

Case Report

The Prevalence of Dermatoses Among Resident Doctors and Medical Students During COVID-19 Pandemic: A Cross-Sectional Study

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Abstract

Objectives: To verify the prevalence of dermatoses in resident doctors during the period recruited for the COVID-19 pandemic and also compare it to medical students.

Methods: Cross-sectional study using a convenience sample of resident doctors and medical students during the period from March 1, 2020 to February 28, 2022. We used statistical significance values <0.05 and confidence interval of 95%.

Results: Ninety-four individuals were recruited, 47 in each group. The average age was 27.6 and 22.8 years in the resident doctors group and medical students group, respectively and with a statistical difference between them ($p=0.001$), with a male predominance in the resident doctors group (53.2% vs. 38.3%). The three most prevalent dermatoses in the resident doctors group were contact dermatitis of the hands (46.8%), acne (42.5%) and telogen effluvium (38.2%), but with no statistical difference with the medical students group. Post-inflammatory hyperchromia of the face was the fifth most prevalent, with a statistical difference between the groups (17.0% vs. 2.1%, $p=0.030$).

Conclusion: Resident doctors' dermatoses were more related to contact dermatitis on the hands, acne and telogen effluvium, in addition to post-inflammatory hyperchromia on the face. Hand contact dermatitis was related to hygiene habits and facial post-inflammatory hyperchromia was related to the use of personal protective equipment.

Keywords: COVID-19; Resident Doctor; Undergraduate Medical Education; Occupational Dermatitis; Contact Dermatitis

Introduction

During the 2019 New Coronavirus (COVID-19) pandemic, there were changes in several teaching hospitals [1]. At the University Hospital (HU) of the present study, Resident Doctors (RD) were recruited to assist patients with COVID-19, due to the excess of infected people, regardless of their specialties, while classes for Medical Students (MS) were suspended in person and transformed into remote activities.

Given this scenario, several dermatoses could occur due to hand hygiene practices, the mandatory use of Personal Protective Equipment (PPE) and the stress caused by coping, as suspected by Babino, et al., but without actually carrying out the investigation [2]. Another recent study showed that nursing professionals developed contact dermatitis due to excessive hand hygiene [3].

However, there is still no research involving this group of professionals, the RDs, in relation to dermatoses resulting from health protocols that could have occurred during the fight against the pandemic. Throughout this period, these postgraduate students had their academic activities suspended to dedicate themselves to dealing with the pandemic.

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The present study aimed to verify the prevalence of dermatoses in RD (exposed to PPE and the virus), during the period recruited for the COVID-19 pandemic and also to compare it with MS (not exposed to mandatory PPE or directly to the virus) in a tertiary teaching hospital.

Materials and Methods

A cross-sectional study was carried out, using a convenience sample, that is, everyone who agreed to participate and who was RD or MS at the HU of the State University of Londrina (UEL), Brazil, during the period from March 1, 2020 to February 28, 2022, entered the study. If the form had incomplete data, the participant would be excluded. The research was approved by the UEL Animal and Human Research Ethics Committee (CAAE: 63396922.2.0000.5231).

A form developed by the researchers themselves was applied to everyone who signed the free and informed consent form. The main information collected was: name, age, gender, marital status, race, income, COVID-19 infection and skin diseases that occurred. The data were compiled in an Excel spreadsheet to later be analyzed using a statistical program.

The Stata® program (version 13.0, Statacorp Texas) and Jamovi 1.6.15 were used for statistical analysis. We performed Fisher's exact test to compare categorical variables. Minimum and maximum values, mean and standard deviation were considered. We used statistical significance values (p-value) <0.05 and a Confidence Interval (CI) of 95%.

The sample size (n= 94, 47 individuals in each group) was estimated based on the a priori expectation of the occurrence of dermatosis in up to 45% of resident doctors and 25% among medical students, with a significance level (alpha) of 0.05 and power of 80%.

Results

The specialties of the RD group were varied: anesthesiology, angiology, cardiology, dermatology, endocrinology, gastroenterology, general surgery, gynecology, infectious diseases, internal medicine, neurology, neurosurgery, ophthalmology, orthopedics, otorhinolaryngology, pathology, pediatrics, pulmonology, psychiatry and rheumatology. In the MS group there were students from the first to the fourth year of medicine.

