

Impact of COVID-19 Pandemic on Dermatology Teaching Program in India: A Survey on the Faculty and Residents' Perspective

Abstract

Background: Impact of COVID-19 pandemic has been immense. An innocent casualty of this disaster is medical education and training. Dermatology, which primarily deals with out-patient services, medical and surgical interventions, and in-patient services, was one of the worst hit. The National Medical Commission of India has implemented competency-based medical education (CBME) in Dermatology, Venereology, and Leprosy since 2019. The new curriculum relies on acquiring practical and procedural skills, training skills in research methodology, professionalism, attitude, and communication. **Objectives:** The study was undertaken to understand the implications of the COVID-19 pandemic on postgraduate dermatology CBME training in India. **Materials and Methods:** A questionnaire-based survey was carried out on postgraduate dermatology teachers and residents in India after obtaining ethics committee approval. An online semi-structured English questionnaire was administered by Google Forms. The calculated sample size was 366 dermatology faculty and 341 postgraduate students. Validity (Content validity ratio (CVR) ≥ 0.56) and reliability (Cronbach's alpha coefficient 0.7249) of the questionnaire were determined. **Results:** Among the 764 responses received, 51.4% reported that their institutes were converted to exclusive COVID hospitals. Domains of dermatology education affected were procedural training ($n = 655$), bedside clinical teaching ($n = 613$), outpatient department-based clinical teaching ($n = 487$), bedside laboratory procedures ($n = 463$), research activities ($n = 453$), histopathology ($n = 412$), and theory classes ($n = 302$). To keep up with the teaching-learning process, online platforms were mostly utilized: Zoom Meeting ($n = 379$), Google Meet ($n = 287$), and WhatsApp Interaction ($n = 224$). Teaching during ward rounds was significantly more affected in exclusively COVID institutes than non-exclusive COVID institutes ($P < 0.001$). Psychomotor skill development suffered a major jolt with 26.7% of respondents reporting a standstill ($P < 0.001$). Communication skills among students suffered due to social distancing, mask, and poor attendance of patients. According to 23.84% of respondents, formative assessment was discontinued. **Conclusion:** Online seminars, journal clubs, and assessments have been incorporated during the pandemic. Online modalities should be used as a supplementary method as psychomotor skills, communication skills, research work, and bedside clinics may not be replaced by the e-learning.

Keywords: CBME, COVID-19, dermatology, medical education, online platforms

Introduction

The impact of novel coronavirus disease 19 (COVID-19) pandemic has been immense on each and every aspect of life. Lockdowns were implemented all across the globe, and this led to a devastating effect on the physical and mental well-being of the common man. Since the doctors and nurses were deployed to combat the pandemic, all the non-emergency out-patient departments in our country had to be shut down, and only emergency healthcare services were allowed to function. An innocent casualty of this disaster is medical education and training. Dermatology, which primarily

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deals with out-patient services and medical and surgical interventions, apart from some in-patient services, was one of the worst hits among the various disciplines of medicine. The footfall of patients to the clinics and institutions was severely diminished. Moreover, dermatology training programs all across India have been adversely affected due to a reduction in the number of patients and teacher-student interactions.

The faculties and residents of dermatology were being deputed to manage patients in fever clinics and isolation wards,

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and unfortunately, this is in addition to their regular dermatological duties. With the lockdowns gradually easing, the situation has changed for the better, but the impact of COVID-19 on medical education and training is going to last long. National Medical Commission (NMC) of India has implemented the competency-based training program in Dermatology, Venereology, and Leprosy since 2019, like other postgraduate disciplines.^[1] This new curriculum relies on acquiring practical and procedural skills as well as training skills in research methodology, professionalism, attitude, and communication skills. However, the pandemic is bound to affect the teaching-learning method required to instill the desired level of competency. Thus, the survey was undertaken to understand the implications of the COVID-19 pandemic on the postgraduate dermatology competency-based medical education (CBME) training in India.

