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# Effect of COVID-19 disease and vaccines on dyshidrotic dermatitis

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## Abstract

**Objective**: The purpose of this research is to determine the effect of COVID-19 disease and COVID-19 vaccines on patients with dyshidrosis.

**Methods**: The effects of COVID-19 disease and vaccines on dyshidrosis disease were investigated. It was asked whether dyshidrosis occurred or its severity increased after COVID-19 disease or vaccinations. Information was obtained from the patients by phone who came to our dermatology clinic one year before and three years after March 11, 2020. Additionally, atopic dermatitis, allergic contact dermatitis, food allergies, fungal infection, sun exacerbation, stress, hyperhidrosis, irritating substances/water contact, and smoking were questioned and evaluated whether the COVID-19 pandemic affected these conditions.

**Results**: 59 patients were involved in the study. 29 of them caught COVID-19 disease. There were not any changes of dyshidrosis in 20 patients who caught COVID-19, exacerbation in 5 patients, and first occurred in 4 patients. 38 patients received the COVID-19 vaccine. There were not any changes of dyshidrosis in 25 patients who received the vaccine, exacerbation in 7 patients, first occurred in 4 patients, and reduction in 2 patients. When patients before and after March 11, 2020 were compared, only smoking was found to be significantly higher during the pandemic among the factors related to dyshidrosis.

**Conclusion**: COVID-19 disease and vaccines appeared to be among the factors that cause or increase dyshidrosis, but patch tests are required to eliminate allergic contact dermatitis causing dyshidrosis as hand washing and sanitizer use was increased in the pandemic period.

**Keywords:** Dyshidrosis; COVID-19 disease; COVID-19 vaccines; Pompholyx; Dyshidrotic dermatitis

## 1. Introduction

Pompholyx, also known as dyshidrotic eczema, is a common skin disease that affects the palms and soles [1]. Atopy, allergic contact dermatitis, systemic allergens, fungal infection, photoinduction, intravenous immunoglobulin therapy, hyperhidrosis, irritants, and other factors were implicated in the etiology of dyshidrosis but mostly stated to have unknown origins [2]. COVID-19-related dyshidrosis was reported as a case report in the literature [3]. A case of dyshidrotic dermatitis due to COVID-19 vaccination was reported in the literature [4]. Our aim in this study is to determine the effects of COVID-19 disease and vaccines on dyshidrosis disease, and evaluate the effect of the pandemic on the factors involved in dyshidrosis.

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## 2. Material and Methods

In our study, patients diagnosed with dyshidrosis in our clinic, 1 year before and 3 years after March 11, 2020 (the date when World Health Organisation declared the novel coronavirus outbreak as a global pandemic), were retrospectively investigated from the files, and then questioned by phone.

It was asked whether dyshidrosis first occurred or its severity increased, decreased, or remained unchanged after COVID-19 disease or vaccinations. In addition, the patients were asked about their affected area, duration, frequency of attacks, and the treatment given. Atopic dermatitis, allergic contact dermatitis, food allergies, fungal infections, sun aggravation, stress, hyperhidrosis, irritants/exposure to water, and smoking were asked and then compared according to before and after March 11, 2020, whether the COVID-19 pandemic affected these conditions. The questions asked were given in Table 1.

This study was conducted under the Helsinki criteria after approval by the Izmir Katip Çelebi University Ethics Committee (approval number: 220, date 18.05.2023).

