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Study of 400 Cases of Contact Dermatitis Before and During the Pandemic in a Tertiary Hospital: Cross-Sectional Study

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Abstract

Background: Allergic contact dermatitis (ACD) is a common dermatosis. It can have repercussions on daily or work activities. During the New Coronavirus-2019 (COVID-19) pandemic period, individuals may or may not have been more exposed to sensitizing agents. There are several studies on ACD before the pandemic, but few during the pandemic.

Objectives: Check whether there was a change in patient characteristics and ACD sensitizing agents before the pandemic and in the first two years of the pandemic.

Methods: Observational and retrospective study carried out a review of medical records of patients diagnosed with ACD, from March 2012 to February 2020 and between March 2020 and March 2022.

Limitations: Observational and retrospective study in a single metropolitan region. Negative allergy tests were excluded.

Results: There were a total of 400 patients, 264 in the pre-pandemic group and 136 in the pandemic. There was a predominance of females and whites in both groups, 206 (78.0%) versus 111 (81.6%) and 224 (84.8%) versus 120 (88.2%) in the pre-pandemic and pandemic, respectively. There was no difference in the proportions of allergens involved, but a difference in the level of education.

Conclusions: In the present study, there was a prevalence of females and whites. The population, in general, suffered the influence of habits due to the pandemic. This population had a better level of education, probably contributing in turn to a better awareness of hygienic habits, but which led to a more significant ACD in the cephalic segment.

Keywords: ***Contact dermatitis; Allergy patch test; Pandemic; COVID-19***

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1. Introduction

Allergic contact dermatitis (ACD), as well as primary irritation dermatitis (PID), is a subtype of contact dermatitis (CD) characterized by an inflammatory skin reaction associated with itching, secondary to exposure to allergens. The importance of ACD is that it can cause economic and labor losses such as time off work or disrupt the quality of life of those affected [1]. Clinical history can already separate CD by PID from ACD and give clues to the allergens, but patch tests are often necessary to confirm the diagnosis and determine the responsible agent, being the most efficient method for this purpose [1,2]. Studies prior to the 2019 new coronavirus (COVID-19) pandemic showed that women were more affected than men, and that the main allergen was nickel, with the hands and face being the most prevalent sites [3-5]. But with COVID-19, the characteristics of ACD could have changed, especially among health professionals who used protective equipment more, as well as in the population who changed their hygiene habits. The objective of this work is to identify and analyze the main causes of ACD before and during the COVID-19 pandemic, as well as verify whether there were changes in the characteristics of ACD between the groups (before and during the pandemic) caused by changes in new habits and care.

2. Methods

An observational and retrospective study was carried out, using convenience samples (everyone entered the study as long as they met the inclusion/exclusion criteria) and through a review of the medical records of patients diagnosed with ACD diagnosed in the metropolitan region where the study was carried out. The period was from March 11, 2012 to March 31, 2022, being considered the pandemic period, from March 11, 2020 [6].

The allergic contact tests (patch tests) used were from the FDA Allergenic® with 30 standards substances and 10 cosmetics (FIG. 1; BOARDS 1 and 2). The substances were distributed in 4 adhesive tapes with 10 chambers (10 containers) and placed on the back region (on the left and on the right), lumbar region (on the left and on the right). Test readings were taken at 48 and 96 hours. They were considered positive when: erythema and papules (positive +); erythema, papules and vesicles (positive ++); intense erythema, confluent papules and vesicles that may form blisters (+++). FIG. 2 shows an example of a positive test and with the help of a “template” ruler to identify the corresponding number and substance.

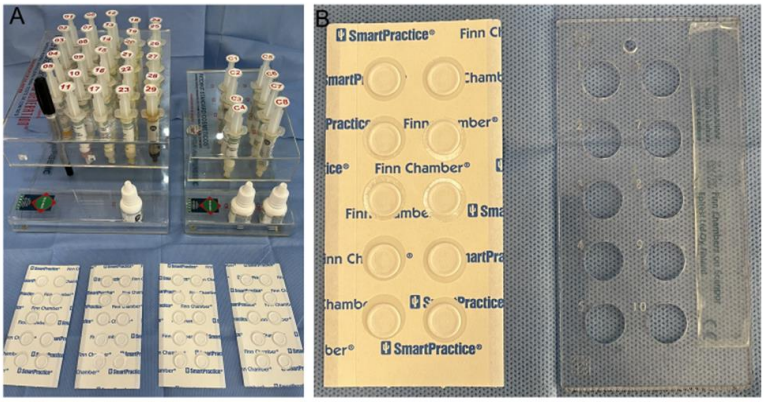


FIG. 1. **A. Allergy patch test kit (FDA Allergenic®) with 30 standard substances (1 to 30) and 10 cosmetics (C1 to C10). B. Detail of an adhesive tape with 10 containers and the ruler used as a template.**