Materials and Methods

A questionnaire-based survey was carried out among the dermatology faculty and residents in India after obtaining ethics committee approval and electronic consent from the participants.^[2] An online semi-structured English questionnaire was administered by means of Google Forms over a period of 4 weeks. The Google Forms were prepared by excluding all identifiers to ensure anonymity and were locked to ensure single response from participants. The sample size was calculated based on the proportion reduction of didactic lectures due to COVID. It was calculated that 366 postgraduate teachers in dermatology would need to be assessed to determine this proportion with 5% margin of error at 95% confidence level. In the absence of prior data, a response distribution of 50% on this issue was assumed in the calculation of the sample size. The population size was taken as 7481, which was the total number of faculty of dermatology (recognized by the Medical Council of India (MCI) as on 31.07.2020) obtained from the MCI website (<https://www.mciindia.org/CMS/informationdesk/teaching-faculty>). Similarly, for postgraduate residents, the sample size was calculated to be 341 with a population size of 2988 (considering 996 postgraduate seats in dermatology each year, including both recognized and permitted, obtained from the site <https://www.mciindia.org/>

CMS/information-desk/collegeand-course-search with the course name MD dermatology, venerology, and leprosy) with 5% margin of error at 95% confidence level and 50% response distribution. Thus, the minimum sample size for 50% response distribution was 707 for the combined pool of faculty and residents.

Development of questionnaire

1. *Item selection:* Items were developed as per competencies in the postgraduate NMC curriculum booklet^[1] after discussion with colleagues, other experts, and targeted responders.
2. *Validity of the Questionnaire:* Face and content validity were tested by a panel of 12 experts. Online content validation was conducted by sending the content validation form to the experts via e-mail and providing them with clear instructions. The experts rated each item in terms of relevance on a scale of 1 to 4. Items deemed 'absolutely essential' were given a score of 4, 'essential' rated as 3, 'useful but not essential' rated 2, and 'not essential' rated 1.
 - a. Content validity ratio (CVR) was determined by the formula $(N_e - N/2)/(N/2)$ where N = Total number of experts and N_e = Number of experts indicating 'essential.'^[3] A minimum CVR value of 0.56 was accepted by 12 experts. Items with a $CVR \geq 0.56$ were retained in the final questionnaire.
 - b. Content validity index (CVI) was calculated by the formula: Number of experts giving a rating of 3-4 divided by the number of experts.^[4] After estimating the CVI for all the items (I-CVI), the acceptability of each item was assessed based on the following criteria: Items with an I-CVI of more than 0.79 were accepted and included in the questionnaire. Those with scores between 0.79 and 0.70 were revised and corrected by the panel of experts, and unacceptable items (CVI scores less than 0.70) were removed from the questionnaire. The content validity of the questionnaire was calculated by the scale-level content validity index (S-CVI/Ave) based on the average method (sum of I-CVI divided by number of items). The questionnaire used for the faculties had an S-CVI/Ave of 0.948 and for residents it was 0.955.

3. Reliability of the questionnaire:

- a. The internal consistency of the items was tested by Cronbach's alpha coefficient, and it was found to be acceptable (Cronbach's alpha coefficient 0.7249).

Response to questionnaire

The questionnaire was circulated via a link among the postgraduate dermatology teachers and dermatology residents through emails, WhatsApp Messenger, Facebook Messenger, Telegram, and other social media via various dermatology forums. On receiving and clicking the link, the participants were auto-directed to a set of questions. The confidentiality and anonymity of the respondents were strictly maintained.

Statistical analysis

Data was tested for normality using Kolmogorov–Smirnov test. Numerical data was analyzed using unpaired *t*-test, and qualitative data was compared using Chi-square test or Fischer's exact test. Correlation was done by Spearman's correlation coefficient and inter-rater agreement by kappa statistics. Logistic regression was performed to find the odds ratio of factors associated with a negative impact on dermatology teaching. The statistical software SPSS version 10.0 and Medcalc® version 9.6.4.0 were used for analysis.

Results

Seven hundred sixty-four responses were received, of which 244 were obtained from the faculty and 520 from senior and junior residents. Three hundred ninety-three (51.4%) participants reported that their institutes were converted to exclusive COVID hospitals,

and routine outpatient department (OPD) and inpatient department (IPD) services could not be delivered. When asked about the deployment of postgraduate students and faculty to COVID duty, it was found that a statistically significant proportion (80.92%) of both faculties and students working in exclusive COVID-19 facilities had to render their services towards COVID patients in comparison with 59.3% who were working in facilities which were not exclusively COVID ($P < 0.001$) [Table 1].

