 12 were reviews, and only 1 was case-control study.<sup>3</sup>

The included studies were published in 36 different journals. Twelve journals had more than three articles, all of which were dermatologic journals. Seventy-eight articles were published in *Journal of the American Academy of Dermatology*, followed by *Dermatologic therapy* (n = 67), *Journal of the European Academy of Dermatology and Venereology* (n = 62), *Journal of Dermatological Treatment* (n = 14) and *Clinical and Experimental Dermatology* (n = 14). Only 2 studies were published on February, 22 in March, 151 in April, and 123 in May. In the selected studies, 53 were accomplished through international cooperation. Among the other articles whose authors were from the

Yuanzhuo Wang, Rouyu Fang, and Hanlin Zhang should be considered joint first author. These authors contributed equally to this study.

**TABLE 1** Classifications of the articles on dermatology and COVID-19

Classification	Theme	Number of articles
Cutaneous manifestations of COVID-19	–	70
Disinfection and personal protective equipment related skin diseases	Related skin diseases of personal protective equipment	14
	Tips of the usage of personal protective equipment	11
	Disinfection	2
Management on patients with other skin diseases	Psoriasis	29
	Skin cancer	9
	Pemphigus	3
	Atopic dermatitis	3
	Others	24
Mechanisms and treatment of COVID-19	Hydroxychloroquine	7
	Anti-cytosine therapy	5
	Biologics	3
	Janus Kinase Inhibitors	3
	Infection possibly mediated by androgen	3
	Others	13
Operating experience against COVID-19	Telemedicine	10
	Dermatologists' perspective in the pandemic	9
	Measures conducted for outpatient clinic visits	9
	Impact of COVID-19 outbreak on dermatologic clinics	6
	Procedural dermatology	6
	Others	9
Others	–	50

same country, 71 were from Italy, 70 from the USA, 22 from China, 19 from Spain, and 63 from other countries.

## 4 | DISCUSSION

The current pandemic of COVID-19 aroused great public concern. The number of publications had rapid growth over time, as the plague of COVID-19 spread rapidly all over the world, and dermatologists contributed some precious experience to the community, especially those from the frontline in the “red-zone” area.

Cutaneous manifestations of COVID-19 have gained much attention. It has been pointed out that a common pattern of cutaneous symptoms may facilitate early diagnosis of COVID-19.<sup>4</sup> Although the cutaneous signs were highly variable and heterogeneous, a recent study reviewed the

literature to summarize common features,<sup>5</sup> including vascular complications, maculopapular eruptions, urticarial rash, vesicular eruption, petechiae/purpuric eruptions, erythema multiforme-like rash, palmar erythema, perifollicular eruption, pruritus, mucosal lesions, and androgenetic alopecia. A systematic investigation is warranted as most studies were derived from case reports and case series under the heavy burden of the pandemic. Of note, these articles supported the important role of dermatologists working side by side with their staff from other departments. Severe cutaneous manifestations suggested poor prognosis for patients and were beneficial for risk stratification at the early stage of the disease.<sup>5</sup>

The management of patients with common skin diseases also attracted much attention, such as psoriasis, skin cancer, pemphigus and atopic dermatitis. Long-term use of immunosuppressants or biologics was common in these patients. Given that these drugs were critical in the treatment and may stimulate the progress of COVID-19 as well, it is a dilemma to make a decision. Studies in March, early April were comments based on expert opinions,<sup>6</sup> and studies of case-series in May provided additional evidence to guide the usage of these drugs.<sup>7</sup> The dermatologists are recommended to read these publications to weigh and judge the risks and benefits, for discontinued usage of biologics may decrease the infection risk of COVID-19 and lead to the aggravation of primary diseases at the same time.<sup>8,9</sup>

Dermatologists also focused on measures on quarantine, triage, and resumption, and tricks of wearing masks, and performing dermoscopy. Many studies also focused on the personal protective equipment (PPE) and the need for disinfection of public places. A long time of wearing masks or other PPEs had reached consensus in causing related skin diseases like dermatitis, and the medical workers should be educated to use them properly to avoid damage.<sup>10</sup> These articles also included the operating experience of dermatology clinics or hospitals, such as the area of telemedicine and emergency management. Procedural dermatology was significantly influenced in the pandemic, including surgical and cosmetic techniques, laser, and the photodynamic therapy.<sup>11</sup> The experience facilitates the resume of outpatient dermatologic surgery with efficiency and safety.<sup>12</sup> There still exist some topics having little to do with dermatology were also discussed in dermatologic journals, such as mechanisms and treatment of COVID-19,<sup>13</sup> COVID-19 and racial disparities,<sup>14</sup> COVID-19 and economy.<sup>15</sup>

Most articles were comments, personal perspectives with low level of evidence. Due to the epidemiologic feature of COVID-19, cohort study, case-control study, and randomized controlled trial were difficult to conduct to further reveal cutaneous manifestations of COVID-19 and disinfection and personal protective equipment-related skin diseases. Studies with larger population are warranted to further evaluate the current findings. National or international studies are also needed for further research. A growing trend was observed in the number of articles, which means COVID-19 has been increasingly attracting the attention of dermatologists. Most articles were from epidemic countries, and as the pandemic was declared, dermatologists should have more understanding of COVID-19, and its relation with dermatology.

We would like to suggest our advice as a health care worker in the “red-zone” area. Services of the dermatology outpatient department and surgery were postponed except for emergency treatment. At the same

time, we prioritize the use of telemedicine consultation, particularly for patients receiving biologics treatment. To minimize the risk of exposure, we also conveyed medical knowledge about usage of PPE, skincare, household cleaning, and the coronavirus to protect the dermatological patients.

## 5 | CONCLUSION

This study systematically reviewed contributions of dermatologists to COVID-19 research. Research topics, journals, publication time, and country of origin were identified, and the value of these articles and their influence on the clinical practice were discussed in detail. We hope this study may help dermatologists to have a better understanding of the mechanisms, management, and the cutaneous manifestations of COVID-19, the operating experience of dermatology clinics in the "red-zone" area, and to use disinfectant and personal protective equipment properly.

### CONFLICT OF INTEREST

The authors declare no conflicts of interest.

### AUTHOR CONTRIBUTIONS

All authors contributed to the manuscript, Hanlin Zhang designed the study and Yuanzhuo Wang conducted the literature search. Keyun Tang collected the data. Rouyu Fang examined the data and revised the manuscript. Qiuning Sun made the analysis. The manuscript have been read and approved by all the authors. We have thoroughly read the instructions for authors. The requirements for authorship have been met and each author believes that the manuscript represents honest work.

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