BOARD 1**. Substances from 1 to 30 with concentrations and vehicles used.**

PATCHKIT STANDARD NEW GENERATION®			
Nº	**Substances**	**concentration**	**vehicle**
01	**Antraquinona**	**2%**	**solid vaseline**
02	**Balsam of Peru**	**25%**	**solid vaseline**
03	**PPD (MIX) N-Isopropyl, N-Phenyl, paraphenylenediamine N-N Diphenyl, paraphenylenediamine**		**solid vaseline**
04	**Hidroquinone**	**1%**	**solid vaseline**
05	**Potassium Bichromate**	**0.5%**	**solid vaseline**
06	**Propylene glycol**	**10%**	**solid vaseline**
07	**Para-tertiary butylphenol**	**1%**	**solid vaseline**
08	**Neomycin**	**20%**	**solid vaseline**
09	**Irgasan**	**1%**	**solid vaseline**
10	**Kathon CG**	**0.5%**	**solid vaseline**
11	**Cobalt chloride**	**1%**	**solid vaseline**
12	**Lanolin**	**30%**	**solid vaseline**
13	**Thiuram (MIX)** Tetramethylthiuramdisulfite (TMTD) Tetramethylthiurammonosulfite (TMTM)	**1%**	**solid vaseline**
14	**Ethylenediamine**	**1%**	**solid vaseline**
15	**Perfume (MIX)** Cinnamic alcohol Cinnamic alpha-amyl aldehyde Eugenol Isoeugenol Hydroxycitronellal Geraniol Oak Moss absolute	**7%**	**solid vaseline**
16	**Mercapto (MIX)** Mercaptobenzothiazole Dibenzothiazole disulfide Morpholinylmercaptobenzothiazole N-Cyclohexyl 2 benzothiazole sulfonamide	**2%**	**solid vaseline**
17	**Benzocaine**	**5%**	**solid vaseline**
18	**Quaternium 15**	**0.5%**	**solid vaseline**
19	**Quinoline (MIX)**		**solid vaseline**

	Chlorquinaldol Clioquinol		
20	**Nitrofurazone**	**1%**	**solid vaseline**
21	**Paraben (MIX)** Methylparaben Ethylparaben Propylparaben Butylparaben Benzylparaben	**15%**	**solid vaseline**
22	**Resin - Epoxy**	**1%**	**solid vaseline**
23	**Thimerosal**	**0.05%**	**solid vaseline**
24	**Turpentine**	**10%**	**solid vaseline**
25	**Carba (MIX)** Diphenylguanidine Zinc dimethyldithiocarbamate Zinc diethyldithiocarbamate	**3%**	**solid vaseline**
26	**Promethazine**	**1%**	**solid vaseline**
27	**Nickel Sulfate**	**5%**	**solid vaseline**
28	**Colophon**	**20%**	**solid vaseline**
29	**Paraphenylenediamine**	**1%**	**solid vaseline**
30	**Formaldehyde**	**1%**	**water**

Source: FDA-Allergenic

BOARD 2. **Substances of C1 to C10 (cosmetics) with the concentrations and vehicles used.**

PATCHKIT STANDARD COSMETICS®			
Nº	**Substances**	**Concentration**	**Vehicle**
C1	**Germall 115 (Imidazolidinylurea)**	**2%**	**solid vaseline**
C2	**BHT (Butyl hydroxy toluene**	**2%**	**solid vaseline**
C3	**Tonsylamide/formaldehyde resin**	**10%**	**solid vaseline**
C4	**Triethanolamine**	**2.5%**	**solid vaseline**
C5	**Bronopol (Bromo-2-nitropropane-1,3-diol 2)**	**0.5%**	**solid vaseline**
C6	**Chloracetamide**	**0.2%**	**solid vaseline**
C7	**Sorbic Acid**	**2%**	**solid vaseline**
C8	**Ammonium Thioglycolate**	**2.5%**	**solid vaseline**
C9	**Amerchol L - 101**	**100%**	**-**
C10	**Chlorhexidine**	**0.5%**	**water**