Facilitators who responded belonged to all tiers of medical education, namely Professors, Associate Professors, and Assistant Professors. Similarly, residents of all years of their dermatology training responded to the questionnaire [Table 1]. When enquired about the functioning of routine OPD and IPD services, 9.3% of the respondents reported that both OPD and IPD services were shutdown in their institutes, and 32.2% mentioned that OPD services (only) were functional and IPD was shutdown. The institutes that were not functioning as exclusive COVID facilities had significantly better functioning of both OPD and IPD ($P < 0.001$) [Table 1].

Regarding the domains of dermatology education affected due to the pandemic, the maximum responses ($n = 655$) indicated that procedural training (e.g., dermoscopy, dermatosurgery, aesthetic procedures, etc.) was the worst-hit, followed by bedside clinical teaching in IPD ($n = 613$), OPD-based clinical teaching ($n = 487$), practical training (bedside laboratory procedures, e.g., KOH (Potassium hydroxide) mount, Gram stain, Giemsa stain, AFB Acid-fast bacilli stain, etc.) ($n = 463$), thesis/research activities ($n = 453$), histopathology test ($n = 412$), and theory classes ($n = 302$) (multiple responses were accepted for this question).

Table 1: Medico-sociographic situation during COVID-19 pandemic at various institutions

	Exclusive COVID facility ($n=393$)	Not exclusively COVID facility ($n=371$)	Total ($n=764$)	<i>P</i> (between groups)
Deployment to COVID duty				
Yes: No	318: 75 (80.92%: 19.08%)	220: 151 (59.29% : 40.70%)	538: 226 (70.4% : 29.6%)	<0.001
Faculty distribution				
1. Professor	42	61	103 (13.5%)	0.123
2. Associate Professor	31	38	69 (9.0%)	
3. Assistant Professor	36	36	72 (9.4%)	
4. Clinical Tutor or Senior Resident	39	32	71 (9.3%)	
5. Junior Resident (third year)	84	67	151 (19.8%)	
6. Junior Resident (second year)	87	63	150 (19.6%)	
7. Junior Resident (first year)	74	74	148 (19.4%)	
Routine Dermatology IPD and OPD				
1. Both OPD and IPD functioning	166	270	436 (57.1%)	<0.001
2. Only OPD is functioning	161	85	246 (32.2%)	<0.001
3. Only IPD functioning	6	5	11 (1.4%)	1.000
4. Both OPD and IPD closed	60	11	71 (9.3%)	<0.001

To keep up with the teaching-learning process, online platforms mostly utilized by the respondents were Zoom Meeting ($n = 379$), Google Meet ($n = 287$), and WhatsApp Interaction ($n = 224$). Microsoft Teams ($n = 29$), CISCO Webex ($n = 16$), Facebook Live ($n = 10$), Skype Meet ($n = 8$), GoTo Meet ($n = 3$), and YouTube video upload ($n = 1$) were also utilized as e-learning tools. E-learning platforms were not utilized by 126 respondents and 4 respondents resorted to telephonic conversation for continuing the learning (multiple responses were accepted for this question).

Didactic lectures were one of the most seriously affected areas with 56.2% of the total respondents reporting a reduction of more than 25% of this teaching-learning method which was significantly more ($P = 0.032$) in exclusive COVID facilities. It was noted that 113 (30.46%) in non-COVID facilities responded that such classes were unaffected in comparison with 83 (21.12%) in COVID facilities. Around 65% of the respondents mentioned that online classes were frequently being taken by the faculties and senior residents, and the frequency varied from once weekly to as and when required. Nearly 267 (67.94%) respondents conducted online lectures in the exclusive COVID institutions compared to 232 (62.53%) respondents in the non-exclusive COVID ones [Table 2].

Journal club sessions were completely stopped in more than 40% of the institutes. In some (17.9%) of the institutes, however, face-to-face sessions were performed with social distancing. The sessions were rather more frequently performed in those institutions which were not converted to exclusive COVID hospitals (the difference from those institutes which were COVID hospitals was statistically significant, $P = 0.005$). In COVID facilities, however, a trend towards utilizing the online platform to conduct journal clubs as well as online lectures was a welcome sign. Online journal clubs on regular weekly basis were conducted significantly more in the exclusive COVID institutes ($P = 0.022$) [Table 2].

