

# A Brief Report of Thirteen Cases of Poppers Dermatitis

Vincent A. Pecora BA, Sara Abdel Azim BS, Erika McCormick BS, Adam Friedman MD FAAD

George Washington University Medical Faculty Associates, Department of Dermatology,  
George Washington University School of Medicine and Health Sciences, Washington, DC

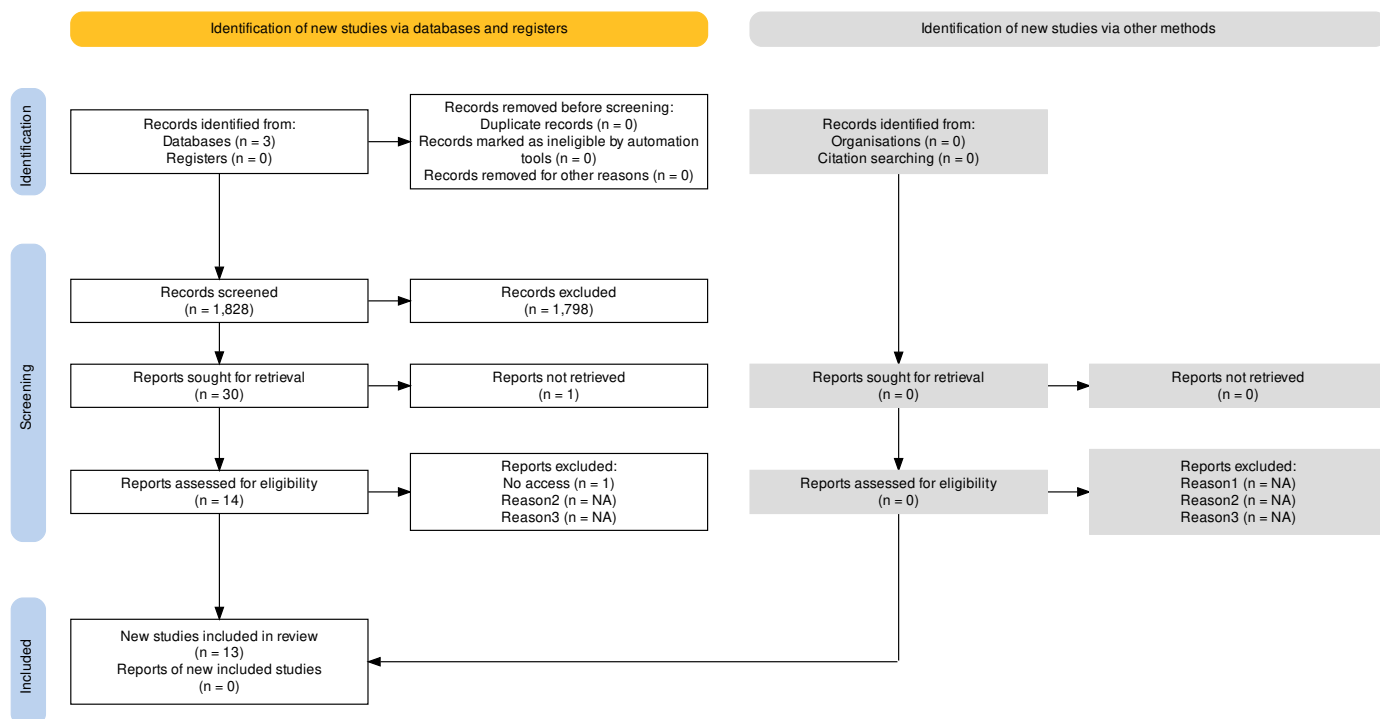
## INTRODUCTION

Poppers are psychoactive inhalants commonly employed in the gay male community for their ability to relax anal sphincter muscles.<sup>1</sup> These drugs induce numerous adverse effects including dizziness, retinal degeneration, headache, maculopathies, fatal methemoglobinemia, and contact dermatitis.<sup>2,3</sup> Poppers are formulated with volatile alkyl nitrite compounds that nitrate aromatic amino acids in the skin through a xanthoprotein reaction, causing irritant contact dermatitis (ICD).<sup>4</sup> Exposure to poppers after previous sensitization has also been shown to induce allergic contact dermatitis (ACD).<sup>4</sup> While there are scattered reports on their role in contact dermatitis, there is limited information pertaining to clinical presentation and management strategies, resulting in potential gaps in care. Given these limitations, the authors sought to collate and review the 13 published case reports on poppers dermatitis to better prepare dermatologists to identify and manage this emerging source of ACD and ICD.

