International Journal of Occupational Medicine and Public Health
e- ISSN 3089-1655
Published by the Medical Science Study Program.
Universitas Sultan Ageng Tirtayasa

International Journal of Medicine and Public Health

International Journal of Occupational Medicine and Public Health is a scientific publication published by the Medical Science study program. Faculty of Medicine, University of Sultan Ageng Tirtayasa which contains research results related to technology development, innovation and novelty of science in the field of relevant medical science at the higher education level.

International Journal of Occupational Medicine and Public Health is an open access and peer-reviewed journal that aims to offer a national and international academic platform for Medical science. This journal publishes articles and reviews scientific in field focus on :

- Medical
- Biomedicine
- Occupational Medicine
- Public health
- Infectious disease
- Nutrition
- Sport science
- Nursing

This journal provides immediate open access to its content on the principle that making research freely available to the public supports a greater global exchange of knowledge.

Announcements

No announcements have been published.

More Announcements...

Vol 2, No 2 (2025): October

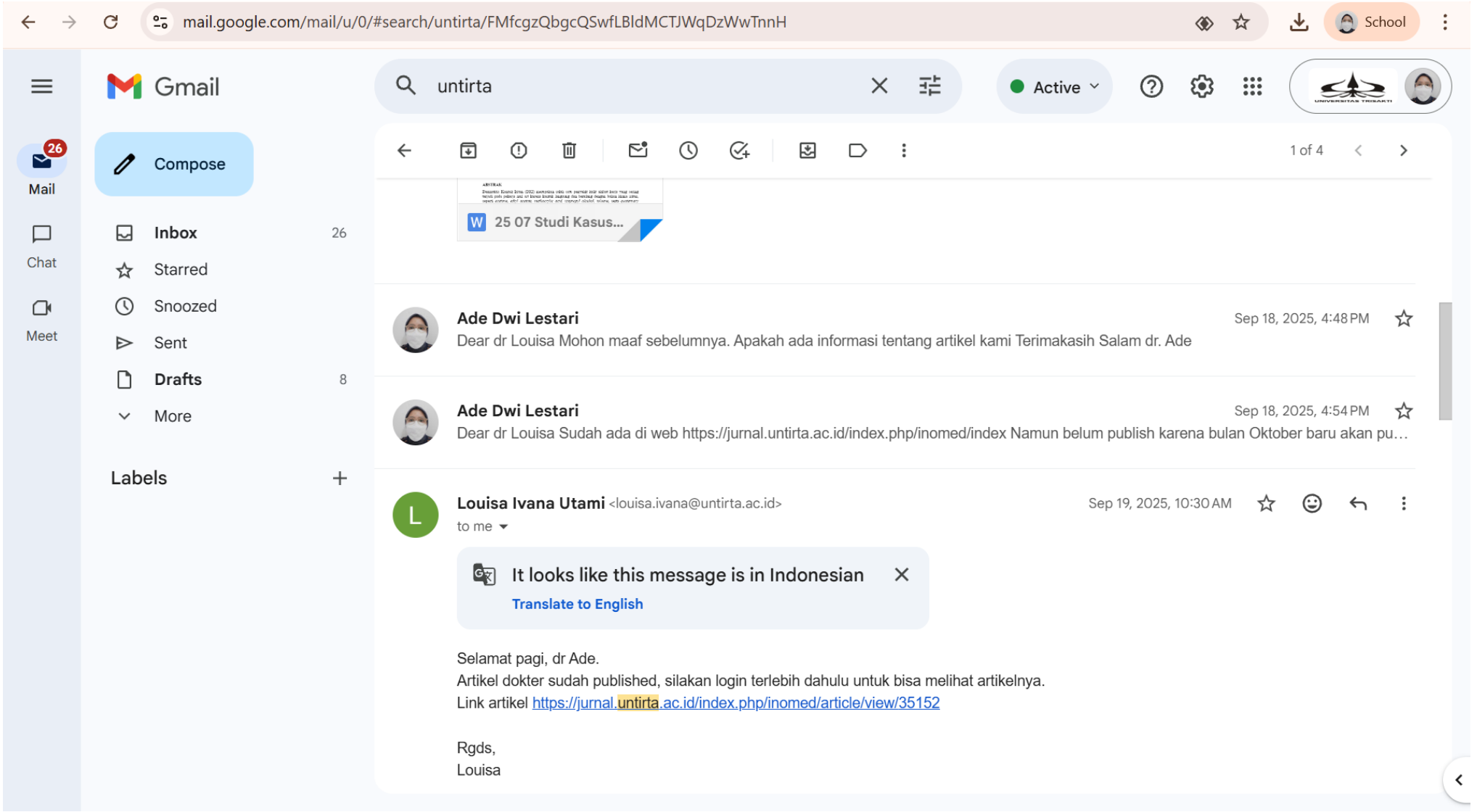
Table of Contents

Articles

Muhammad Kaamil Azzami, Novitrian Eka Putra, Aprillia Putrie Dewi

International Journal of Occupational Medicine and Public Health

View My Stats


mail.google.com/mail/u/0/#search/untirta/FMfcgzQbgcQSwfLBldMCTJWqDzWwTnnH
School
Gmail
untirta
Active
Compose
Mail
Chat
Meet
Inbox 26
Starred
Snoozed
Sent
Drafts 8
More
Labels
1 of 4
25 07 Studi Kasus...
Ade Dwi Lestari
Sep 18, 2025, 4:48 PM
Dear dr Louisa Mohon maaf sebelumnya. Apakah ada informasi tentang artikel kami Terimakasih Salam dr. Ade
Ade Dwi Lestari
Sep 18, 2025, 4:54 PM
Dear dr Louisa Sudah ada di web https://jurnal.untirta.ac.id/index.php/inomed/index Namun belum publish karena bulan Oktober baru akan pu…
Louisa Ivana Utami <louisa.ivana@untirta.ac.id>
Sep 19, 2025, 10:30 AM
to me
It looks like this message is in Indonesian
Translate to English
Selamat pagi, dr Ade.
Artikel dokter sudah published, silakan login terlebih dahulu untuk bisa melihat artikelnya.
Link artikel https://jurnal.untirta.ac.id/index.php/inomed/article/view/35152
Rgds,
Louisa

https://jurnal.untirta.ac.id/index.php/inomed/about/contact

Universitas Sultan Ageng Tirtayasa

HOME | ABOUT | USER HOME | CATEGORIES | SEARCH | CURRENT | ARCHIVES | ANNOUNCEMENTS

Home > About the Journal > **Journal Contact**

Journal Contact

Mailing Address

Fakultas Kedokteran dan Ilmu Kesehatan

Universitas Sultan Ageng Tirtayasa

Principal Contact

Reqgi First Trasia
dr.
Prodi Kedokteran, Fakultas Kedokteran, UNTIRTA
Email: reqgi.first@untirta.ac.id

