



Original Article

Cutaneous manifestations of covid-19 in pediatric population: A web based comparative study between the perspectives of dermatologists and pediatricians

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Received : 03 April 2022

Accepted : 15 April 2022

Published : 26 May 2022

DOI

10.25259/CSDM_40_2022

Quick Response Code:



ABSTRACT

Objectives: To compare the perspectives of dermatologists and pediatricians regarding cutaneous manifestations of covid-19 in the pediatric age group.

Material and methods: An online semi-structured English questionnaire was circulated among the doctors (snowball sampling). Items of the questionnaire with a content validity ratio ≥ 0.49 were retained. Content validity index (CVI) was estimated, and those with a CVI score of >0.79 , were accepted. Appropriate statistical tests were carried out for data analysis.

Results: Among 305 responders, majority were dermatologists ($n = 139$; 45.57%) followed by pediatricians ($n = 106$; 34.75%) and other specialties ($n = 60$; 19.6%). Nearly 46.55% of all responders ($n = 142$) observed cutaneous manifestations among pediatric covid patients (40/139 dermatologists, 28.77%, and 94/106 pediatricians, 88.67%). Nearly 54.22% of pediatricians and 10% of dermatologists reported the infection to be moderate to severe. About 15% of dermatologists and 5.3% of pediatricians came across cutaneous manifestations as the sole manifestation. The commonest manifestation was urticarial (61.26%) followed by a morbilliform rash (52.81%). Multisystem inflammatory syndrome in covid (MISC) was observed almost exclusively by 63.82% of pediatricians. Vascular manifestations were seen by 11.97% responders ($n = 17$). Chilblains were reported by 4.5% of pediatricians. Nearly 78.04% of pediatricians and 35% of dermatologists observed mucosal manifestations.

Conclusion: Pediatricians are more commonly observing cutaneous manifestations. MISC is exclusively reported by pediatricians, highlighting the fact that severe disease is usually not seen by dermatologists. Vascular manifestations are uncommon in the skin of color. Dermatologists encounter asymptomatic covid patients with cutaneous manifestation more often, reiterating the fact that children presenting with urticarial and morbilliform rashes should be tested for covid-19, considering the present scenario.

Keywords: Dermatologists, Pediatricians, Covid-19, Cutaneous manifestations

INTRODUCTION

The ongoing covid-19 pandemic which originally started in Wuhan city, China is by far the most appalling public health problem that the world has faced in a long time. Since its inception, different countries from across the globe have been reporting multiple waves of the coronavirus which has taken innumerable lives and livelihoods of millions of people.^[1] Initially, the pediatric population was infrequently affected^[2] but as the pandemic has evolved, an alarming trend of children becoming increasingly vulnerable to the virus, has come into the picture. With the rise in the number of pediatric covid patients, associated cutaneous manifestations are increasing

as well.^[3-5] Since pediatricians and dermatologists are the two specialties that are dealing with the maximum number of pediatric covid patients, we conducted a study with the objective of comparing the viewpoint of these disciplines, regarding cutaneous manifestations of the disease in children.

MATERIAL AND METHODS

A questionnaire-based, observational study was carried out among the physicians who are managing covid positive pediatric patients in India. An online semi-structured English questionnaire was administered by means of the Google Forms platform and the link was circulated among the doctors through e-mails, WhatsApp messenger, Facebook messenger, Telegram, etc., to the contacts of the investigators (snowball sampling). During the preparation of the questionnaire, items were developed by a discussion with colleagues, other experts, and targeted responders. Face and content validity of the questionnaire was done by a panel of experts. Items with a content validity ratio ≥ 0.49 were retained in the final questionnaire. The content validity index (CVI) was calculated. After estimating the CVI for all the items, those with CVI scores of >0.79 , were considered acceptable. The acceptable items were preserved in the questionnaire, unacceptable items were removed, and modifiable items were revised and corrected by the panel of experts. Internal consistency of the items was tested by Cronbach's alpha coefficient (values more than 0.7 were accepted). A total of 351 primary care physicians comprising dermatologists, pediatricians, and doctors from other specialties filled the form. Fifteen doctors denied to fill out the questionnaire. Thirty one forms were discarded due to erroneous, inconclusive, and incomplete responses. A total of 305 responses were considered for final evaluation. The statistical software SPSS v 10.0 & Medcalc® v 9.6.4.0 was used for analysis.

RESULTS

Out of 305 responders, majority were dermatologists ($n = 139$; 45.57%) followed by pediatricians ($n = 106$; 34.75%) and others doctors ($n = 60$; 19.6%).