The subject seminars were hugely impacted with complete stoppage in 32% of the institutes. The figures were significantly skewed in exclusively COVID institutions ($P < 0.001$). The subject seminars were held unchanged by only 18.6% of the respondents and 49.4% of the respondents resorted to online mode. Unfortunately, the impact of multidisciplinary symposia and interdepartmental meetings was immense, with 68.6% of the respondents mentioning that such meetings had come to a complete standstill. Weekly or fortnightly multidisciplinary students' symposiums and interdepartmental meetings were also conducted in online fashion by nearly 79 (20.10%) responders in exclusive COVID facilities compared to 58 (15.63%) in non-COVID facilities [Table 2].

There was a significant influence on teaching during ward rounds with 42.7% reporting complete stoppage since the

wards were handed over for COVID care, whereas such teaching was unchanged in 44.4% of institutes. The impact was significantly more in exclusively COVID institutes than in non-exclusive COVID institutes ($P < 0.001$) [Table 2].

Psychomotor skill development suffered a major jolt with clinical case presentations and clinicopathological correlations coming to a standstill in 26.7% of institutions. The clinical case presentations and clinicopathological correlations were significantly affected in the exclusive COVID hospitals ($P < 0.001$), to the extent that they were absent in 136 (34.6%) respondents and reduced due to less IPD and OPD attendance. The COVID facilities resorted to online weekly, fortnightly, and monthly clinical case presentations and clinicopathological correlations in 131 (33.33%) responders compared to 105 (28.3%) in non-COVID facilities [Table 3]. Procedural training was grossly affected in 13.1% of institutions during this period where no procedures (even including phototherapy) were being carried out. Among the different procedures performed, PUVA (Psoralen Ultraviolet A)/NB-UVB (Narrow Band Ultraviolet B) and wound dressing were least affected whereas dermoscopy, chemical peels, lasers, dermabrasion, punch grafting, nail surgeries, electrosurgery, and skin biopsies were most affected (multiple responses were accepted for this question).

Development of teaching skills in postgraduate students came to a standstill in 37.7% of institutions. Respondents resorted to online mode (7.7%) or face-to-face sessions with social distancing (54.6%). There was no significant difference in the response from faculties or students of exclusively COVID or not exclusively COVID institutes ($P = 0.201$) [Table 3].

Rotational postings of dermatology postgraduates were completely stopped in 68.7% of institutions. This impact was not significantly different whether the institution was fully COVID or not [Table 3].

In spite of COVID, all first-year residents joined the course. Development of research proposal of a first-year resident was hampered and deadline for submission could not be met in 33.9% of institutes. In 50.4% of institutes, the deadline was not announced and was delayed. In only 15.7% of institutes, there was no effect of COVID on the submission of thesis proposals by first-year residents ($P = 0.822$). Regarding the collection of data for dissertation already started, it was noted that only 0.26% of institutes could carry out the research activities. In the rest, the data collection was reduced due to non-recruitment of research participants in 62.04%, whereas there was non-availability of patients for follow-up in 33.34%. The influence on data collection was significantly more in fully COVID institutes than non-exclusive COVID institutes ($P = 0.041$) [Table 4].

Development of communication skills among students suffered profoundly due to the COVID-19 pandemic. The attributed reasons were primarily due to social distancing,