**Table 1** Questions asked to patients with dyshidrosis

| |
|---|
| 1. Is dyshidrosis on the hands and feet? Is it only on hand or foot? |
| 2. How many years have you had the disease? |
| 3. Are there attacks? How often? |
| 4. If you caught COVID-19 disease, did dyshidrosis increase or occur in one month? |
| 5. Did dyshidrosis increase or occur in one month after COVID-19 vaccines? |
| 6. Do you have atopic dermatitis? |
| 7. Has allergic contact dermatitis been detected (nickel, etc.)? |
| 8. Are you allergic to products you take orally? Does it happen after food or medication? (chromium, nickel, neomycin, quinolone, etc.) |
| 9. Do you have foot fungus or fungus in any other area? |
| 10. Does it increase with the sun? |
| 11. Does it increase with physical stress or mental stress? |
| 12. Is there hand or foot sweating? |
| 13. Does it increase with excessive exposure to irritants (detergents and solvents) or water? |
| 14. Do you smoke? |
| 15. Which treatment did you have for dyshidrosis? |

## 3. Results

362 patients diagnosed with dyshidrosis were detected in the records over the 4 years. The number of patients who were contacted via phone and obtained information was 59. 29 of 59 patients were female and 30 were male. The mean age of 59 patients was 29.15. Hand involvement was present in 31 patients, foot involvement in 6 patients, and hand and foot involvement in 22 patients. The mean duration of the disease was 4.28 years. 30 of 59 patients did not catch COVID-19 disease, and 29 of them caught the disease. There were not any changes of dyshidrosis in 20 patients who caught COVID-19, exacerbation in 5 patients, and first occurred in 4 patients. 21 of the 59 patients did not receive the COVID-19 vaccine, 38 patients received the vaccine (Pfizer BioNTech (BNT162b2) COVID-19 vaccine and/or Sinovac-CoronaVac COVID-19 vaccine). There were not any changes of dyshidrosis in 25 patients who received the COVID-19 vaccine, exacerbation in 7 patients, first occurred in 4 patients, and reduction in 2 patients. 56 patients did not have atopic dermatitis, and 3 patients had. 55 patients did not have allergic contact dermatitis, and 4 patients had. 49 patients had food allergies, and 10 patients did not. 43 patients did not have tinea infection, and 16 patients did. Sun exposure did not affect dyshidrosis in 24 patients, increased in 30 patients, and decreased in 5 patients. Dyshidrosis increased during the summer months in 11 patients and decreased in 1 patient. Stress increased dyshidrosis in 31 patients, and did not affect 28 patients. Hyperhidrosis was absent in 38 patients, involved hand in 12 patients, foot in 3 patients, and both hands and feet in 6 patients. There was an increase with irritant (detergent) substance and water in 24 patients, and no increase in 35 patients. 33 patients were smokers, and 26 patients were non-smokers. The attack frequencies and their related patients were as follows: single attack, every 2-3 days, every 15-20 days, 2 times a year, once in a month, every 3-4 months, continually; 24, 1, 1, 1, 13, 3, and 4, respectively. As a treatment, 54 patients were given topical treatment, 4 patients were given topical and oral antihistamine, and 1 patient was given local PUVA and topical treatment. Descriptive data of patients with dyshidrosis was given in Table 2. Smoking was found to be significantly higher during the pandemic. Other dyshidrosis-related factors were not found to be significant compared to before and after March 11, 2020 (Table 3)

**Table 2** Descriptive data of patients with dyshidrosis

| **Variables** | ***n*** | **%** | **Variables** | **n** | **%** |
|---|---|---|---|---|---|
| Age | | | Atopic dermatitis | | |
| $\bar{x}\pm ss$ | 29.15±15.17 | | No | 56 | 94.9 |
| *M* (*min-max*) | 30 (3-63) | | Yes | 3 | 5.1 |
| Gender | | | Allergic contact | | |
| Female | 29 | 49.2 | No | 55 | 93.2 |
| Male | 30 | 50.8 | Yes | 4 | 6.8 |
| Location | | | | | |
| Palmar | 31 | 52.5 | Food allergy | | |
| Plantar | 6 | 10.2 | No | 49 | 83.1 |
| Palmar and plantar | 22 | 37.3 | Yes | 10 | 16.9 |
| Duration (years) | | | Tinea | | |
| $\bar{x}\pm ss$ | 4.28±4.92 | | No | 43 | 72.9 |
| *M* (*min-max*) | 3.5 (0.5-30) | | Yes | 16 | 27.1 |
| Attack frequencies | | | Sun | | |
| Single attack | 24 | 40.7 | No effect | 24 | 40.7 |
| Decrease in summer | 1 | 1.7 | Increase | 30 | 50.8 |
| Increase in summer | 11 | 18.6 | Decrease | 5 | 8.5 |
| Every 2-3 days | 1 | 1.7 | | | |
| Every 15-20 days | 1 | 1.7 | | | |
| 2 times a year | 1 | 1.7 | | | |
| Once in a month | 13 | 22.0 | | | |
| Every 3-4 months | 3 | 5.1 | | | |
| Continually | 4 | 6.8 | | | |