Source: FDA-Allergenic

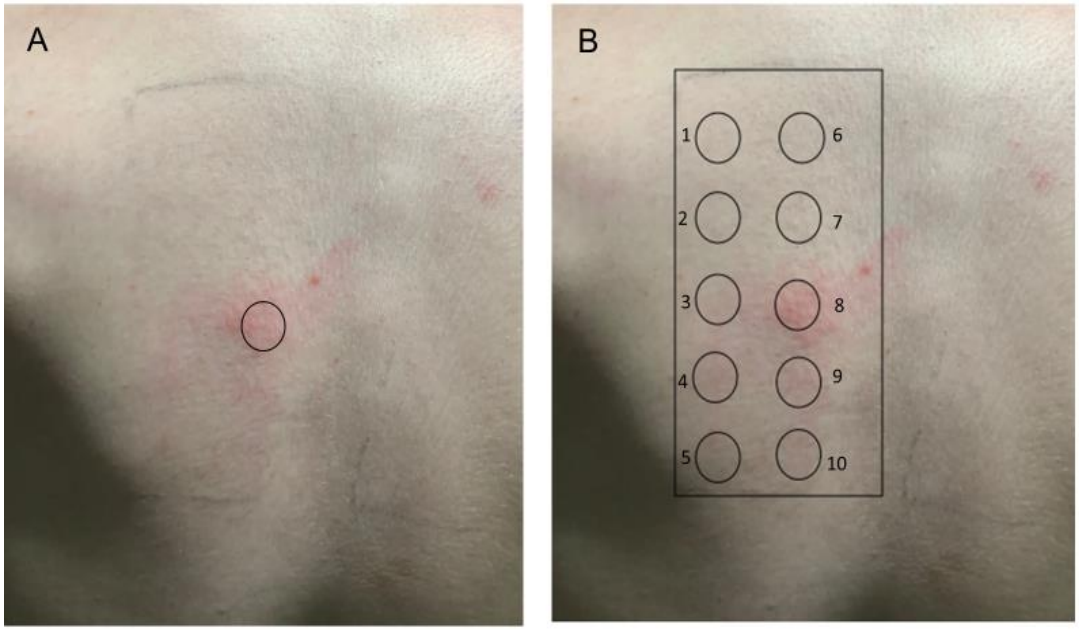


FIG. 2. **A. Reading at 48 hours showing the region of the back on the left showing an erythematous plaque. B. Detail of an imaginary template ruler showing substance number 8 (Neomycin).**

The following were excluded from the study: a) cases of CD due to PID; b) negative contact allergy tests, c) patients who did not meet the inclusion criteria or d) outside the stipulated period.

The data were filled in forms developed by the researchers themselves. The information collected was compiled in an Excel spreadsheet for statistical analysis. Stata® software (version 13.0, Statacorp Texas) and Jamovi Stata were used for statistical analysis. We performed Fisher's Exact Test to compare categorical variables. Continuous variables were analyzed using the Wilcoxon-Mann-Whitney Test. After checking the normality of quantitative variables using the Shapiro-Wilk test, the Mann-Whitney and Kruskal-Wallis non-parametric tests were used to compare the results obtained. Statistical significance values (p-value) <0.05 and a confidence interval (CI) of 95% were considered.

The study was approved by the Ethics Committee for Research Involving Human Beings of the Universidade Estadual de Londrina, CAAE: CAAE: 63396922.2.0000.5231.

3. Results

TABLE 1 presents the main findings of the study. There were a total of 400 individuals, 206 (78.0%) and 111 (81.6%) female, before and during the pandemic, respectively, but without statistical differences between the groups (p=0.436). The average age of the individuals was 41.7 and 43.2 years, in the group before and during the pandemic, respectively, and with no statistical difference (p=0.383). The majority of individuals were white [pre-pandemic group, n=224 or 84.8% (95% CI: 79.9%-89.9%)] and [pandemic group, n=120 or 88.2% (95% CI: 81.5%-93.1%)] and p=0.447.