Cutaneous manifestations

Nearly 46.55% of all responders ($n = 142$) observed cutaneous manifestations among pediatric covid patients, of which, 76.05% reported the frequency to be less than 5%. About 66.90% of respondents mentioned that the commonest age group was 6–14 years. Nearly 88.02% reported the severity of the disease to be mild. About 78.87% mentioned that the cutaneous manifestations occurred simultaneously with the systemic manifestations (fever, malaise, sore throat, etc.) Cutaneous features as the sole manifestation of covid-19 were seen by 7.74% ($n = 11$) of responders. About 12.67% ($n = 18$)

came across skin manifestations that preceded the systemic features. The commonest cutaneous manifestation was urticaria (61.26%) followed by a morbilliform rash (52.81%), and MISC (45.77%). Vascular manifestations, vasculitis, and pernio were seen by 11.97% ($n = 17$) only. Nearly 65.49% ($n = 93$) reported itching to be the commonest symptom. Nearly 84.50% stated that cutaneous manifestations lasted for less than seven days, in most cases. Nearly 69.01% felt that the second wave was characterized by a higher number of mucocutaneous manifestations, in comparison to the first wave.

Mucosal manifestations

About 28.85% of all 305 responders observed mucosal manifestations ($n = 88$), out of which, 78.40% were pediatricians and 35% were dermatologists. Commonest mucosal manifestations were glossitis and papillitis ($n = 50$, 56.81%) followed by petechiae ($n = 38$, 43.18%), and gingivitis ($n = 30$, 34.09%).

Dermatologists vs pediatricians

Forty out of 139 dermatologists (28.77%), as compared to 94 out of 106 pediatricians (88.67%) reported cutaneous manifestations ($p < 0.0001$, chi-square test). Responses of dermatologist and pediatricians who have observed such manifestations has been compared and summarized in Table 1.

DISCUSSION

In our study, only 28.77% of dermatologists came across pediatric covid patients with cutaneous manifestations as opposed to 88.67% of pediatricians which were statistically significant ($p < 0.0001$, chi-square test). Among covid positive children with skin findings, the majority of the respondents (88.02%) reported mild covid-19, whereas 54.22% of pediatricians and only 10% of dermatologists saw moderate to severe covid-19 infection. Pediatricians often are the first source of contact with children acquiring covid-19 infection. Overall, the severity of covid-19 among children is also less than adults with most being treated under home isolation by pediatricians, further reducing the footfall to dermatologists.^[6] Moderate to severe cases of covid-19 who get hospitalized are managed by pediatricians, where dermatologists are roped in if required. Covid-positive children having cutaneous features with minimal systemic features (asymptomatic to mild cases) are the ones that present to dermatologists most commonly.

The majority of dermatologists (90%) and pediatricians (68%) stated that the frequency of cutaneous manifestations was less than 5% among pediatric patients, which matches the reported prevalence rates of 0.25–3%.^[7] Six to fourteen years was the commonest age group reported by our

Table 1: Comparison of dermatologists vs pediatricians who observed cutaneous manifestations in pediatric covid patients.

Responders who observed cutaneous manifestations in pediatric covid patients	Pediatricians (n = 94)	Dermatologists (n = 40)
Frequency of cutaneous manifestations ($p = 0.0003$, chi-square test)		
<5%	68.08%	90%
>5%	31.92%	10%
Most common age group		
<1 years	3.19%	7.5%
1–5 years	30.85%	22.5%
6–14 years	65.95%	70%
Covid severity ^[5]		
Asymptomatic ($p = 0.0339$, chi-square test)	5.3%	15%
Mild	89.36%	82.5%
Moderate	43.61%	7.5%
Severe	10.63%	2.5%
Onset of cutaneous symptoms		
Before covid-19 symptoms	11.70%	17.50%
Along with covid-19 symptoms	82.97%	67.5%
After resolution of covid-19 symptoms	20%	35.2%
As sole presentation of covid ($p = 0.0339$, chi-square test)	5.3%	15%
Cutaneous manifestations:		
Urticaria	51.06%	82.5%
Morbilloform rash	57.44%	52.5%
MISC ($p < 0.0001$, chi-square test)	63.82%	7.5%
Vasculitis like	9.57%	10%
Pernio like	4.25%	–
Papulosquamous	6.38%	–
Erythema multiforme like	8.5%	–
Vesicular like	2.12%	2.5%
Others	4.25% (non-specific erythema)	–
Most common duration of cutaneous manifestations (<5 days)		
<7 days	82.97%	85%
>7 days	9.57%	7.5%
Most common symptoms along with cutaneous manifestations (multiple choice allowed)		
Itching	60.63%	72.5
Burning sensation	40.42%	32.5%
Pain	28.72%	12.5%
Asymptomatic	36.17%	20%
Comparing cutaneous manifestation in the second wave and first wave		
Second wave had more cutaneous manifestations among paediatric covid patients	64.89%	75%
First wave had more cutaneous manifestations among paediatric covid patients	12.76%	7.5
No difference	20.21%	17.5
Responders who observed mucosal manifestations among paediatric covid patients:		
Glossitis and papillitis	56.52%	78.57%
Petechaie	42.02%	42.85%
Gingivitis	36.32%	35.71%
Ulcer	17.39%	7.14%

(Continued)

Table 1: *Continued...*

Responders who observed cutaneous manifestations in pediatric covid patients	Pediatricians (n = 94)	Dermatologists (n = 40)
Geographic tongue	10.14%	7.14%
Nonspecific	24.63%	28.57%

responders, which corroborates with a documented mean age of 12.89 years.^[8]