Table 2: Influence of COVID-19 pandemic on teaching-learning methods

	Exclusive COVID facility (n=393)	Not exclusively COVID facility (n=371)	Total (n=764)	P (between groups)
Influence on theory classes and didactic lecture				
a) Unaffected	83	113	196 (25.7%)	0.032
b) Reduced by 25%	60	50	110 (14.4%)	
c) Reduced by >25%	235	194	429 (56.2%)	
d) Non-responders	15	14	29 (3.8%)	
Online lectures				
a) None taken	126	139	265 (34.7%)	0.128
b) Yes, weekly	118	114	232 (30.4%)	0.875
c) Yes, alternate weekly	16	7	23 (3.0%)	0.091
d) Yes, as and when required	133	106	239 (31.3%)	0.119
e) Taken by other faculty	0	3	3 (0.4%)	0.114
f) Schedule for the current academic year is over	0	2	2 (0.3%)	0.235
Influence on the journal clubs				
a) Completely stopped	162	144	306 (40.1%)	0.507
b) Unchanged (face-to-face sessions with social distancing)	55	82	137 (17.9%)	0.005
c) Online, weekly	97	66	163 (21.3%)	0.022
d) Online, twice a month	71	68	139 (18.2%)	0.926
e) As and when required (depending on attendance)	3	7	10 (1.3%)	0.212
f) No journal club ever held	1	3	4 (0.5%)	0.360
g) Once a month	4	1	5 (0.7%)	0.374
Influence on the subject seminars				
a) Completely stopped	151	94	245 (32%)	<0.001
b) Unchanged (face-to-face sessions with social distancing)	72	70	142 (18.6%)	
c) Online, weekly	131	166	297 (38.9%)	
d) Online, twice a month	39	41	80 (10.5%)	
Influence on students' multidisciplinary symposiums and interdepartmental meetings				
a) Completely stopped	267	257	524 (68.6%)	0.681
b) Unchanged (face-to-face sessions with social distancing)	39	41	80 (10.5%)	
c) Online, weekly	37	23	60 (7.9%)	
d) Online, twice a month	42	35	77 (10.1%)	
e) As and when required or scheduled	4	6	10 (1.3%)	
f) Depends on attendance as residents posted for COVID duty	0	1	1 (0.1%)	
g) Never happened or not conducted	1	2	3 (0.4%)	
h) Not applicable/relevant	1	3	4 (0.5%)	
i) Once a month	1	2	3 (0.4%)	
j) Once in two months	1	1	2 (0.3%)	
Influence on teaching during ward rounds				
a) Unchanged (face-to-face sessions with social distancing)	113	226	339 (44.4%)	<0.001
b) Reduced frequency due to manpower shortage because of COVID duty assigned to faculties/residents	80	19	99 (13.1%)	
c) Stopped due to dermatology wards being handed over COVID care	200	126	326 (42.7%)	

use of masks, and poor attendance of patients in OPD. There was no significant difference in the impact in

exclusive COVID institutions versus nonexclusive COVID institutions ($P = 0.074$) [Table 4].

Table 3: Influence of COVID-19 pandemic on teaching of psychomotor skill development

	Exclusive COVID facility (n=393)	Not exclusively COVID facility (n=371)	Total (n=764)	P (between groups)
Influence on clinical case presentations and clinicopathological correlations?				
a) Absent	136	68	204 (26.7%)	<0.001
b) Unchanged (face to face with social distancing)	34	63	97 (12.7%)	
c) Reduced due to less patient attending OPD	56	74	130 (17%)	
d) Reduced due to reduced IPD admission	33	58	91 (11.9%)	
e) Online, weekly	97	78	175 (22.9%)	
f) Online, fortnightly	8	10	18 (2.4%)	
g) Less OPD + IPD attendance	1	2	3 (0.4%)	
h) Residents on COVID duty	2	1	3 (0.4%)	
i) Once a month online	26	17	43 (5.6%)	
Postgraduate students able to develop their teaching skills (teaching MBBS students and JRs)?				
1. Unchanged (face-to-face sessions with social distancing)	215	202	417 (54.6%)	0.201
2. Online teaching of MBBS students by the postgraduates	24	35	59 (7.7%)	
3. Discontinued	154	134	288 (37.7%)	
Influence on rotation postings in other departments				
a) Completely stopped	278	247	525 (68.7%)	0.415
b) Unchanged (face-to-face sessions with social distancing)	44	55	99 (13%)	
c) Reduced by 25%	20	17	37 (4.8%)	
d) Reduced by 25–50%	18	24	42 (5.5%)	
e) Reduced by >50%	33	28	61 (8%)	

Approximately, 23.82% of respondents reported that formative assessment of postgraduate students was totally discontinued. However, assessments were taken in previous frequencies at 22.1% of institutions. Around 39.7% of respondents mentioned that the assessment used to be done offline with increased intervals and reduced frequencies, maintaining social distancing. Many others reported that faculties shifted towards online assessment in 14.39% of the institutions [Table 4].

Almost 39.5% of the respondents mentioned that they would not prefer the online teaching and learning methods once the pandemic is over. It needs to be highlighted that faculties and students in exclusively COVID institutes are significantly inclined towards offline mode. Rest of the participants were open to online mode in addition to face-to-face classes [Table 5].

Discussion

CBME was introduced in the postgraduate curriculum of dermatology where focus was given on developing competencies. The domains of knowledge, psychomotor skills, and attitude-communication were structured and detailed.