Support Contact

dr. Louisa Ivana Utami, M.Biomed
Email: louisautami@gmail.com

International Journal of Occupational Medicine and Public Health

OPEN JOURNAL SYSTEMS

MENU

- Online Submissions
- Focus & Scope
- Publication Ethics
- Author Guidelines
- Manuscript Template
- Indexing and Abstracting
- Contact Us
- Open Access Policy
- Plagiarism Polish
- Author Fees
- Peer Review Process
- Editorial Team
- Peer Reviewers

Journal Help

USER

You are logged in as...

https://jurnal.untirta.ac.id/index.php/inomed/author/submissionEditing/35152

International Journal of Occupational Medicine and Public Health
e- ISSN 3089-1655
Published by the Medical Science Study Program.
Universitas Sultan Ageng Tirtayasa

HOME | ABOUT | USER HOME | CATEGORIES | SEARCH | CURRENT | ARCHIVES | ANNOUNCEMENTS

Home > User > Author > Submissions > #35152 > **Editing**

#35152 Editing

SUMMARY | REVIEW | EDITING

Submission

Authors	Ade Dwi Lestari, Nyoman Diktri Maharatih, Putri Windyaningsih, Salsabila Hasna Baringbing
Title	Case Study of Occupational Irritant Contact Dermatitis in Nail Art Workers.
Section	Articles
Editor	Arif Widodo Reqgi Trasia

Copyediting

COPYEDIT INSTRUCTIONS

REVIEW METADATA		REQUEST	UNDERWAY	COMPLETE
1.	Initial Copyedit File: 35152-94042-1-CE.DOCX 2025-08-20	2025-08-21	—	2025-08-25
2.	Author Copyedit File: 35152-94042-2-CE.DOCX 2025-08-28 Choose File No file chosen Upload	2025-08-26	2025-08-28	2025-09-01

OPEN JOURNAL SYSTEMS

MENU

- Online Submissions
- Focus & Scope
- Publication Ethics
- Author Guidelines
- Manuscript Template
- Indexing and Abstracting
- Contact Us
- Open Access Policy
- Plagiarism Polish
- Author Fees
- Peer Review Process
- Editorial Team
- Peer Reviewers

International Journal of Occupational Medicine and Public Health
Prodi Kedokteran UNTIRTA

INTERNATIONAL JOURNAL OF OCCUPATIONAL MEDICINE AND PUBLIC HEALTH

Case Study of Occupational Irritant Contact Dermatitis in Nail Art Workers.

Nyoman Diktri Maharatih[1], Putri Windyaningsih[2], Salsabila Hasna Baringbing[3], Ade Dwi Lestari[4]
[1,2,3]Medical Education Study Program, Faculty of Medicine, Universitas Trisakti, Jakarta, Indonesia
[4]Department of Occupational Medicine, Faculty of Medicine, Universitas Trisakti, Jakarta, Indonesia

(adedwilestari@trisakti.ac.id, 628128021830)

ABSTRACT

Irritant Contact Dermatitis (ICD) is one of the most common occupational skin diseases among nail art workers due to frequent and direct contact with chemical irritants such as acetone, ethyl acetate, methacrylic acid, isopropyl alcohol, toluene, and quaternary ammonium compounds. This study aims to evaluate a case of ICD in a nail art worker and to explore its association with occupational exposure. The research was conducted using a case study method, applying the seven-step approach to diagnosing occupational diseases, which includes medical history, physical examination, and a review of relevant literature. A 28-year-old woman who had been working in a nail art salon for three years presented with painful sensations on the fingertips of both hands, accompanied by dryness, cracking skin, and mild itching—especially after contact with acetone-based nail polish remover. Based on clinical evaluation, occupational history, and supporting scientific references, the patient was diagnosed with ICD as an occupational disease. Repeated exposure to acetone was found to have a strong association with the onset of symptoms. The diagnosis also considered the duration of employment, length of exposure per session, infrequent use of personal protective equipment (PPE), and the absence of relevant non-occupational risk factors. This study concludes that the ICD in this patient is an occupational disease. Education and the consistent use of PPE are essential for preventing and controlling recurrence

Keywords : ***Irritant Contact Dermatitis, Nail Art Workers, Occupational Diagnosis, Acetone***

https://doi.org/.

INTRODUCTION

The use of nail cosmetics dates back to around 5000 BC, when women in India, China, and Egypt adorned their nails with henna for decoration and ritual. Today, approximately 85–90 % of women worldwide use nail care products. The nail cosmetics industry, which includes nail polish, acrylics, silk wraps, gels, and extensions, is a global, multibillion-dollar market, with women as its primary consumers.[1]

This situation may affect various populations; however, workers such as nail art technicians who are frequently exposed to chemicals, water, and solvents in their daily activities face a higher risk of developing skin disorders. Prolonged exposure to substances such as acetone, alcohol, detergents, and tool or nail cleaners can cause repeated damage to the skin's protective layer (the stratum corneum), ultimately compromising skin integrity and triggering inflammation.[2]

Irritant contact dermatitis (ICD) not only causes physical symptoms such as dry, cracked, painful, and reddened skin, but also adversely impacts work productivity, psychological comfort, and overall quality of life. According to the World Health Organization (WHO), in 2020, ICD ranked as the fourth most prevalent occupational disease, accounting for 10 % of cases. Among work-related illnesses, 80 % were attributable to irritant contact dermatitis (Kim et al., 2020).[3]

Globally, the prevalence of contact dermatitis is estimated at approximately 300 million cases annually. In Indonesia, a study by Tjendera et al. reported a dermatitis prevalence of 6.78 %, of which 90 % were contact dermatitis (both irritant and allergic).[4] Among these, 92.5 % were work-related contact dermatitis, 5.4 % were due to skin infections, and 2.1 % were from other skin diseases. Another epidemiological study by Samuelet al. in Indonesia found that out of 389 contact dermatitis cases, 97 % were confirmed as contact dermatitis; of these, 66.3 % were irritant contact dermatitis and 33.7 % allergic contact dermatitis.[5]

Given the considerable risk faced by nail art workers from irritant exposures and the potential long-term consequences, a thorough understanding of the etiology, classification, risk factors, and management of ICD is essential. Therefore, this paper is prepared as a scientific and educational contribution to raise awareness and advance prvention efforts regarding irritant contact dermatitis among this workforce.