## MATERIALS AND METHODS

A comprehensive literature search was conducted on PubMed, Google Scholar, and Scopus to identify all published cases of poppers contact dermatitis. Search terms included 'dermatitis' and 'poppers' or 'alkyl nitrites' or 'amyl nitrites' or 'isobutyl nitrites' or 'propyl nitrites'. Date, geographical, and language restrictions were not employed. Full text of 2 case reports could not be accessed and were excluded. Factors chosen for extraction were age, gender, type of alkyl nitrite, men who have sex with men (MSM) association, time to reaction onset, morphological characteristics, diagnosis of contact dermatitis (allergic, irritant, both, or neither), patch testing completion, lesion location, and treatments. Independent samples t-tests were performed using SPSS Version 26. A PRISMA flow diagram was constructed to summarize the process of data extraction (Figure 1).

**FIGURE 1.** PRISMA Flow Diagram summarizing data extraction.



**RESULTS**

A total of 13 reports detailing 14 patient cases of poppers dermatitis were collected and analyzed (Table 1).

**Risk Factors**

The average age of patients diagnosed with poppers contact dermatitis was 39 years old and ranged from 23 to 56. Eighty-

five percent (12/14) of patients identified as male and 15% as female (3/14). One hundred percent of patients reporting sexual orientation identified as MSM (7/7). Most cases of poppers dermatitis did not report the specific type of alkyl nitrite in the poppers solution (57.14%). Of the cases that did report the type of alkyl nitrite (42.86%), amyl nitrite was the offending agent in 80% and isobutyl nitrite was identified in one patient case.