However, the introduction of CBME was at its nascent stage when the COVID 19 pandemic hit the world. The medical

education system saw one of its significant lows during this period. Institutes focused their attention on battling COVID, and faculty and students, irrespective of their disciplines, were drawn to the forefront of this battle. Many institutes were converted to exclusive COVID facilities where minimum dermatology patient care was provided. Other institutes rendered their dermatology patient care with skeletal infrastructure and manpower since their resources had been drawn into COVID care. In this study, the influence of the pandemic was felt more in the exclusively COVID institutes where closure of both IPD and OPD services was found to be more than in the non-exclusive ones. The exclusively COVID facilities mostly rendered their dermatology care through the out-patient department. Our research showed that almost 70% of manpower was deployed to COVID duties during this period which was significantly more in the exclusively COVID facilities. The shortage of manpower and their reduced dedicated working time in dermatology can explain the adverse influence on training, teaching, and research which are essential elements in postgraduate education. The present research explored the impact of COVID on the various domains of dermatology postgraduate education with emphasis on its aftermath in exclusively COVID and non-exclusively COVID institutes. The response of faculties and postgraduate residents was captured from institutes situated in all the 28 states of India, including union territories.

Table 4: Influence of COVID-19 pandemic on research activities, communication skill development, and assessments

	Exclusive COVID facility (n=393)	Not exclusively COVID facility (n=371)	Total (n=764)	P (between groups)
Effect of submission of research proposal for thesis by the first-year resident				
1. Development of research proposal is hampered and deadline of submission could not be met.	137	122	259 (33.9%)	0.822
2. Deadline for research proposal submission date not announced yet	194	191	385 (50.4%)	
3. Unchanged	62	58	120 (15.7%)	
Influence on collection of data for dissertation on the thesis already started				
1. Unchanged	0	2	2 (0.26%)	0.041
2. Reduced due to unavailability of patients for follow-up	153	118	270 (33.34%)	
3. Reduced due to non-recruitment of research participants	240	251	474 (62.04%)	
Teaching towards 'Communication skills development' affected				
Not affected	26	39	65 (8.5%)	0.074
a) Yes, due to social distancing and use of facial mask	135	181	316 (41.4%)	
b) Yes, due to poor attendance of patients in OPD	155	134	289 (37.8%)	
c) Yes, due to OPD and/or IPD closure	74	15	89 (11.6%)	
d) Yes, due to no students in OPD/No student postings	3	2	5 (0.7%)	
Influence on formative assessment of postgraduates				
a) Unchanged	83	86	169 (22.1%)	0.059
b) Reduced in number but conducted in the department after maintaining social distancing	146	157	303 (39.7%)	
c) Online examination is being undertaken at regular interval	26	31	57 (7.5%)	
d) Online examination is being undertaken at reduced interval	27	26	53 (6.9%)	
e) Discontinued	111	71	182 (23.82%)	

Table 5: Attitude of faculties and students towards online teaching-learning methods

	Exclusive COVID facility (n=393)	Not exclusively COVID facility (n=371)	Total (n=764)	P (between groups)
Prefer to continue with the online teaching and learning (in addition to face-to-face classes) once the pandemic is over?				
a) No	173	129	302 (39.5%)	0.010
b) Yes	103	117	220 (28.8%)	0.110
c) To some extent	117	125	242 (31.7%)	0.276

We assessed the various teaching-learning methods (for the knowledge domain) that were being used during the pandemic. The maximum impact was seen on student multidisciplinary symposiums and interdepartmental meetings, followed successively by journal clubs, subject seminars, and theory classes and didactic lectures; the least affected was teaching during ward rounds. Of the traditional teaching-learning methods covering the knowledge domain, postgraduate students depended primarily on bedside teaching with social distancing (where the IPD facilities were running). Online methods developed as the new modalities for imparting knowledge to sail through these rough times. Teachers and residents resorted to online lectures, journal clubs, subject seminars, and interdepartmental meetings at varied frequencies to