METHODS

A 28-year-old woman presented to the dermatology and venereology outpatient clinic at a general hospital in West Jakarta with complaints of pain at the fingertips of both hands for the past two weeks. The symptoms were accompanied by dryness, cracked skin, and mild itching. The patient had experienced similar symptoms previously, but they were mild and not bothersome. The patient had not

sought medical attention for these complaints prior to this visit. The patient works at a nail art salon and has been employed there for approximately three years. She reported that her fingertips became increasingly painful and dry after contact with acetone nail polish remover and when cleaning tools and the work area with 70% alcohol disinfectant. During work, the patient rarely uses gloves due to discomfort. She denied skin complaints on other parts of the body. The patient denied a history of allergies or previous skin diseases. She had not received any treatment for her current complaints. No family members reported similar symptoms. The patient has a history of dry skin and rarely uses moisturizers. The patient works at the nail art salon six days a week, from 10:00 AM to 8:00 PM, with a break from 12:00 PM to 1:00 PM. In a day, she handles approximately 15 clients, with session durations ranging from 20 to 120 minutes. During work, the patient uses nail polish, acetone, nail primer, nail glue, artificial nails, alcohol, and various nail art tools (scissors, files, and nail drills).

Figure 1 Patient's Dermatological Status.

RESULTS

Seven Steps for Diagnosing Occupational Disease

Step 1: Establishing the Clinical Diagnosis

Based on the patient's history and physical examination, the patient was diagnosed with irritant contact dermatitis on the distal phalanges of digits I–V of both hands (manus dextra et sinistra).

Step 2: Identifying Workplace Exposures

The patient has worked as a nail art technician for three years, with a work duration of 9 hours per day, including approximately 1 hour of rest, and works 6 days per week.
No physical hazards were identified in the workplace. Chemical hazards include acetone (nail polish remover), nail polish (butyl acetate, dibutyl phthalate, formaldehyde), artificial nails and nail primer (methyl methacrylate, ethyl methacrylate), nail glue (toluene, ethyl acetate), and 70% alcohol (used for cleaning tools) (Lipman et al., 2021).[6] Potential biological hazards include bloodborne infections such as hepatitis B, hepatitis C, and HIV, as well as fungal infections (e.g., Trichophyton rubrum).[7] The patient serves approximately 15 clients daily, with a total work duration of 54 hours per week, which may lead to excessive workload, classified as a psychosocial hazard. Ergonomically, during treatment sessions (20–120 minutes), the patient maintains neck flexion >30° and back flexion >20° (awkward

posture). The patient also performs repetitive movements, including wrist flexion-extension and deviation >10 seconds and >30 times per minute. Additionally, the patient sits for prolonged periods without back support.

Step 3: Establishing the Relationship Between Workplace Exposures and the Disease

Several studies indicate a relationship between workplace exposures and the incidence of irritant contact dermatitis (ICD), particularly among nail art workers. A book chapter titled Occupational Dermatitis in Nail Salon Workers states that nail technicians' hands are at risk of irritation due to wet work involving water contact. Certain chemicals used, such as nail polish removers (acetone, butyl acetate, ethyl acetate, and methyl ethyl ketone) and cuticle removers (sodium hydroxide and potassium hydroxide), are known to have significant irritative potential (Horev, 2018).[8]

A narrative review article showed that acetone and ethyl acetate in nail polish removers can cause irritant contact dermatitis (Lipman et al., 2021). Additionally, a cross-sectional study of 159 nail technicians from 120 salons in South Korea found that 157 workers with 3.5 years of exposure to gel/nail products experienced persistent inflammation and skin complaints approaching the category of cumulative ICD (Sung-Ae Park et al., 2014).[9]

A cross-sectional study of 49 nail technicians in Tehran found that 37 female technicians working in salons with minimal positive ventilation were exposed to significant amounts of fine particles and volatile chemical compounds, increasing the risk of skin and respiratory irritation (Ebrahimi et al., 2023).[10] A study in Vietnam involving 21 nail technicians with 42 measurements found that volatile organic compounds (e.g., acetone) in nail salons caused occupational symptoms, particularly skin and respiratory irritation, among female workers (Nguyen et al., 2019).[11]

Step 4: Determining the Adequacy of Exposure Levels to Cause the Disease

Table 1. Adequacy of Exposure Levels to Cause the Disease

No	Patient	Evidence-Based	Conclusion
1.	The patient works as a nail art technician using acetone.	Acetone was detected in 97.6% of air samples from salons, with reported symptoms including skin and nasal irritation, significantly higher than in the control group (Nguyen et al., 2020).[11]	Acetone is present in the patient's workplace.
2.	The patient's symptoms worsen after contact with acetone nail polish remover.	Acetone in nail polish remover can cause ICD and allergic contact dermatitis (ACD) (Lipman et al., 2021).[6]	Acetone causes ICD.

3.	The patient has worked for 3 years.	157 workers with 3.5 years of long-term exposure to nail and gel products experienced inflammation and skin complaints consistent with cumulative ICD, though less prevalent than allergies (Park et al., 2014).[9]	The patient's work duration supports the occurrence of ICD.
4.	The patient works 10 hours/day with a 1-hour break.	Nail technicians exposed to chemicals such as acetone, toluene, MMA, and acrylates, and working >10 hours, are at higher risk of skin and respiratory irritation (Park et al., 2014).[9]	The patient's work duration supports the occurrence of ICD.
5.	The patient handles 15 clients with session durations of 20–120 minutes.	All 49 nail salon technicians serving clients for >1 hour per session without adequate ventilation are at risk of cumulative ICD (Ebrahimi et al., 2023).[10]	Long session durations per client support the occurrence of ICD.

Step 5: Identifying Individual Risk Factors

The patient is a 28-year-old female. The patient has no history of skin diseases, allergies, or atopy. No family history of atopy was reported. The patient has dry skin and rarely uses moisturizers.

Step 6: Identifying Non-Occupational Factors That May Cause the Disease

The patient has no side jobs or habits that could cause irritation. The patient washes dishes once daily and laundry twice weekly using the same brand of soap and detergent for over 5 years, with no prior symptoms.