**TABLE 1.****Summary of Risk Factors, Clinical Presentation, and Management Strategies for Poppers Dermatitis.**

Study	Risk Factors				Clinical Presentation						Management
	Age	Gender	MSM	Type of Nitrite	Onset	Suspected Spillage Event	Location	Type of Dermatitis (Allergic, Irritant, Both Unspecified, Other)	Patch Testing Done?	Morphology	Treatment
Darrigade et al. (2020) <sup>2</sup>	42	Male	Un-specified	Isobutyl nitrite	Few hours	No	Perinasal * Lips	Allergic	Yes (Positive 2+ reaction to 2% aqueous solution of poppers)	Ecematous, edematous, crusted dermatitis	Topical Pimecrolimus
Schauber et al. (2012) <sup>3</sup>	42	Male	Yes	Unspecified alkyl nitrite	Overnight (< 1 day)	Yes	Thigh (Right)	Both Allergic and Irritant	No	Vesicular, erythematous plaque	Unspecified
Schauber et al. (2012) <sup>3</sup>	56	Male	Yes	Unspecified alkyl nitrite	"Few" weeks	Yes	Ankle	Both Allergic and Irritant	No	Ulcerated lesion with erythematous margins	Unspecified
Latini et al. (2017) <sup>4</sup>	Un-specified	Male	Yes	Unspecified alkyl nitrite	2 months	Yes	Penis	Irritant	Yes (Negative for alkyl nitrite preparation in 2% water at 48/72 hours)	Oval ulcer > 3 cm with a sanious reddish bottom	Previous, ineffective treatments: antibiotics, steroids, antimycotic drugs
Leducq et al. (2017) <sup>5</sup>	Un-specified	Male	Un-specified	Amyl nitrite	Unspecified	No	Perinasal *	Unspecified Contact Dermatitis	No	Contact dermatitis with impetiginization	Unspecified
Kluger et al. (2021) <sup>6</sup>	23	Female	Un-specified	Amyl nitrite	5 days	Yes	Breast (Right)	Irritant	No	Erythematous patch rapidly progressing to ulceration	Oral antibiotics (Amoxicillin and Clavulanic acid) and chlorhexidine
Moret et al. (2020) <sup>7</sup>	52	Male	Yes	Unspecified alkyl nitrite	1 day	Yes	Thigh (Right) Scrotum	Irritant	No	Erythematous lesion with red-brown borders	Wound disinfection and dry gauze
Romaguera, C. and Grimalt, F. (1982) <sup>8</sup>	31	Male	Yes	Amyl nitrite	18 months	No	Perinasal * Perioral **	Unspecified Contact Dermatitis	No	Pruritic, erythematous, eczematous lesions	Cease popper use
Bos et al. (1985) <sup>9</sup>	37	Male	Yes	Amyl nitrite	3 years of relapsing pruritic dermatitis	No	Perinasal * Perioral *** Penis Scrotum	Allergic	Yes (Positive 2+ for amyl nitrite 2% in liquid paraffin)	Erythematous, vesicular	Unspecified
Foroozan et al. (2009) <sup>10</sup>	25	Female	Un-specified	Unspecified alkyl nitrite	Overnight (< 1 day)	No	Perinasal *	Irritant	No	Oozing, yellow impetiginized crusts	Misting and emollients
Navarrete-Dechent, C. and Uribe, P. (2019) <sup>11</sup>	44	Male	Un-specified	Unspecified alkyl nitrite	Overnight (< 1 day)	No	Perinasal *	Irritant	No	Pruriginous perinasal rash with clear vesicles and symmetrical crusting	Topical hydrocortisone and fusidic acid cream
Vine et al. (2013) <sup>12</sup>	37	Male	Yes	Amyl nitrite	4 weeks	No	Perinasal * Nasal *** Perioral ***	Other: Chemical Contact Leukoderma	No	Painful, dry, erythematous lesions followed by perioral skin depigmentation	Biweekly 308-nm excimer laser treatment during 78 sessions
Magdaleno-Tapia et al. (2019) <sup>13</sup>	39	Male	Un-specified	Unspecified alkyl nitrite	Overnight (< 1 day)	No	Perinasal *	Unspecified Contact Dermatitis	No	Symmetrical yellow impetiginized crusts	Unspecified
Estenaga et al. (2021) <sup>14</sup>	37	Male	Un-specified	Unspecified alkyl nitrite	3 days	No	Perinasal *	Unspecified Contact Dermatitis	No	Erythematous plaques covered with yellow impetiginized crusts	Emollients

This document contains proprietary information, images and marks of Journal of Drugs in Dermatology (JDD).

No reproduction or use of any portion of the contents of these materials may be made without the express written consent of JDD. If you feel you have obtained this copy illegally, please contact JDD immediately at support@jddonline.com