| | | | | | |
|---|---|---|---|---|---|
| Treatment | | | | | |
| Topical | 54 | 91.5 | Stress | | |
| Topical+PUVA | 1 | 1.7 | No effect | 28 | 47.5 |
| Topical+ antihistaminic | 4 | 6.8 | Increase | 31 | 52.5 |
| Covid-19 disease | | | Hyperhidrosis | | |
| No | 30 | 50.8 | No | 38 | 64.4 |
| Yes | 29 | 49.2 | Hand | 12 | 20.3 |
| | | | Foot | 3 | 5.1 |
| | | | Hand and foot | 6 | 10.2 |
| Covid-19 effect | | | | | |
| No change | 20 | 69.0 | Irrıtants/water | | |
| First occurred | 4 | 13.8 | No effect | 35 | 59.3 |
| Exacerbation | 5 | 17.2 | Increase | 24 | 40.7 |
| Covid-19 vaccination | | | Smoking | | |
| No vaccine | 21 | 35.6 | No | 33 | 55.9 |
| Vaccinated | 38 | 64.4 | Yes | 26 | 44.1 |
| Covid-19 vaccine effect | | | | | |
| No change | 25 | 65.8 | | | |
| Exacerbation | 7 | 18.4 | | | |
| Reduction | 2 | 5.3 | | | |
| First occured | 4 | 10.5 | | | |

x̄: mean, ss: Standard deviation, M: median

**Table 3** Comparison of Patient Characteristics by Groups

| | **Group** | | **Test statistics&** | |
|---|---|---|---|---|
| | Before March 11, 2020 | After March 11, 2020 | Test value | *p* value |
| Age $\bar{x}\pm ss$ | 26.90±13.55 | 30.48±16.08 | 0.874 | 0.386# |
| *M* (*min-max*) | 27.5 (4-52) | 34 (3-63) | | |
| Gender | | | | |
| Female | 14 (43.6) | 15 (40.5) | 2.945 | 0.086& |
| Male | 8 (36.4) | 22 (59.5) | | |
| Location | | | | |
| Palmar | 8 (36.4) | 23 (62.2) | 3.769 | 0.156& |
| Plantar | 3 (13.6) | 3 (8.1) | | |
| Palmar and plantar | 11 (50.0) | 11 (29.7) | | |
| Attack frequencies | | | | |
| Single attack | 10 (45.5) | 14 (37.8) | | |
| Decrease in summer | 1 (4.5) | 0 (0.0) | | |
| Increase in summer | 3 (13.6) | 8 (21.6) | | |
| Every 2-3 days | 0 (0.0) | 1 (2.7) | 6.980 | 0.567& |
| Every 15-20 days | 0 (0.0) | 1 (2.7) | | |
| 2 times a year | 0 (0.0) | 1 (2.7) | | |
| Once in a month | 7 (31.8) | 6 (16.2) | | |