Step 7: Establishing the Occupational Disease Diagnosis

Occupational Irritant Contact Dermatitis

DISCUSSION

The diagnosis of irritant contact dermatitis (ICD) was established based on the patient's history and physical examination. The patient's complaints included pain at the fingertips of both hands, accompanied by dryness and cracked skin, which align with the pathophysiology of ICD, characterized by cellular changes affecting the stratum corneum due to exposure to hazardous agents considered toxic to the skin (Lurati et al., 2015).[12] Physical examination revealed dry skin with erythema and scaling on the distal phalanges of digits I–V of both hands (manus dextra et sinistra). This supports the diagnosis of ICD, which most commonly affects the hands (61.9%), with classic symptoms including dry skin,

erythema, scaling, and, over time, thickening of the skin (hyperkeratosis) with lichenification that is diffuse (Patel et al., 2022).[13]

During work, the patient uses various chemicals, including nail polish, acetone, nail primer, nail glue, artificial nails, alcohol, and nail art tools (scissors, files, and nail drills). A study by Nguyen HL et al. detected acetone in 97.6% of air samples from salons, with reported symptoms including skin and nasal irritation, significantly higher than in the control group.[11] This supports the presence of acetone in the patient's nail art salon workplace.

The patient reported that her fingertips became increasingly painful and dry after contact with acetone-based nail polish remover. Research by Lipman Z et al. indicates that acetone in nail polish removers can cause both ICD and allergic contact dermatitis (ACD). However, acetone is less commonly associated with ACD compared to ICD (Silverberg et al., 2021).[14]

The patient has worked as a nail art technician for approximately three years. She previously experienced similar symptoms, but they were mild and not bothersome. Studies by White et al. and Pacheco et al. found that 157 workers with 3.5 years of long-term exposure to nail and gel products experienced inflammation and skin complaints consistent with cumulative ICD, although its prevalence is lower than that of allergies. The patient's three-year work history aligns with these findings, pointing toward cumulative ICD (Park et al., 2014).[9]

The patient works at the nail art salon six days a week, from 10:00 AM to 8:00 PM, with a one-hour break from 12:00 PM to 1:00 PM. A study by Park SA et al. found that nail technicians exposed to chemicals such as acetone, toluene, MMA, and acrylates, and working more than 10 hours per day, are at higher risk of skin and respiratory irritation. This indicates that the patient's work duration supports the occurrence of ICD (Park et al., 2014).[9]

The patient handles approximately 15 clients daily, with session durations ranging from 20 to 120 minutes. A study by Ebrahimi V et al. found that all 49 nail salon technicians serving clients for more than one hour per session without adequate ventilation are at risk of cumulative ICD.[10] Thus, it can be concluded that the long duration of client sessions supports the occurrence of ICD (Ebrahimi et al., 2023).[10]

From an occupational perspective, ICD is commonly experienced by nail salon workers due to exposure to chemicals used in nail care, such as nail polish, nail polish remover, gel, nail glue, primer, and disinfectants. Chemicals frequently causing irritation include acetone, ethyl acetate, methacrylic acid, isopropyl alcohol, toluene, and quaternary ammonium compounds (Lipman et al., 2021).[6] According to Horev et al., in a book subchapter titled Occupational Dermatitis in Nail Salon Workers, nail technicians' hands are at risk of irritation due to wet work involving water contact.[8] Certain chemicals, such as nail polish removers (acetone, butyl acetate, ethyl acetate, and methyl ethyl ketone) and cuticle removers (sodium hydroxide and potassium hydroxide), have significant irritative potential. A study

based on data from The Health and Occupation Reporting network in the UK examined contact dermatitis cases among beauty workers, including nail technicians, between 1996 and 2011. Over this 15-year period, 257 cases of occupational contact dermatitis were recorded (Kwok et al., 2014).[15]

The patient is a 28-year-old female with no history of skin diseases, allergies, or atopy. She also reported having dry skin and rarely using moisturizers. A study by Pacheco et al. found that women are more likely to experience occupational contact dermatitis than men (58% vs. 42%). Additionally, dry skin is an endogenous factor that can increase the risk of ICD among workers (Lurati et al., 2015).[14] The patient has no side jobs or habits that could cause irritation. She washes dishes once daily and laundry twice weekly using the same brand of soap and detergent for over five years, with no prior symptoms. Based on the seven-step diagnosis of occupational disease, the patient can be diagnosed with occupational irritant contact dermatitis.

Control measures that can be implemented include substitution, administrative controls, and the use of personal protective equipment (PPE). Substitution involves replacing acetone-based nail polish removers with products that do not contain acetone, such as those with ethyl acetate as the primary ingredient. Administrative controls can include training on proper skin care, such as regular hand washing and the use of non-irritating hand creams, as well as PPE usage. The use of PPE, such as nitrile gloves (typically blue or purple are suitable when handling acetone.

CONCLUSION

The diagnosis of irritant contact dermatitis on the distal phalanges of digits I–V of both hands (manus dextra et sinistra) was established based on the patient's history, physical examination, and other clinical data. Following the application of the seven-step occupational disease diagnosis, the patient was diagnosed with occupational irritant contact dermatitis. Management of the patient's irritant contact dermatitis includes both pharmacological and non-pharmacological approaches. The prognosis ad sanationem is dubia ad bonam, with the possibility of recurrence if the patient does not avoid contact with the irritant acetone. The occupational prognosis is also dubia ad bonam, as the patient can continue working as a nail art technician with appropriate risk control measures. This highlights the importance of preventive measures and improvements in workplace practices to reduce the risk of irritant contact dermatitis among similar workers.

REFERENCES

Reinecke JK, Hinshaw MA. Nail health in women. Int J Womens Dermatol. 2020 Feb 5;6(2):73-79. doi: 10.1016/j.ijwd.2020.01.006. PMID: 32258335; PMCID: PMC7105659.

Novak-Bilic G, Vucic M, Japundzic I, Mestrovic-Stefekov J, Stanic-Duktaj S, Lugovic-Mihic L. Irritant and allergic contact dermatitis - skin lesion characteristics. Acta Clin Croat. 2018;57(4):713–720. doi: 10.20471/acc.2018.57.04.13.

Kim T, Tam I. PRESENTATIONS A Systematic Review of Photopatch Test Results from 2020. Available from: www.liebertpub.com

Tjendera M, Astiah AA, Khatimah MH. KEJADIAN DERMATITIS KONTAK AKIBAT KERJA DARI PROSES PRODUKSI PLYWOOD. Vol. 15. 2025.