**Clinical Presentation**

Dermatitis most commonly manifested within 1 day of exposure to poppers (35.7%). Three cases presented within 1 to 7 days (21.4%), three within 1 week to 1 month (21.4%), and 2 cases presented over 1 month after exposure (14.3%). The perinasal (64.3%) and perioral regions (21.4%) were the most frequently affected anatomical locations. Less commonly affected areas included the scrotum (14.3%), penis (14.3%), thigh (14.3%), ankle (7.1%), breast (7.1%), lip (7.1%), and nasal region (7.1). The most common morphological descriptions of these lesions were erythematous (57.1%), crusted (35.7%), vesicular (28.6%), and impetiginized (28.6%). Other morphological characteristics included ulcerated (21.4%), eczematous (14.3%), pruritic (14.3%), and vitiliginous (7.1%). Patch testing was employed in 3 cases (21.4%) to determine if the cutaneous reactions were allergic or irritant in nature. Of the patients who were patch-tested, 66.6% were diagnosed with ACD and 33.3% with an irritant reaction. The remaining 11 cases were diagnosed solely based on clinical presentation (78.6%). The most common diagnosis of contact dermatitis was ICD (35.7%); less frequent diagnoses included ACD (14.3%), both ACD and ICD (14.3%), unspecified forms of contact dermatitis (28.6%), or neither ACD nor ICD (7.1%). The case classified as neither ACD nor ICD was diagnosed as vitiliginous chemical leukoderma, a form of contact dermatitis with subsequent skin depigmentation. A significant number of cases diagnosed as ICD were attributed to direct contact with poppers through accidental or unintentional spillage onto the skin ( $P < 0.001$ ). Sixty percent of the patients diagnosed with ICD were attributed to a suspected poppers spillage event or unintentional contact with poppers.

**Management**

Treatments for poppers dermatitis included topical steroids (14.3%), emollients (14.3%), antibiotics (7.1%), laser therapy (7.1%), complete termination of poppers use (7.1%), and wound disinfection and gauze application (7.1%). Six cases did not specify the treatments employed (43%).

**DISCUSSION**

The demographic most commonly affected by poppers dermatitis includes men near the age of 40 who identify as MSM and use poppers containing an unspecified form of alkyl nitrite. The most common clinical presentations of poppers dermatitis include erythematous, crusted, impetiginized, and vesicular lesions in the perinasal and perioral regions. However, lesions also appeared in distant anatomical sites such as the thigh, ankles, penis, and scrotum due to poppers spillage events; these spillage-induced lesions were more likely to be diagnosed as ICD. Poppers induce numerous forms of contact dermatitis including allergic, irritant, both allergic and irritant, or vitiliginous chemical leukoderma.

Poppers use is disproportionately higher in the MSM community as they are frequently distributed at “chemosex”

parties and used to relax anal sphincter muscles during sexual intercourse.<sup>1</sup> Thirty-five point six percent (35.6%) of gay men have been shown to use poppers in their lifetime while only 3.7% of heterosexual males have used poppers.<sup>15</sup> Due to the societal stigmatization of poppers as “party drugs” used by gay men,<sup>1,15</sup> MSM patients are less likely to self-disclose poppers use.<sup>12</sup> Thus, it is important for dermatologists to inquire about poppers exposure in patients who identify as MSM and present with crusted, erythematous, impetiginized lesions with an unknown etiology. The impetiginized nature of these lesions warrants thoughtful application of antibiotics. In order to ensure that impetiginized lesions do not evolve into other soft and skin tissue infections (SSTIs), providers should incorporate bacterial cultures and antibiotics into their treatment regimens when appropriate. While antibiotics are currently not recommended as first-line therapy for poppers dermatitis, providers should be aware of what appears to be an increased risk for concurrent skin and soft tissue infections when encountering cases of poppers dermatitis.

Although lesions are most likely to appear in the perinasal or perioral region due to direct inhalation, dermatologists should also be aware that spillage events in other sites account for a significant amount of poppers dermatitis cases and therefore inquire about unintentional exposure events. Patch testing can be used to distinguish ICD from ACD as these forms of contact dermatitis present with different pathophysiological mechanisms, clinical morphologies, and time of onset. If providers are interested in conducting patch testing, it is important to note that alkyl nitrites do not appear on the standard NACDG panel of allergens, meaning that possible cases of poppers dermatitis can be overlooked during conventional patch testing. Thus, dermatologists should conduct patch testing with aqueous 2% alkyl nitrite preparations if poppers dermatitis is suspected.<sup>2,4,9</sup>

Prompt treatment of poppers dermatitis is crucial as untreated lesions can result in chronic inflammation and increased vulnerability to infections. Although allergen avoidance is the most effective strategy to prevent contact dermatitis,<sup>1</sup> it may not be feasible due to the widespread availability and use of poppers in the MSM community. In these circumstances, dermatologists should provide management strategies for symptomatic relief which include topical steroids and emollients.