| | | | | |
|---|---|---|---|---|
| Every 3-4 months<br>Continually | 0 (0.0)<br>1 (4.5) | 3 (8.1)<br>3 (8.1) | | |
| Treatment<br>Topical<br>Topical+PUVA<br>Topical+ antihistaminic | <br>20(90.9)<br>1 (4.5)<br>1 (4.5) | <br>34 (91.9)<br>0 (0.0)<br>3 (8.1) | 1.817 | 0.556 |
| Atopic dermatitis<br>No<br>Yes | <br>21 (95.5)<br>1 (4,5) | <br>35 (94.6)<br>2 (5,4) | 0.021 | >0.999 |
| Allergic contact dermatitis<br>No<br>Yes | <br>21 (95.5)<br>1 (4.5) | <br>34 (91.9)<br>3 (8.1) | 0.277 | >0.999 |
| Food allergy<br>No<br>Yes | <br>16 (72.7)<br>6 (27.3) | <br>33 (89.2)<br>4 (10.8) | 2.656 | 0.103 |
| Tinea<br>No<br>Yes | <br>14 (63.6)<br>8 (36.4) | <br>29 (78.4)<br>8 (21.6) | 1.517 | 0.218 |
| Sun<br>No effect<br>Increase<br>Decrease | <br>9 (40.9)<br>10 (45.5)<br>3 (13.6) | <br>15 (40.5)<br>20 (54.1)<br>2 (5.4) | 1.375 | 0.524 |
| Stress<br>No effect<br>Increase | <br>9 (40.9)<br>13 (59.1) | <br>19 (51.4)<br>18 (48.6) | 0.603 | 0.591 |
| Hyperhidrosis<br>No<br>Hand<br>Foot<br>Hand and foot | <br>15 (68.2)<br>2 (9.1)<br>1 (4.5)<br>4 (18.2) | <br>23 (62.2)<br>10 (27.0)<br>2 (5.4)<br>2 (5.4) | 4.457 | 0.215 |
| Irrıtants/water<br>No effect<br>Increase | <br>13 (59.1)<br>9 (40.9) | <br>22 (59.5)<br>15 (40.5) | 0,.001 | 0.978 |
| Smoking<br>No<br>Yes | <br>16 (72.7)<br>6 (27.3) | <br>17 (15.9)<br>20 (54.1) | 4.015 | 0.045 |

Descriptive values are given as n and % for categorical variables; Descriptive values are given as $\bar{x}$: mean, *ss*: standard deviation, *M*: Median for continuous variables [#]: Independent two sample t test, [‡]:Man Whitney U test, [&]: Chi-square test.

## 4. Discussion

In our study, the first appearance of dyshidrosis in 4 of 29 patients with COVID-19 and the increase in its severity and attack frequency in 5 patients proposed that COVID-19 disease may affect dyshidrosis. Regarding vaccines, the first appearance of dyshidrosis in 4 of 38 COVID-19-vaccinated patients and the increase in its severity and attack frequency in 7 patients suggest that vaccines may affect dyshidrosis. Patients associated new occurrence and exacerbation of dyshidrosis with vaccination or COVID-19 disease because they stated that dyshidrosis occurred within 1 month after vaccination or catching COVID-19 disease. There are case reports in the literature about the occurrence of dyshidrosis after COVID-19 disease or vaccination [3,4,5].

In the article covering 375 cases regarding skin findings of COVID-19, the lesions were classified into five categories: acral areas of erythema with vesicles or pustules (pseudo-chilblain) (19%), other vesicular eruptions (9%), urticarial lesions (19%), maculopapular eruptions (47%), and livedo or necrosis (6%). It was stated that vesicular eruption was encountered in 34 patients (9%), was seen in the trunk, but was also seen in the acral regions, and occurred in the early stages of COVID-19 disease, but isolated involvement in hand and foot was not reported in the study [6]. Vesicular lesions seen in COVID-19 were reported mainly to involve the trunk [7].

In Català et al.'s study of post-SARS-CoV-2 vaccination skin reactions of 405 patients, injection site reaction (32.1%), urticaria (14.6%), morbilliform (8.9%), papulovesicular (6.4%), pityriasis rosea-like (4.9%) and purpuric (4%) rash

were reported, but dyshidrosis was not reported [8]. In a study, consisting of 2290 individuals, examining skin side effects after COVID-19 vaccines in Turkey, dyshidrosis was found to be 0.2% after the first dose and 0.05% after the second dose [9].