TABLE 1. **Clinical and demographic characteristics (N=400).**

Characteristics	Pre-pandemic (n=264)	Pandemic (n=136)	p
Age, years			0.383
Mean ± SD	41.7 ± 15.1	43.2 ± 14.5	
minimum–maximum	10 – 84	12 – 83	
Gender, nº (%)			0.436
male	58 (22.0)	25 (18.4)	
female	206 (78.0)	111 (81.6)	
Race, nº (%) #			0.447
white	224 (84.8)	120 (88.2)	
yellow	27 (10.2)	12 (8.8)	
brown	11 (4.2)	2 (1.5)	
black	2 (0.8)	2 (1.5)	
Level of schooling, nº (%) $			0.031
incomplete middle school	3 (1.1)	3 (2.2)	
middle school	43 (16.3)	18 (13.2)	
some high school	9 (3.4)	2 (1.5)	
complete high school	78 (29.2)	34 (25.0)	
some college	20 (7.6)	11 (8.1)	
bachelors or higher	111 (42.4)	68 (50.0)	
health professionals, nº (%) &			>0.99
yes	38 (14.4)	19 (14.0)	
Location of dermatitis *			
cs/neck	79 (29.9)	57 (41.9)	0,019
trunk	28 (10.6)	10 (7.4)	0.368
upper limbs	115 (43.6)	45 (33.1)	0.052
lower limbs	11 (4.2)	8 (5.9)	0.461
cs + upper limbs	10 (3.8)	4 (2.9)	0.779
upper limbs + lower limbs	4 (1.5)	6 (4.4)	0.094
cs + trunk	7 (2.6)	3 (2.2)	>0.99
trunk + upper limbs	7 (2.6)	2 (1.5)	0.724
trunk + lower limbs	2 (0.8)	1 (0.7)	>0.99
trunk + upper + lower limbs	1 (0.4)	0 (0.0)	>0.99
substances, nº (%) ¶			
nickel sulfate	98 (27.7)	57 (30.3)	0.549
Biopsies, nº (%) †			0,251
yes	56 (21.2)	19 (14.0)	

self-defined race by participants

$ categorized from 1 to 6 (incomplete middle school=1; middle school=2; some high school=3; complete high school=4; some college=5; bachelors or higher=6).

& doctors, nurses, dentists, physiotherapists, pharmacists, nursing assistant

* cs denotes cephalic segment.

¶ most prevalent substance: Nickel sulfate 98 of 354 positive substances; 57 of 188 positive substances

† biopsies performed

Regarding education level, the pandemic group was higher than the pre-pandemic group (p=0.031). There was no statistical difference in the proportions of cases of health professionals in the two groups (p>0.99) (TABLE 1). Regarding location, the head/neck region was the most affected in the pandemic (41.9% versus 29.9%, p=0.019). There were cases in which more than one region was affected, both in the cephalic segment and in other parts of the body (TABLE 1). Nickel was the most prevalent allergen in both groups, with no difference between them (p=0.549). There were also cases in which more than one substance tested positive, resulting in a greater number of substances in relation to the number of samples in the groups (TABLES 1 and 2).

TABLE 2. **Main substances that reacted positively.**

Substances nº (%)¶	**Pre-pandemic (n=354)**	**Pandemic (n=188)**	**p***
Nickel Sulfate	98 (27.7)	57 (30.3)	0.549
Thimerosal	34 (9.6)	11(5.9)	0.143
Paraphenylenediamine	28 (7.9)	11 (5.9)	0.485
Cobalt chloride	23 (6.5)	15 (8.0)	0.596
Kathon CG	22 (6.2)	6 (3.2)	0.155
Formaldehyde	22 (6.2)	7 (3.7)	0.315
Potassium bichromate	17 (4.8)	12 (6.4)	0.429
Colophon	11 (3.1)	9 (4.8)	0.343
Epoxy resin	10 (2.8)	6 (3.2)	0.795
Carba Mix	9 (2.6)	1(0.5)	0.176
Perfume Mix	7 (2.0)	4 (2.1)	>0.99
Neomycin	6 (1.7)	6 (3.2)	0.357
PPD Mix	5 (1.4)	3 (1.6)	>0.99
Paraben Mix	5 (1.4)	2 (1.0)	>0.99
Others #	57 (16.1)	38 (20.2)	NA