Table 1 presents the main findings of the study. There were a total of 94 individuals (no exclusions), 47 in each group, with the average age of the individuals being 27.6 and 22.8 years, for RD group and MS group, respectively and with a statistical difference between them (p=0.001) (Table 1, Fig. 1) .

Characteristics	Resident doctors (n=47)	Students (n=47)	p
Age, years			0.001
mean±SD	27.6±2.8	22.8±2.6	
minimum-maximum	24 - 37	17 - 29	
Sex, n° (%)			0.214
male	25 (53.2)	18 (38.3)	
female	22 (46.8)	29 (61.7)	
Race, n° (%) *			
white	42 (89.3)	33 (70.2)	0.038
yellow	2 (4.3)	4 (8.5)	0.677
brown	2 (4.3)	4 (8.5)	0.677
black	1 (2.1)	6 (12.8)	0.110
Income per family, n°(%) †			
2 or less	1 (2.1)	4 (8.5)	0.361
2- 4	11 (23.4)	9 (19.1)	0.801
5-9	26 (55.3)	18 (38.3)	0.147
10-19	6 (12.8)	13 (27.7)	0.121

More than 20	3 (6.4)	3 (6.4)	>0.99
Marital status, n ^o (%) ‡			
single	35 (74.4)	47 (100.0)	<0.001
Dermatoses §			
hand contact dermatitis	22 (46.8)	14 (29.8)	0.137
acne	20 (42.5)	26 (55.3)	0.302
telogen effluvium	18 (38.2)	21 (44.7)	0.675
Change of domicile, n ^o (%)			
yes	8 (17.0)	0 (0.0)	0.005
COVID infection, n ^o (%) **			
yes	24 (51.2)	31 (65.9)	0.208

p denotes statistical significance.

* participant's self-defined race,

† minimum wages in Brazil for the years 2020 and 2021.

‡ for singles, stable union is excluded.

§ the three most prevalent dermatoses among resident doctors. There was the same individual with two and three dermatoses simultaneously.

|| individuals who chose to change residence to avoid infecting their family members.

** individuals who have been proven to have COVID-19 (polymerase chain reaction/PCR or serological)

Table 1: Clinical and demographic characteristics (N= 94).