Samuel, Zairina N, Ikhsan R, Ramadhani S. Karakteristik Kejadian Dermatitis Kontak Iritan pada Karyawan Pencucian Mobil di Kecamatan Medan Selayang. *Scripta Score: Scientific Medical Journal*. 2022;4(2). doi:10.32734/scripta.v5i1.10545

Lipman ZM, Tosti A. Contact dermatitis in nail cosmetics. Allergies. 2021;1(4):225–232. doi:10.3390/allergies1040021

Pacheco KA. Occupational dermatitis: How to identify the exposures, make the diagnosis, and treat the disease. Ann Allergy Asthma Immunol. 2018 Jun;120(6):583-591. doi: 10.1016/j.anai.2018.04.013. Epub 2018 Apr 23. PMID: 29698693

Horev, L. (2018). Occupational Dermatitis in Nail Salon Workers. In: Tur, E., Maibach, H. (eds) Gender and Dermatology. Springer, Cham. https://doi.org/10.1007/978-3-319-72156-9_20

Park SA, Gwak S, Choi S. Assessment of occupational symptoms and chemical exposures for nail salon technicians in Daegu City, Korea. J Prev Med Public Health. 2014 May;47(3):169-76. doi: 10.3961/jpmph.2014.47.3.169. Epub 2014 May 30. PMID: 24921020; PMCID: PMC4050214.

Ebrahimi V, Yarahmadi R, Salehi M, Ashtarinezhad A. Assessing occupational exposure of airborne PMs and TVOCs in the nail salons in Tehran city, Iran. Heliyon. 2023 Dec 1;9(12):e23088. doi: 10.1016/j.heliyon.2023.e23088. PMID: 38144351; PMCID: PMC10746482.

Nguyen, M. K., Kim, H. Y., Kim, Y. M., & Lim, Y. W. (2020). Occupational symptoms due to exposure to volatile organic compounds among Vietnamese female nail salon workers in Danang City. *Annals of Occupational and Environmental Medicine, 32*(e14).doi:10.35371/aoem.2020.32.e14

Lurati AR. Occupational Risk Assessment and Irritant Contact Dermatitis. Workplace Health & Safety. 2015;63(2):81-87. doi:10.1177/2165079914565351

Patel K, Nixon R. Irritant Contact Dermatitis - a Review. Curr Dermatol Rep. 2022;11(2):41-51. doi: 10.1007/s13671-021-00351-4. Epub 2022 Apr 7. PMID: 35433115; PMCID: PMC8989112

Silverberg JI, Guttman-Yassky E, Agner T, Bissonnette R, Cohen DE, Simpson E, et al. Chronic Hand Eczema Guidelines From an Expert Panel of the International Eczema Council. *Dermatitis*. 2021 Sep-Oct 01. 32 (5):319-326.

Kwok C, Money A, Carder M, Turner S, Agius R, Orton D, Wilkinson M. Cases of occupational dermatitis and asthma in beauticians that were reported to The Health and Occupation Research (THOR) network from 1996 to 2011. Clin Exp Dermatol. 2014 Jul;39(5):590-5. doi: 10.1111/ced.12367. PMID: 24934913.

Ade Dwi Lestari

35152-94570-1-PB

Ade Dwi Lestari

Document Details

Submission ID
trn:oid:::3618:128480315

Submission Date
Feb 17, 2026, 6:12 PM GMT+7

Download Date
Feb 17, 2026, 10:07 PM GMT+7

File Name
35152-94570-1-PB.pdf

File Size
652.1 KB

8 Pages

3,311 Words

18,117 Characters

18% Overall Similarity

The combined total of all matches, including overlapping sources, for each database.

Filtered from the Report

- Bibliography
- Small Matches (less than 8 words)

Match Groups

35 Not Cited or Quoted 14%
Matches with neither in-text citation nor quotation marks

12 Missing Quotations 4%
Matches that are still very similar to source material

0 Missing Citation 0%
Matches that have quotation marks, but no in-text citation

0 Cited and Quoted 0%
Matches with in-text citation present, but no quotation marks

Top Sources

14% Internet sources
10% Publications
10% Submitted works (Student Papers)

Match Groups

- **35** Not Cited or Quoted 14%
  Matches with neither in-text citation nor quotation marks
- **12** Missing Quotations 4%
  Matches that are still very similar to source material
- **0** Missing Citation 0%
  Matches that have quotation marks, but no in-text citation
- **0** Cited and Quoted 0%
  Matches with in-text citation present, but no quotation marks

Top Sources

14% Internet sources
10% Publications
10% Submitted works (Student Papers)

Top Sources

The sources with the highest number of matches within the submission. Overlapping sources will not be displayed.

1	Internet	pmc.ncbi.nlm.nih.gov 2%
2	Internet	ndl.ethernet.edu.et 1%
3	Internet	perpustakaan.poltekkes-malang.ac.id 1%
4	Internet	dn790008.ca.archive.org <1%
5	Internet	www.jbiomedkes.org <1%
6	Internet	ejournal.warunayama.org <1%
7	Internet	jurnal.globalhealthsciencegroup.com <1%
8	Internet	jurnal.untirta.ac.id <1%
9	Student papers	Queensland University of Technology on 2016-02-15 <1%
10	Student papers	South College on 2021-06-20 <1%

11	Student papers	
The University of Manchester on 2024-06-26		<1%
12	Student papers	
University of Kentucky on 2017-11-22		<1%
13	Internet	
jurnal.umj.ac.id		<1%
14	Student papers	
Excelsior University on 2023-11-27		<1%
15	Internet	
ejurnal.univbatam.ac.id		<1%
16	Student papers	
Curtin University of Technology on 2023-05-01		<1%
17	Internet	
www.jms-sba.com		<1%
18	Internet	
www.ncbi.nlm.nih.gov		<1%
19	Student papers	
Cardiff University on 2014-04-27		<1%
20	Internet	
pubmed.ncbi.nlm.nih.gov		<1%
21	Publication	
Dewi Laelatul Badriah, Cecep Heriana. "Personal Protective Equipment (PPE) and ...		<1%
22	Internet	
jddonline.com		<1%
23	Internet	
nailcrafting.com		<1%
24	Student papers	
Edith Cowan University on 2020-09-04		<1%

25 Student papers

Universitas Airlangga on 2019-07-22 <1%

26 Internet

www.bmj.com <1%

27 Student papers

California Northstate College of Pharmacy on 2023-05-06 <1%

28 Publication

Dinda Tiara Nurzahrah Dariswan, R. Azizah. "Risk Factors Associated With Contac... <1%

29 Publication

Heni Fa'riatul Aeni, Lilis Banowati, Evi Nur Avivah. "Determine The Factors Relate... <1%

30 Publication

Krister Aune Teigen, Anje Christina Höper, Solveig Føreland, Merete Åse Eggesbø,... <1%

31 Internet

academicworks.cuny.edu <1%

32 Internet

balidv.id <1%

33 Internet

international.appihi.or.id <1%

34 Internet

jurnal.uinsu.ac.id <1%

35 Internet

onlinelibrary.wiley.com <1%

36 Internet

pailnetwork.sunnybrook.ca <1%

International Journal of Occupational Medicine and Public Health
Prodi Kedokteran UNTIRTA

INTERNATIONAL JOURNAL OF OCCUPATIONAL MEDICINE AND PUBLIC HEALTH

Case Study of Occupational Irritant Contact Dermatitis in Nail Art Workers.