**CONCLUSION**

Poppers dermatitis is a unique dermatological condition in the MSM community which presents with complex risk factors, clinical presentations, and management strategies. The data summarized here can help dermatologists identify, diagnose, and treat suspected cases of poppers dermatitis. In order to acquire a comprehensive sexual history, dermatologists should inquire about unintentional exposure to poppers, particularly possible spillage events. Further work can be done to destigmatize

poppers' use and elucidate the various clinical manifestations and pathophysiology of poppers dermatitis. Collectively, this work can expand the scope of LGBTQ+ dermatology, a frequently underreported topic in the field of medicine.

## DISCLOSURES

The authors have no conflicts of interest to declare.

## REFERENCES

1. Romanelli F, Smith KM, Thornton AC, et al. Poppers: epidemiology and clinical management of inhaled nitrite abuse. *Pharmacotherapy*. 2004;24(1):69-78.
2. Darrigade AS, Dendooven E, Mangodt E, et al. Airborne ACD by proxy caused by 'poppers'. *Contact Dermatitis*. 2021;84(3):212-214.
3. Schaubert J, Herzinger T. 'Poppers' dermatitis. *Clin Exp Dermatol*. 2012;37(5):587-588.
4. Latini A, Lora V, Zaccarelli M, et al. Unusual presentation of poppers dermatitis. *JAMA Dermatol*. 2017;153(2):233-234.
5. Leducq S, Samimi M. Perinasal dermatitis to amyl nitrites ('poppers' dermatitis). *J Cutan Med Surg*. 2022;26(5):540.
6. Kluger N, Frances P. Unilateral contact dermatitis of the breast caused by amyl nitrites (poppers). *Ann Dermatol Venereol*. 2021;148(2):139.
7. Moret F, Lindner G, Woitok BK. The untimely popping phial: poppers as an unusual cause of skin corrosion of the thigh. *Case Rep Emerg Med*. 2020;2020:2058624.
8. Romaguera C, Grimalt F. Contact dermatitis from nasal sprays and amyl nitrite. *Contact Dermatitis*. 1982;8:266-267.
9. Bos JD, Jansen FC, Timmer JG. ACD to amyl nitrite ('poppers'). *Contact Dermatitis*. 1985;12(2):109.
10. Foroozan M, Studer M, Spingard B, et al. Dermatoses faciales aux poppers [Facial dermatitis due to inhalation of poppers]. *Ann Dermatol Venereol*. 2009;136(3):298-299.
11. Navarrete-Dechent C, Uribe P. Symmetrical pruriginous nasal rash. *Cutis*. 2019;104(3):30-31.
12. Vine K, Meulener M, Shieh S, et al. Vitiliginous lesions induced by amyl nitrite exposure. *Cutis*. 2013;91(3):129-136.
13. Magdaleno-Tapia J, Valenzuela-Oñate C, Giacaman von der Weth MM, et al. Image gallery: painful skin rash on the face after a 'chemsex' party. *Br J Dermatol*. 2019;180(2):33.
14. Estenaga Á, Rodríguez-Garijo N, Tomás-Velázquez A, et al. Popper's dermatitis: an unusual diagnostic challenge. *J Dtsch Dermatol Ges*. 2021;19(4):603-604.
15. Le A, Yockey A, Palamar JJ. Use of "poppers" among adults in the United States, 2015-2017. *J Psychoactive Drugs*. 2020;52(5):433-439.

## AUTHOR CORRESPONDENCE

**Adam Friedman MD FAAD**

E-mail:..... ajfriedman@mfa.gwu.edu