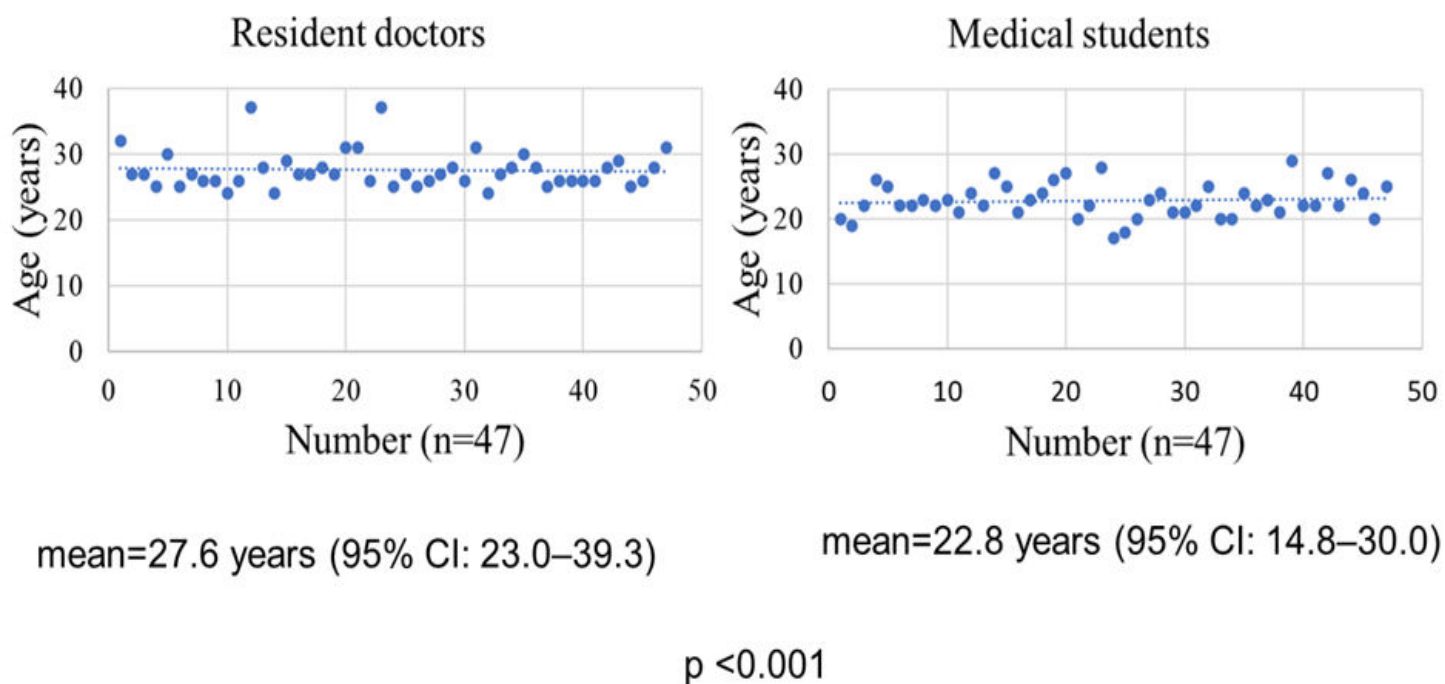


Figure 1: Scatterplot of the ages of resident doctors and medical students.

Males were more prevalent in the RD group (53.2% vs. 38.3%), but without statistical differences compared to the MS group ($p=0.214$). The majority of individuals were white [RD group =89.3% (95% CI: 76.8%-96.5%)] vs. [MS group =70.2% (95% CI: 55.1%-82.7%)] and $p=0.038$.

Regarding family income, both in the RD group and MS group, the range of 5-9 minimum wages was the most prevalent, but with no significant difference between the groups (55.3% vs. 38.3%, $p=0.147$). Singles were the most prevalent marital status (74.4% vs. 100%, $p<0.001$). When comparing family income and marital status only within the RD group, the highest prevalence of income (5-9 salaries) and single marital status (74.4%) showed no significance ($p=0.409$) and statistical significance ($p<0.001$), respectively (Table 1,2).

Income (minimum wages)	%	p*	Marital Status	%	p*
2 or less	2.12		Single	74.4	<0.001
2 to 4	23.4		Married	21.2	
5 to 9	55.3	0.409	Divorced	0	
10 to 19	12.76		Stable union	4.25	
More than 20	6.38		Widower	0	

* Statistical significance assessed by Fisher's exact test

Table 2: Socioeconomic data among resident doctors.

We used Pearson's non-parametric correlation coefficient to analyze socioeconomic status and dermatoses. There was an inverse correlation (-0.061 vs. -0.117) with dermatoses, but not significant ($p=0.682$ vs. 0.433), for the RD group and MS group, respectively.

The three most prevalent dermatoses in the RD group were hand Contact Dermatitis (CD) (46.8%), acne (42.5%) and Telogen Effluvium (TE) (38.2%), but without statistical difference with the MS group (Table 1). In both groups, CD was due to excessive hand washing or the use of alcohol gels. Table 3 compares all dermatoses in the two groups. Post-Inflammatory Hyperpigmentation (PIH) of the face, although not among the three most prevalent (the fifth most prevalent), was the only one with a statistical difference between the groups (17.0% vs. 2.1%, $p=0.030$).

Dermatoses *	RD (%)	MS (%)	p
Hand contact dermatitis †	46.8	29.8	0.137
Acne	42.5	55.3	0.302
Telogen effluvium	38.2	44.7	0.675
Seborrheic dermatitis of the scalp	27.7	17.0	0.322
Post-inflammatory hyperpigmentation (face)	17.0	2.1	0.030
Seborrheic dermatitis of the face	12.8	12.8	>0.99
Alopecia areata	6.4	2.1	0.616
Urticaria	6.4	6.4	>0.99
Superficial mycoses	4.2	10.6	0.434
Others ‡	2.1	8.5	0.361

* There have been simultaneous cases of 2 or more dermatoses.
† Contact dermatitis was related to excessive hand hygiene.
‡ One case of worsening rosacea (group of residents); 2 cases of worsening rosacea and 2 cases of atopic dermatitis (student group).
p denotes statistical significance accessed with Fisher's exact test.

Table 3: Main dermatoses (in percentage of cases) among Resident Doctors (RD) group and Medical Students (MS) group.

There were RD who moved house, which did not occur in the MS group (17% vs. 0%, $p=0.005$). There was no difference in the proportion of people infected with COVID in the two groups ($p=0.208$) (Table 1).