Nyoman Diktri Maharatih[1], Putri Windyaningsih[2], Salsabila Hasna Baringbing[3], Ade Dwi Lestari[4]
[1,2,3]Medical Education Study Program, Faculty of Medicine, Universitas Trisakti, Jakarta, Indonesia
[4]Department of Occupational Medicine, Faculty of Medicine, Universitas Trisakti, Jakarta, Indonesia

(adedwilestari@trisakti.ac.id, 628128021830)

ABSTRACT

Irritant Contact Dermatitis (ICD) is one of the most common occupational skin diseases among nail art workers due to frequent and direct contact with chemical irritants such as acetone, ethyl acetate, methacrylic acid, isopropyl alcohol, toluene, and quaternary ammonium compounds. This study aims to evaluate a case of ICD in a nail art worker and to explore its association with occupational exposure. The research was conducted using a case study method, applying the seven-step approach to diagnosing occupational diseases, which includes medical history, physical examination, and a review of relevant literature. A 28-year-old woman who had been working in a nail art salon for three years presented with painful sensations on the fingertips of both hands, accompanied by dryness, cracking skin, and mild itching—especially after contact with acetone-based nail polish remover. Based on clinical evaluation, occupational history, and supporting scientific references, the patient was diagnosed with ICD as an occupational disease. Repeated exposure to acetone was found to have a strong association with the onset of symptoms. The diagnosis also considered the duration of employment, length of exposure per session, infrequent use of personal protective equipment (PPE), and the absence of relevant non-occupational risk factors. This study concludes that the ICD in this patient is an occupational disease. Education and the consistent use of PPE are essential for preventing and controlling recurrence

Keywords : *Irritant Contact Dermatitis, Nail Art Workers, Occupational Diagnosis, Acetone*

https://doi.org/.

INTRODUCTION

The use of nail cosmetics dates back to around 5000 BC, when women in India, China, and Egypt adorned their nails with henna for decoration and ritual. Today, approximately 85–90 % of women worldwide use nail care products. The nail cosmetics industry, which includes nail polish, acrylics, silk wraps, gels, and extensions, is a global, multibillion-dollar market, with women as its primary consumers.[1]

This situation may affect various populations; however, workers such as nail art technicians who are frequently exposed to chemicals, water, and solvents in their daily activities face a higher risk of developing skin disorders. Prolonged exposure to substances such as acetone, alcohol, detergents, and tool or nail cleaners can cause repeated damage to the skin's protective layer (the stratum corneum), ultimately compromising skin integrity and triggering inflammation.[2]

Irritant contact dermatitis (ICD) not only causes physical symptoms such as dry, cracked, painful, and reddened skin, but also adversely impacts work productivity, psychological comfort, and overall quality of life. According to the World Health Organization (WHO), in 2020, ICD ranked as the fourth most prevalent occupational disease, accounting for 10 % of cases. Among work-related illnesses, 80 % were attributable to irritant contact dermatitis (Kim et al., 2020).[3]

Globally, the prevalence of contact dermatitis is estimated at approximately 300 million cases annually. In Indonesia, a study by Tjendera et al. reported a dermatitis prevalence of 6.78 %, of which 90 % were contact dermatitis (both irritant and allergic).[4] Among these, 92.5 % were work-related contact dermatitis, 5.4 % were due to skin infections, and 2.1 % were from other skin diseases. Another epidemiological study by Samuelet al. in Indonesia found that out of 389 contact dermatitis cases, 97 % were confirmed as contact dermatitis; of these, 66.3 % were irritant contact dermatitis and 33.7 % allergic contact dermatitis.[5]

Given the considerable risk faced by nail art workers from irritant exposures and the potential long-term consequences, a thorough understanding of the etiology, classification, risk factors, and management of ICD is essential. Therefore, this paper is prepared as a scientific and educational contribution to raise awareness and advance prvention efforts regarding irritant contact dermatitis among this workforce.

METHODS

A 28-year-old woman presented to the dermatology and venereology outpatient clinic at a general hospital in West Jakarta with complaints of pain at the fingertips of both hands for the past two weeks. The symptoms were accompanied by dryness, cracked skin, and mild itching. The patient had experienced similar symptoms previously, but they were mild and not bothersome. The patient had not

sought medical attention for these complaints prior to this visit. The patient works at a nail art salon and has been employed there for approximately three years. She reported that her fingertips became increasingly painful and dry after contact with acetone nail polish remover and when cleaning tools and the work area with 70% alcohol disinfectant. During work, the patient rarely uses gloves due to discomfort. She denied skin complaints on other parts of the body. The patient denied a history of allergies or previous skin diseases. She had not received any treatment for her current complaints. No family members reported similar symptoms. The patient has a history of dry skin and rarely uses moisturizers. The patient works at the nail art salon six days a week, from 10:00 AM to 8:00 PM, with a break from 12:00 PM to 1:00 PM. In a day, she handles approximately 15 clients, with session durations ranging from 20 to 120 minutes. During work, the patient uses nail polish, acetone, nail primer, nail glue, artificial nails, alcohol, and various nail art tools (scissors, files, and nail drills).

Figure 1 Patient's Dermatological Status.

RESULTS

Seven Steps for Diagnosing Occupational Disease

Step 1: Establishing the Clinical Diagnosis

Based on the patient's history and physical examination, the patient was diagnosed with irritant contact dermatitis on the distal phalanges of digits I–V of both hands (manus dextra et sinistra).

Step 2: Identifying Workplace Exposures

The patient has worked as a nail art technician for three years, with a work duration of 9 hours per day, including approximately 1 hour of rest, and works 6 days per week. No physical hazards were identified in the workplace. Chemical hazards include acetone (nail polish remover), nail polish (butyl acetate, dibutyl phthalate, formaldehyde), artificial nails and nail primer (methyl methacrylate, ethyl methacrylate), nail glue (toluene, ethyl acetate), and 70% alcohol (used for cleaning tools) (Lipman et al., 2021).[6] Potential biological hazards include bloodborne infections such as hepatitis B, hepatitis C, and HIV, as well as fungal infections (e.g., Trichophyton rubrum).[7] The patient serves approximately 15 clients daily, with a total work duration of 54 hours per week, which may lead to excessive workload, classified as a psychosocial hazard. Ergonomically, during treatment sessions (20–120 minutes), the patient maintains neck flexion >30° and back flexion >20° (awkward

posture). The patient also performs repetitive movements, including wrist flexion-extension and deviation >10 seconds and >30 times per minute. Additionally, the patient sits for prolonged periods without back support.