¶ There were patients who had more than one positive substance

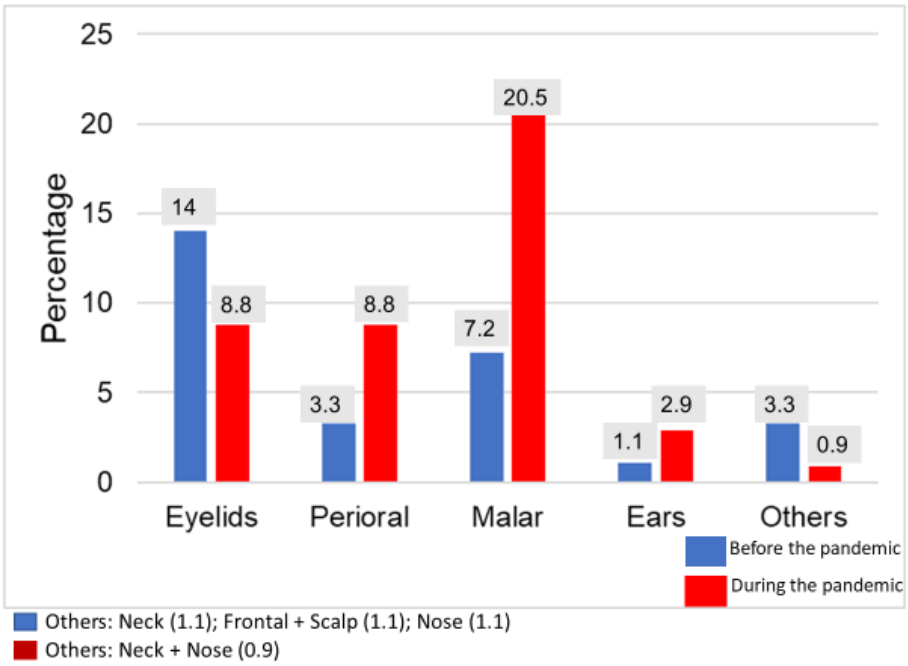
* Statistical significance assessed with Fisher's exact test

Ethylenediamine, Quinoline (MIX), BHT (Butylhydroxytoluene), Chloracetamide, Germall 115 (Imidazolidinylurea), Hydroquinone, Sorbic Acid, Ammonium Thioglycolate, Thiuran Mix, Tonsylamide Resin, Quaternium 15, Lanolin, Triethanolamine, Mercapto-mix, Chlorhexidine, Amerchol L – 101, Irgasan, Propylene glycol, Balsam of Peru, Bronopol, Nitrofurantoin, Benzocaine, Para-tertiary butyl-phenol.

NA means “not applicable”

Regarding biopsies performed, there was no greater proportion of this procedure during the pandemic compared to the pre-pandemic period (p=0.251).

GRAPH 1 shows the comparison between the main ACD locations between the two groups. The malar region was the most affected during the pandemic, followed by the eyelid and peri-oral region (GRAPH 1).



GRAPH 1. **Comparison of facial regions in percentage in the pre-pandemic group and during the pandemic.**

4. Discussion

On March 11, 2020, Coronavirus disease 2019 (COVID-19) was declared a global pandemic by the World Health Organization (WHO) [6]. Due to the various recommendations to prevent the transmission of COVID-19, they were introduced into the population in general and, particularly, among health professionals (HPs) effective methods that included the use of personal protective equipment (PPE) and personal hygiene measures, such as baths, hand washing and use of alcohol gels [7].

Previous studies reported the main epidemiological data in the period prior to the pandemic [3-5]. Babino et al., in 2022 [7], carried out a review article on the changes and impact of ACD during the pandemic period through compilations of articles, but without carrying out a cross-sectional or longitudinal study. Our study encompassed the previous period (pre-pandemic group) and the pandemic period (group during the pandemic) in the same population and verified whether there was a difference between the periods studied.

In our series, it was observed that ACD was more prevalent in women, in white people and between the fourth and fifth decade of life, which is in accordance with the literature [8,9]. The female gender was 78.0% and 81 .6%, in the groups before and

during the pandemic, respectively, but with no statistical difference between the groups (p=0.383), as well as white ethnicity was 84.8% and 88.2% (p=0.447) and average age of 41.7 and 43.2 years (p=0.383) (TABLE 1).

Previous studies point to nickel as the most common allergen [10,11], which is in line with our pre-pandemic findings (TABLE 2). The pandemic did not change this characteristic, nor in the proportion between groups (p=0.549). The findings of 27.7% and 30.3% are in accordance with the literature, which varies from 11.4% to 36.2% [5,9]. Babino et al [7]. suspected that there was an increase in allergies related to formaldehyde (present in masks), rubber and latex (gloves) and propylene glycol (disinfectant wipes), which did not occur in our study. Regarding location, there was a prevalence of upper limb involvement in the pre-pandemic period, which was in accordance with the literature, although not significant [3,5]. The head and neck region were most affected during the pandemic (41 .9% versus 29.9%, p=0.019), which is in line with the suspicions of Babino et.al. [7] (TABLES 1 and 2).