keep abreast of the changing times. In a letter to the editor, the authors have highlighted how a multi-provider video visit software (multiple users can simultaneously interface with the patient) was used to provide health care as well as how it could be utilized for residents' education.^[5] It has been highlighted in a systemic review of medical education (which included one article related to dermatology education) across all medical disciplines that, in spite of the available online resources, the lack of bedside teaching compromised with the students' direct involvement with the patient and has a negative impact on physical examination skills and non-technical skills.^[6] Our study noted that the brunt on theory classes and didactic lectures was mostly borne by exclusive COVID institutes, and they are the ones who tried their best to make up for

their loss by engaging in online modalities like Zoom Meeting, Google Meet, and WhatsApp interaction. It has been highlighted that it is difficult to provide clinical education in an online mode, but innovative methods are being used in the form of online picture quizzes, podcasts, giving access to online video libraries, etc.^[6] A study by Das *et al.* looked at possible solutions in case of repeated COVID outbreaks in the form of simulated models, instructional videos followed by hands-on training, cadaveric simulators, online pathological slide libraries, tele-dermatology, virtual networking sessions, and online case sharing.^[7] Setting up an effective educational website after a proper assessment of needs, determining technical resources, developing content, encouraging active learning, and monitoring online communication can add a separate dimension to online medical education which can be utilized even when the pandemic is diminishing.^[8]

Teaching psychomotor skill development was another area which took the brunt of this pandemic. Dermoscopy, chemical peels, lasers, dermabrasion, punch grafting, electrosurgery, and skin biopsies were minimally performed and taught because of lack of patients, apprehension of transmission of disease due to close contact, and requirement for pre-COVID testing prior to procedures, which were prevailing as per the guidelines issued from time to time by the Government of India. Studies have highlighted that training of surgical skills also suffered a blow because of shortage in personal protective equipment (PPE) and rationing them which limited the residents' opportunity to attend, observe, and assist.^[6] Some centers started distributing take-home surgical kits, arranged virtual oversight of common procedures via live-streaming, paired the first-year residents with seniors (who were trained before the COVID-19 hit) for teaching, and arranged practice sessions in open space with limited number of participants.^[9]

Clinical case presentation and clinicopathological correlation dipped due to less patient attendance and residents deployed to COVID duty. Online methods were also tried for teaching a set of skills. Dermatology residents discontinued teaching MBBS students (as a part of their teaching skill development) in almost 37% of cases and did not prefer the online methods. However, they continued to take up offline classes, maintaining social distancing norms where it was feasible. Integration with other departments in imparting skill development (rotational posting) suffered a tremendous jolt, which could be due to the non-alignment of duty rosters set for different departments due to COVID-19.

Research activities were also at its thread-bare minimum during the pandemic. Data collection for dissertation work was reduced by more than 99% by the second-year residents due to non-recruitment of participants and non-availability of patients for follow-up. Here also, the exclusive COVID institutes were the worst hit. First-year residents could not submit their dissertation proposals in time and it so

happened that 50% of the respondents reported that the universities did not announce the deadline for research proposal submission. Understandably, research other than that on COVID-related issues came to a standstill during the early years of the pandemic. A systematic review by Sathian *et al.* has also found that research activities across all medical disciplines have declined due to less patient footfall during the pandemic and fewer patient follow-ups.^[10]

Similar results have been found in a study by Das *et al.* on dermatology residents during the pandemic, which showed that 65.1% of residents found that there was a greater than 50% reduction in clinical training compared to pre-COVID times, 50.8% of residents were of the opinion that no hands-on procedural training was being held, and 65.1% opined that research activities could not be conducted.^[11] A French study on residents found that out of 246 participants who filled up the questionnaire, 181 claimed the pandemic had negative effect on the dermatology curriculum. This was mostly due to the cancellation of congresses and courses due to COVID, loss of dermatology training time, or lack of supervision.^[12] The study also found that 41.9% of dermatology residents had been deployed to COVID duties, and those in a highly COVID-impacted area were significantly less able to maintain their dermatology activities.^[12] Another study on the residents found that such irregularities in academic curriculum and deputation in COVID wards and fever clinics adversely affected the mental health of the residents, making them depressed.^[13] Findings of similar studies on dermatological postgraduate education are compared with other studies in Table 6.

Body language, communication skill development which is an essential part of Attitude, Ethics, COMMunication (AETCOM), and CBME could not be taught properly since the facial expressions were hidden behind masks, empathy could not be perceived optimally due to social distancing. Online consultation, which came up during this period, also has similar limitations.