Step 3: Establishing the Relationship Between Workplace Exposures and the Disease

Several studies indicate a relationship between workplace exposures and the incidence of irritant contact dermatitis (ICD), particularly among nail art workers. A book chapter titled Occupational Dermatitis in Nail Salon Workers states that nail technicians' hands are at risk of irritation due to wet work involving water contact. Certain chemicals used, such as nail polish removers (acetone, butyl acetate, ethyl acetate, and methyl ethyl ketone) and cuticle removers (sodium hydroxide and potassium hydroxide), are known to have significant irritative potential (Horev, 2018).[8]

A narrative review article showed that acetone and ethyl acetate in nail polish removers can cause irritant contact dermatitis (Lipman et al., 2021). Additionally, a cross-sectional study of 159 nail technicians from 120 salons in South Korea found that 157 workers with 3.5 years of exposure to gel/nail products experienced persistent inflammation and skin complaints approaching the category of cumulative ICD (Sung-Ae Park et al., 2014).[9]

A cross-sectional study of 49 nail technicians in Tehran found that 37 female technicians working in salons with minimal positive ventilation were exposed to significant amounts of fine particles and volatile chemical compounds, increasing the risk of skin and respiratory irritation (Ebrahimi et al., 2023).[10] A study in Vietnam involving 21 nail technicians with 42 measurements found that volatile organic compounds (e.g., acetone) in nail salons caused occupational symptoms, particularly skin and respiratory irritation, among female workers (Nguyen et al., 2019).[11]

Step 4: Determining the Adequacy of Exposure Levels to Cause the Disease

Table 1. Adequacy of Exposure Levels to Cause the Disease

No	Patient	Evidence-Based	Conclusion
1.	The patient works as a nail art technician using acetone.	Acetone was detected in 97.6% of air samples from salons, with reported symptoms including skin and nasal irritation, significantly higher than in the control group (Nguyen et al., 2020).[11]	Acetone is present in the patient's workplace.
2.	The patient's symptoms worsen after contact with acetone nail polish remover.	Acetone in nail polish remover can cause ICD and allergic contact dermatitis (ACD) (Lipman et al., 2021).[6]	Acetone causes ICD.

3.	The patient has worked for 3 years.	157 workers with 3.5 years of long-term exposure to nail and gel products experienced inflammation and skin complaints consistent with cumulative ICD, though less prevalent than allergies (Park et al., 2014).[9]	The patient's work duration supports the occurrence of ICD.
4.	The patient works 10 hours/day with a 1-hour break.	Nail technicians exposed to chemicals such as acetone, toluene, MMA, and acrylates, and working >10 hours, are at higher risk of skin and respiratory irritation (Park et al., 2014).[9]	The patient's work duration supports the occurrence of ICD.
5.	The patient handles 15 clients with session durations of 20–120 minutes.	All 49 nail salon technicians serving clients for >1 hour per session without adequate ventilation are at risk of cumulative ICD (Ebrahimi et al., 2023).[10]	Long session durations per client support the occurrence of ICD.

Step 5: Identifying Individual Risk Factors

The patient is a 28-year-old female. The patient has no history of skin diseases, allergies, or atopy. No family history of atopy was reported. The patient has dry skin and rarely uses moisturizers.

Step 6: Identifying Non-Occupational Factors That May Cause the Disease

The patient has no side jobs or habits that could cause irritation. The patient washes dishes once daily and laundry twice weekly using the same brand of soap and detergent for over 5 years, with no prior symptoms.

Step 7: Establishing the Occupational Disease Diagnosis

6 Occupational Irritant Contact Dermatitis

DISCUSSION

18 The diagnosis of irritant contact dermatitis (ICD) was established based on the patient's history and physical examination. The patient's complaints included pain at the fingertips of both hands, accompanied by dryness and cracked skin, which align with the pathophysiology of ICD, characterized by cellular changes affecting the stratum corneum due to exposure to hazardous agents considered toxic to the skin (Lurati et al., 2015).[12] Physical examination revealed dry skin with erythema and scaling on the distal phalanges of digits I–V of both hands (manus dextra et sinistra). This supports the diagnosis of ICD, which most commonly affects the hands (61.9%), with classic symptoms including dry skin,

erythema, scaling, and, over time, thickening of the skin (hyperkeratosis) with lichenification that is diffuse (Patel et al., 2022).[13]

During work, the patient uses various chemicals, including nail polish, acetone, nail primer, nail glue, artificial nails, alcohol, and nail art tools (scissors, files, and nail drills). A study by Nguyen HL et al. detected acetone in 97.6% of air samples from salons, with reported symptoms including skin and nasal irritation, significantly higher than in the control group.[11] This supports the presence of acetone in the patient's nail art salon workplace.

The patient reported that her fingertips became increasingly painful and dry after contact with acetone-based nail polish remover. Research by Lipman Z et al. indicates that acetone in nail polish removers can cause both ICD and allergic contact dermatitis (ACD). However, acetone is less commonly associated with ACD compared to ICD (Silverberg et al., 2021).[14]

The patient has worked as a nail art technician for approximately three years. She previously experienced similar symptoms, but they were mild and not bothersome. Studies by White et al. and Pacheco et al. found that 157 workers with 3.5 years of long-term exposure to nail and gel products experienced inflammation and skin complaints consistent with cumulative ICD, although its prevalence is lower than that of allergies. The patient's three-year work history aligns with these findings, pointing toward cumulative ICD (Park et al., 2014).[9]

The patient works at the nail art salon six days a week, from 10:00 AM to 8:00 PM, with a one-hour break from 12:00 PM to 1:00 PM. A study by Park SA et al. found that nail technicians exposed to chemicals such as acetone, toluene, MMA, and acrylates, and working more than 10 hours per day, are at higher risk of skin and respiratory irritation. This indicates that the patient's work duration supports the occurrence of ICD (Park et al., 2014).[9]

The patient handles approximately 15 clients daily, with session durations ranging from 20 to 120 minutes. A study by Ebrahimi V et al. found that all 49 nail salon technicians serving clients for more than one hour per session without adequate ventilation are at risk of cumulative ICD.[10] Thus, it can be concluded that the long duration of client sessions supports the occurrence of ICD (Ebrahimi et al., 2023).[10]