Guillet et al. identified the causes of pompholyx in 120 patients as follows: mycosis (10.0%); allergic contact pompholyx (67.5%), with cosmetic and hygiene products being the main factor (31.7%), followed by metals (16.7%); and internal reactivation from drugs, food, or haptenic (nickel) origin (6.7%) [10]. Smoking was stated to be an aggravating cofactor for dyshidrosis and in our study smoking was increased in the pandemic period. However, its contribution to dyshidrosis was found to be very low after objective assessment in Guillet et al.'s study [10]. Although stress was thought to play a role for about a quarter of patients, no difference was found compared to the control group in Guillet et al.'s study [10]. During the pandemic period, hand washing frequency and psychological stress increased. In our study, the relationship between frequent hand washing, disinfectant use, psychological stress, and dyshidrosis was asked to the patients, and no statistically significant results were obtained. This might be due to the small number of patients in the study. Patients might not have associated the dyshidrosis-inducing effect of the new substance they started using, the effect of which could be determined by patch testing which we did not perform in our study. Our study's other limitation was being based on telephone surveys.

## 5. Conclusion

COVID-19 disease and COVID-19 vaccinations may have increased the incidence of dyshidrosis. Conducting patch tests to reveal the allergic contact dermatitis possible confounding effect with new studies may help to better delineate the direct effects of COVID-19 disease and vaccines on dyshidrosis.

## Compliance with ethical standards

### *Disclosure of conflict of interest*

No conflict of interest to be disclosed.

### *Statement of ethical approval*

The study was conducted according to the guidelines of the Declaration of Helsinki and approved by the ethics committee of the Izmir Katip Çelebi University Ethics Committee (approval number: 220, date 18.05.2023).

### *Statement of informed consent*

Informed consent was obtained from all individual participants included in the study.

## Reference

[1] Wollina, Uwe. "Pompholyx: a review of clinical features, differential diagnosis, and management." *American journal of clinical dermatology* vol. 11,5 (2010): 305-14.

[2] Lofgren, Sabra M, and Erin M Warshaw. "Dyshidrosis: epidemiology, clinical characteristics, and therapy." *Dermatitis : contact, atopic, occupational, drug* vol. 17,4 (2006): 165-81.

[3] Keller R, Corrêa GP, Porteiro DL, Litvcoc M. Dyshidrotic Eczema as a Manifestation of COVID-19. Clin Surg. 2021; 6: 3232.

[4] Bentivegna, Kathryn et al. "COVID-19 booster exemption for severe dyshidrotic eczema." *Journal of the American Academy of Dermatology* vol. 89,5 (2023): 1087-1088.

[5] Alelq, N A et al. "Influence of Covid-19 vaccination on immune-mediated skin diseases." *Journal of the European Academy of Dermatology and Venereology : JEADV* vol. 36,12 (2022): e965-e968.

[6] Galván Casas, C et al. "Classification of the cutaneous manifestations of COVID-19: a rapid prospective nationwide consensus study in Spain with 375 cases." *The British journal of dermatology* vol. 183,1 (2020): 71-77.

[7] Tan, See Wei et al. "Skin manifestations of COVID-19: A worldwide review." *JAAD international* vol. 2 (2021): 119-133.

[8] Català, A et al. "Cutaneous reactions after SARS-CoV-2 vaccination: a cross-sectional Spanish nationwide study of 405 cases." *The British journal of dermatology* vol. 186,1 (2022): 142-152.

[9] Cebeci Kahraman, Filiz et al. "Cutaneous reactions after COVID-19 vaccination in Turkey: A multicenter study." *Journal of cosmetic dermatology* vol. 21,9 (2022): 3692-3703.

[10] Guillet, Marie Hélène et al. "A 3-year causative study of pompholyx in 120 patients." *Archives of dermatology* vol. 143,12 (2007): 1504-8.