Formative assessments were discontinued or reduced in most of the institutes and only a few of the respondents (<15%) said that online modes of examination were being held. Other studies have highlighted that across all the medical disciplines in different institutes, innovative methods of assessment have been adopted in the form of oral examinations via teleconferences, or through simulation programs, or video supervised by clinical educators.^[6] In the opinion of the authors, in dermatology, the assessment by showing pictorials has been used even before COVID-19 during the practical examination if patients with particular diseased condition (especially sexually transmitted infections) were not available.^[6] Thus, similar methods are not new in dermatological assessment, albeit assessment of psychomotor and affective domains are not possible in this format.

Table 6: Comparison of the present study with other studies evaluating the impact of COVID-19 on postgraduate dermatology education

Parameters	Das et al. ^[11] (2021)	Shourick et al. ^[12] (2022)	Present study
Study population	Dermatology residents of India	Dermatology residents of France	Both dermatology residents and faculty across all states and union territories of India
Sample size	378 (formal sample size calculation not detailed and response rate not provided)	246 (Census method; 54.4% responses from total of 452 residents)	764 with 244 faculty and 520 residents across all states and union territories. (Census method, with minimum required sample size of 707 for 50% response distribution)
Questionnaire development	Validation not performed	Validation not performed	Validity and reliability of questionnaire were tested before application
Effect on academic activities	47.6% were affected. Impact was significantly more in Government vs non-Governmental facility	76.7% were affected. No significant difference between highly affected COVID areas versus others.	74.3% of theory and didactic lectures affected, and complete stoppage of 40.1% of journal clubs, 32% of subject seminars, and 42.7% of ward rounds. The impact was significantly more in exclusively COVID facility.
Effect on procedural training	50.8% were affected. Government facilities significantly more affected than non-Governmental facility	Effect on procedural training not evaluated	13.1% were affected where no procedures (including phototherapy) were carried out. Least affected were phototherapy and wound dressing
Effect on research	65.1% were affected	80% were affected	Development of protocol affected in 84.3% and data collection affected in 99.7%
Effect on communication skill development	Not assessed	Not assessed	Affected in 91.5%
Effect on teaching skill development	Not assessed	Not assessed	Affected in 45.4%
Effect on formative assessment	Not assessed	Not assessed	Affected in 77.9%

COVID-19 has brought a change in the traditional teaching-learning methods and introduced the online platforms which have their own limitations and advantages too. Thus, more than 70% of respondents were accommodative of online methods in addition to face-to-face classes when the pandemic ceases. The French study by Shourick *et al.* opined that since dermatology is more visual than the other specialties, virtual interactive tools should be encouraged for distance learning; however, elements of basic dermatology education such as ability to assess texture, perform biopsies, and use of tools like Wood's lamp, dermoscopy, and KOH scraping cannot be replaced virtually.^[12] There has been a suggestion of engaging the residents in structured self-directed learning and encouraging them to develop personalized learning plans with rotating supervisors using online platform.^[14]

Conclusion

The COVID-19 pandemic has helped introduce the dermatology medical teachers in India to a new platform: the online mode of teaching. The online modality is still being explored by the students and facilitators alike. Not only have various teaching-learning methods been incorporated during the pandemic but also assessments and clinical teaching have been opted in the online meetings and platforms. The transition to online mode was a rapid one. To ensure continuity of dermatology medical education, this shift was inevitable and maybe the only way forward to incorporate teaching and learning among teachers and students separated

by COVID duties, emergencies, and sickness. Access to an uninterrupted network, technical expertise to make online videos, scheduling the teaching-learning sessions at everyone's convenience, and content preparation were among the challenges of this sudden change. However, this pandemic has opened up a world of opportunities of online training, e-seminars, e-journal clubs, virtual networking, and connecting experts across the globe. Sharing of information, teaching-learning methodologies, and assessments have adapted themselves to keep the baton going even in troubled times of the pandemic. Online platforms need to be further delved into and their boundaries pushed to make the most of their potential. However, the users of the online modalities have agreed that they can be used as a supplementary method to the conventional teaching as psychomotor skills, communication skills, research work, and bedside clinic teachings may not be replaced by the online methods.

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Note: Reviews, opinions, and studies evaluating one particular teaching tool/methods were excluded. Only those articles which evaluated the dermatology postgraduate training were included in the table

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Conflicts of interest

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