Melo et al. (2019) [12] found in a study of occupational contact dermatitis, prior to the pandemic, that individuals with a higher level of education were affected. Our study observed a better level of education in the pandemic group (p=0.031). One of the hypotheses would be a better awareness of hygienic habits and sanitary care [7], but, which predisposed ACD due to a decrease in the skin barrier (frequent baths and hand washing), greater occlusion of allergens (due to the mandatory use of masks) and stress itself oxidative (release of pro-inflammatory cytokines) caused by the pandemic period.

There was no proportional increase in HPs between the pre- and pandemic periods (p>0.99), as expected by Babino et al. [7] The authors assume that the population, in general, became aware of prevention care of the pandemic with a greater number of baths and hand hygiene every time they leave their homes, and not due to the substances contained in the PPE, so much so that there was no significant difference in the proportions of allergens involved in the two groups (TABLE 2). On the other hand, HPs were restricted to the workplace and only took baths when they returned to their homes.

There was no proportional increase in biopsies to define ACD (p=0.251). One of the hypotheses would be a greater involvement on the face (to avoid the chance of a visible scar) and the clinical history led to the diagnosis of ACD.

This study has limitations because it is monocentric and has a cross-sectional and retrospective study.

5. Conclusion

In the present study, there was a prevalence of females and whites. The population, in general, not just HPs, suffered the influence of habits due to the pandemic. This part of the population had a better level of education, which probably contributed, in turn, to a better awareness of hygienic habits and health care, but which led to more significant CD in the head segment.

6. Ethics

The study was approved by the Ethics Committee for Research Involving Human Beings of the State University of Londrina, CAAE: 63396922.2.0000.5231.

7. Financial Support

None.

8. Conflict of Interest

None.

9. Supporting Information

STROBE checklist.

REFERENCES

1. Li Y, Li L. Contact Dermatitis: Classifications and Management Clin Rev Allergy Immunol. 2021;61(3):245-81.
2. Nassau S, Fonacier L. Allergic Contact Dermatitis. Med Clin North Am. 2020;104(1):61-76.
3. Mowad CM, Anderson B, Scheinman P, et al. Allergic contact dermatitis: Patient diagnosis and evaluation. J Am Acad Dermatol. 2016;74(6):1029-40.
4. Watts TJ, Watts S, Thursfield D, et al. A Patch Testing Initiative for the Investigation of Allergic Contact Dermatitis in a UK Allergy Practice: A Retrospective Study. J Allergy Clin Immunol Pract. 2019;7(1):89-95.
5. Almogren A, Shakoor Z, Gad El Rab MO, et al. Ann Pattern of patch test reactivity among patients with clinical diagnosis of contact dermatitis: a hospital-based study. Saudi Med. 2012;32(4):404-7.
6. WHO Director-General's opening remarks at the media briefing on COVID-19-11 March 2020. Available at: https://www.who.int/dg/speeches/detail/who-directorgeneral-s-opening-remarks-at-the-media-briefing-oncovid-19
7. Babino G, Argenziano G, Balato A. Impact in Contact Dermatitis during and after SARS-CoV2 Pandemic. Curr Treat Options Allergy. 2022;9(1):19-26.
8. Sedó-Mejía G, Soto-Rodríguez A, Pino-García C, et al. Contact dermatitis: Clinical practice findings from a single tertiary referral hospital, a 4-Year retrospective study. World Allergy Organ J. 2020;13(7):100440.
9. Alinaghi F, Bennike NH, Egeberg A, et al. Prevalence of contact allergy in the general population: A systematic review and meta-analysis. Contact Dermatitis. 2019;80(2):77-85.
10. Zhu M, Vinturache A, Ding G. Nickel allergic contact dermatitis. CMAJ. 2022;194(33):E1136.
11. Tramontana M, Bianchi L, Hansel K, et al. Nickel Allergy: Epidemiology, Pathomechanism, Clinical Patterns, Treatment and Prevention Programs. Endocr Metab Immune Disord Drug Targets. 2020;20(7):992-1002.
12. Melo MDGM, Villarinho ALCF, Leite IDC. Sociodemographic and clinical profile of patients with occupational contact dermatitis seen at a work-related dermatology service, 2000 - 2014. An Bras Dermatol. 2019;94(2):147-56.