From an occupational perspective, ICD is commonly experienced by nail salon workers due to exposure to chemicals used in nail care, such as nail polish, nail polish remover, gel, nail glue, primer, and disinfectants. Chemicals frequently causing irritation include acetone, ethyl acetate, methacrylic acid, isopropyl alcohol, toluene, and quaternary ammonium compounds (Lipman et al., 2021).[6] According to Horev et al., in a book subchapter titled Occupational Dermatitis in Nail Salon Workers, nail technicians' hands are at risk of irritation due to wet work involving water contact.[8] Certain chemicals, such as nail polish removers (acetone, butyl acetate, ethyl acetate, and methyl ethyl ketone) and cuticle removers (sodium hydroxide and potassium hydroxide), have significant irritative potential. A study

based on data from The Health and Occupation Reporting network in the UK examined contact dermatitis cases among beauty workers, including nail technicians, between 1996 and 2011. Over this 15-year period, 257 cases of occupational contact dermatitis were recorded (Kwok et al., 2014).[15]

The patient is a 28-year-old female with no history of skin diseases, allergies, or atopy. She also reported having dry skin and rarely using moisturizers. A study by Pacheco et al. found that women are more likely to experience occupational contact dermatitis than men (58% vs. 42%). Additionally, dry skin is an endogenous factor that can increase the risk of ICD among workers (Lurati et al., 2015).[14] The patient has no side jobs or habits that could cause irritation. She washes dishes once daily and laundry twice weekly using the same brand of soap and detergent for over five years, with no prior symptoms. Based on the seven-step diagnosis of occupational disease, the patient can be diagnosed with occupational irritant contact dermatitis.

Control measures that can be implemented include substitution, administrative controls, and the use of personal protective equipment (PPE). Substitution involves replacing acetone-based nail polish removers with products that do not contain acetone, such as those with ethyl acetate as the primary ingredient. Administrative controls can include training on proper skin care, such as regular hand washing and the use of non-irritating hand creams, as well as PPE usage. The use of PPE, such as nitrile gloves (typically blue or purple are suitable when handling acetone.

CONCLUSION

The diagnosis of irritant contact dermatitis on the distal phalanges of digits I–V of both hands (manus dextra et sinistra) was established based on the patient's history, physical examination, and other clinical data. Following the application of the seven-step occupational disease diagnosis, the patient was diagnosed with occupational irritant contact dermatitis. Management of the patient's irritant contact dermatitis includes both pharmacological and non-pharmacological approaches. The prognosis ad sanationem is dubia ad bonam, with the possibility of recurrence if the patient does not avoid contact with the irritant acetone. The occupational prognosis is also dubia ad bonam, as the patient can continue working as a nail art technician with appropriate risk control measures. This highlights the importance of preventive measures and improvements in workplace practices to reduce the risk of irritant contact dermatitis among similar workers.

REFERENCES

Reinecke JK, Hinshaw MA. Nail health in women. Int J Womens Dermatol. 2020 Feb 5;6(2):73-79. doi: 10.1016/j.ijwd.2020.01.006. PMID: 32258335; PMCID: PMC7105659.

Novak-Bilic G, Vucic M, Japundzic I, Mestrovic-Stefekov J, Stanic-Duktaj S, Lugovic-Mihic L. Irritant and allergic contact dermatitis - skin lesion characteristics. Acta Clin Croat. 2018;57(4):713–720. doi: 10.20471/acc.2018.57.04.13.

Kim T, Tam I. PRESENTATIONS A Systematic Review of Photopatch Test Results from 2020. Available from: www.liebertpub.com

Tjendera M, Astiah AA, Khatimah MH. KEJADIAN DERMATITIS KONTAK AKIBAT KERJA DARI PROSES PRODUKSI PLYWOOD. Vol. 15. 2025.

Samuel, Zairina N, Ikhsan R, Ramadhani S. Karakteristik Kejadian Dermatitis Kontak Iritan pada Karyawan Pencucian Mobil di Kecamatan Medan Selayang. *Scripta Score: Scientific Medical Journal*. 2022;4(2). doi:10.32734/scripta.v5i1.10545

Lipman ZM, Tosti A. Contact dermatitis in nail cosmetics. Allergies. 2021;1(4):225–232. doi:10.3390/allergies1040021

Pacheco KA. Occupational dermatitis: How to identify the exposures, make the diagnosis, and treat the disease. Ann Allergy Asthma Immunol. 2018 Jun;120(6):583-591. doi: 10.1016/j.anai.2018.04.013. Epub 2018 Apr 23. PMID: 29698693

Horev, L. (2018). Occupational Dermatitis in Nail Salon Workers. In: Tur, E., Maibach, H. (eds) Gender and Dermatology. Springer, Cham. https://doi.org/10.1007/978-3-319-72156-9_20

Park SA, Gwak S, Choi S. Assessment of occupational symptoms and chemical exposures for nail salon technicians in Daegu City, Korea. J Prev Med Public Health. 2014 May;47(3):169-76. doi: 10.3961/jpmph.2014.47.3.169. Epub 2014 May 30. PMID: 24921020; PMCID: PMC4050214.

Ebrahimi V, Yarahmadi R, Salehi M, Ashtarinezhad A. Assessing occupational exposure of airborne PMs and TVOCs in the nail salons in Tehran city, Iran. Heliyon. 2023 Dec 1;9(12):e23088. doi: 10.1016/j.heliyon.2023.e23088. PMID: 38144351; PMCID: PMC10746482.

Nguyen, M. K., Kim, H. Y., Kim, Y. M., & Lim, Y. W. (2020). Occupational symptoms due to exposure to volatile organic compounds among Vietnamese female nail salon workers in Danang City. *Annals of Occupational and Environmental Medicine, 32*(e14).doi:10.35371/aoem.2020.32.e14

Lurati AR. Occupational Risk Assessment and Irritant Contact Dermatitis. Workplace Health & Safety. 2015;63(2):81-87. doi:10.1177/2165079914565351

Patel K, Nixon R. Irritant Contact Dermatitis - a Review. Curr Dermatol Rep. 2022;11(2):41-51. doi: 10.1007/s13671-021-00351-4. Epub 2022 Apr 7. PMID: 35433115; PMCID: PMC8989112

Silverberg JI, Guttman-Yassky E, Agner T, Bissonnette R, Cohen DE, Simpson E, et al. Chronic Hand Eczema Guidelines From an Expert Panel of the International Eczema Council. *Dermatitis*. 2021 Sep-Oct 01. 32 (5):319-326.

Kwok C, Money A, Carder M, Turner S, Agius R, Orton D, Wilkinson M. Cases of occupational dermatitis and asthma in beauticians that were reported to The Health and Occupation Research (THOR) network from 1996 to 2011. Clin Exp Dermatol. 2014 Jul;39(5):590-5. doi: 10.1111/ced.12367. PMID: 24934913.