Interestingly, 12.67% of responders mentioned that the skin findings preceded the systemic manifestations of covid-19. About 15% dermatologists came across cutaneous manifestations as sole manifestation in comparison to 5.3% paediatricians ($p < 0.039\%$, chi-square test). These observations re-emphasize the fact that early suspicion and prompt diagnosis are necessary among children to prevent the spread of covid-19 in the community. A systematic review of adult covid-19 patients reported similar findings with 5.3% patients presenting with cutaneous manifestations before systemic features and 12.1% patients with skin findings as sole manifestation.^[8]

Although urticaria and the morbilliform rash are common for all age groups in covid patients (consistent with any viral exanthem), children tend to develop certain manifestations such as chilblain-like lesions, erythema multiforme-like lesions, and multisystem inflammatory syndrome in covid (MISC).^[9] In our study, urticarial rash (61.26%) and morbilliform rash (52.81%) were the most common observed cutaneous manifestations among both dermatologists and pediatricians. Underlying vasculitic process *via* binding of the covid-19 virus to angiotensin-converting enzyme 2 (ACE-2) receptor on endothelium, activation of bradykinin pathway in the kinin-kallikrein system, and non-immunological activation of mast cells has been postulated for the occurrence of urticarial rash.^[10]

MISC-associated cutaneous manifestations were observed by the majority of pediatricians (63.82%) while only three dermatologists came across MISC as part of referral consultations, which was statistically significant ($p < 0.0001$, chi-square test). All pediatric patients with fever for more than five days with mucocutaneous symptoms such as maculopapular rash, non-purulent conjunctivitis, and oral mucosal involvement, and presenting four to six weeks post covid-19 infection should be evaluated for evidence of MISC so as to rule out life-threatening systemic affection.^[11,12]

Vascular manifestations have been mostly reported among countries having people with lighter skin types with striking paucity in literature from darker skin type predominant countries.^[13] Chilblain-like lesions were widely reported among the pediatric population during the first peak of covid-19 disease in western countries, 19% in a Spanish consensus.^[14-16] Hachem *et al.* could not formally prove

SARS-CoV-2 infection in their patients, but history and the detection of anti-SARS-COV-2 IgA suggested a relationship between chilblain-like lesions and covid-19.^[15] Consistent with the literature, in our study, only 9.15% and 2.8% of responders came across vasculitic and chilblain-like lesions, respectively. Differences in thrombophilic genetic profile namely lower levels of lipoprotein A1 and higher factor V Leiden minor allele mutations among whites compared to Asians have been proposed for the observed higher frequency of vascular manifestations in the latter population.^[17]

Pediatricians (78.04%) saw mucosal manifestations more commonly than dermatologists (35%). A possible explanation could be that pediatricians come across MISC-related mucosal findings more often than dermatologists. In a large study of 666 covid patients, 25% of patients had oral mucosal findings with macroglossia and anterior papillitis accounting for 18% of cases.^[18] It has been observed that among children admitted with covid-19, mucosal manifestations are frequently observed (majority fulfill the criteria of MISC). However, children with mucosal findings have conflicting reports as to whether they have higher rates of intensive care admission rates than those without mucosal involvement.^[19,20]

The average time of resolution of cutaneous manifestations noted in the pediatric population with covid is 5.8 days (SD 4.8).^[8] The majority of the dermatologists (85%) and pediatricians (82.97%) in our study stated that cutaneous symptoms lasted for less than seven days, reiterating the fact that cutaneous manifestations are usually mild and self-resolving and symptomatic therapy is enough.

Limitations of our study include selection bias, snowball sampling technique, and subjectivity of responses. Moreover, there will always be a difference between pediatricians and dermatologists, in the assessment of cutaneous lesions, which is another drawback of the study.

Our survey (first of its kind) compares the perspective of pediatricians and dermatologists, who are seeing covid positive children. Pediatricians come across cutaneous manifestations, much more often than dermatologists. Urticarial and morbilliform rash represent the commonest lesions, as per both the specialties. MISC is exclusively reported by pediatricians, portraying the extreme spectrum of cutaneous manifestations of covid-19 with multisystem involvement and potentially life-threatening consequences. Recognizable vascular manifestations in the skin of color are uncommon. Dermatologists come across asymptomatic covid patients

with cutaneous manifestation more often. Early suspicion and identification of cutaneous manifestation suggestive of covid-19 infection should prompt immediate PCR testing for covid-19 and follow-up of household contacts.

CONCLUSION

Paediatricians are more commonly observing cutaneous manifestations. MISC is exclusively reported by pediatricians, highlighting the fact that severe disease is usually not seen by dermatologists. Vascular manifestations are uncommon in skin of color.

Declaration of patient consent

Patient consent is not required as the patient's identity is not disclosed or compromised.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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How to cite this article: Agarwal A, Das A, Panda M, Goyal J, Dash M. Cutaneous manifestations of Covid-19 in pediatric population: A web based comparative study between the perspectives of dermatologists and pediatricians. *CosmoDerma* 2022;2:39.