Discussion

The higher average age in the RD group compared to MS group (27.6 vs. 22.8 and $p=0.001$) was already expected because they were individuals who had already graduated, that is, they had more years of schooling and, consequently, were older

chronological (Table 1, Fig. 1).

Although males were the most prevalent in the RD group (53.2% vs. 38.3%), there was no statistical significance ($p=0.214$). Dash, et al., also observed a higher prevalence of dermatoses in male doctors in their study in a tertiary hospital, which is partially in agreement with the literature, as our study also involved RD (graduated doctors) [4].

There was a higher prevalence of white race in both groups, but with statistical differences between them: [RD group =89.3% (95% CI: 76.8%-96.5%)] and [MS group =70.2% (95% CI: 55.1%-82.7%)] and $p=0.038$. The literature does not mention a difference in race between doctors and skin diseases [4,5], but one hypothesis for this difference by the authors would be the system of quotas by race in the selection process of MS at the university where the study took place (Table 1).

The literature correlates low socioeconomic status with some dermatoses [6]. In the present study, we used Pearson's non-parametric correlation coefficient, which showed an inverse correlation (-0.061 vs. -0.117) with dermatoses, but not significant ($p=0.682$ vs. 0.433), for the RD group and MS group, respectively.

Dash, et al., observed, in health professionals (not just doctors), hand CD with excessive hand hygiene, due to damage to the skin barrier [4]. Dani, et al., verified "Maskne", defined as acne secondary to the use of a mask that worsens even more with the use of a face shield, a facial protection shield (a PPE that was mandatory when caring for those infected in the first years of the pandemic) [5]. Current theories include that a combination of mechanical stress from the mask, lack of ventilation and imbalance of the skin's microbiome would cause acne. This friction caused by PPE (also due to the time of use) and acne could also lead to PIH, which would explain the higher prevalence of this finding (post-inflammatory hyperpigmentation of the face) in the RD group compared to MS group who were not exposed to PPE (17.0% vs. 2.1%, $p=0.030$) (Table 3).

As for TE, studies have shown a causal relationship with COVID-19 infection, just as any other infection could trigger the abrupt end of the anagen phase and lead to premature entry into the telogen phase [7,8]. Physiological and emotional stress can also cause TE, which could have occurred both in the RD group (coping stress) and in the MS group (stress due to classes and remote assessments) [9].

The present study showed that the most prevalent dermatoses in the RD group were hand CD, acne and TE, but without statistical differences with the MS group (Table 1). The authors raise the hypothesis that in the MS group, in addition to the confirmed practice of constant hand washing and application of alcohol gels, they also used masks when leaving their homes and also experienced emotional stress, both conditions that could favor acne and TE [9,10]. Face PIH, with a significant difference for the RD group (Table 3), could be related both to the time of wearing masks and to more specific PPE, such as the face shield that could have caused more friction and local inflammation.

There were RDs who changed residence, which did not occur in the MS group (17% vs. 0%, $p=0.005$). The plausible hypothesis was that in the exposed group (RD), there were cases in which they required care to avoid the risk of infecting their family members, perhaps because they had comorbidities. In the MS group, as classes were online, there was no such concern (Table 1). There was no difference in the proportion of people infected with COVID-19 in the two groups ($p=0.208$), although it was expected that the MS group would have a lower infection rate. One hypothesis would be that the MSs became infected due to carelessness with the people closest to them, while the RDs maintained stricter precautions when attending to and caring for those infected (Table 1).

Our study has limitations related to selection bias, as it is a cross-sectional study with a small sample size. Other limitations include the self-reported nature of dermatologic conditions, potential underdiagnosis or misclassification of dermatoses, limited generalizability beyond the study population, confounding factors such as occupational stressors (e.g., work hours, patient exposure) that could influence skin conditions or additional demographic or lifestyle factors (e.g., diet, history of skin conditions, prior use of skin products). Future multicenter studies would help improve our limitations.

Conclusion

During the period of combating the new coronavirus of 2019, the RDs of our service presented, as the most prevalent dermatoses, CD of the hands, acne and TE, in addition to PIH of the face. Hand CD was related to hand hygiene habits and facial PIH could be related to the use of PPE.

Conflicts of Interest

The authors have carried out the work on their own and the ICMJE form for Disclosure of Potential Conflicts of Interest have been submitted and none were declared.

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