

Evaluation of Patch Test Findings in Patients With Anogenital Dermatitis

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IMPORTANCE Contact dermatitis in the anogenital area is associated with sleep disturbance and dyspareunia and can profoundly affect quality of life. The literature on anogenital contact dermatitis and culprit allergens is limited. The last large-scale study on common, relevant allergens in patients with anogenital dermatitis was published in 2008.

OBJECTIVES To characterize patients with anogenital dermatitis referred for patch testing by the North American Contact Dermatitis Group, to identify common allergens, and to explore sex-associated differences between anogenital dermatitis and allergens.

DESIGN, SETTING, AND PARTICIPANTS A retrospective, cross-sectional analysis was conducted of the North American Contact Dermatitis Group database among 28 481 patients who underwent patch testing from January 1, 2005, to December 31, 2016, at outpatient referral clinics in the United States and Canada.

EXPOSURE Patch testing for allergens.

MAIN OUTCOMES AND MEASURES Currently relevant allergic patch test reactions in patients with anogenital dermatitis.

RESULTS Of 28 481 patients tested during the study period, 832 patients (336 men and 496 women; mean [SD] age, 50.1 [26.5] years) had anogenital involvement and 449 patients (177 men and 272 women; mean [SD] age, 49.6 [17.4] years) had anogenital dermatitis only. Compared with those without anogenital involvement, there were significantly more male patients in the group with anogenital dermatitis (177 [39.4%] vs 8857 of 27 649 [32.0%]; relative risk, 1.37; 95% CI, 1.14-1.66; $P < .001$). In the group with anogenital involvement, female patients were significantly less likely than male patients to have allergic contact dermatitis as a final diagnosis (130 [47.8%] vs 107 [60.5%]; relative risk, 0.78; 95% CI, 0.64-0.94; $P = .01$), whereas a final diagnosis of other dermatoses (eg, lichen planus, lichen sclerosus, or lichen simplex chronicus) was more frequent for female patients than for male patients (67 [24.6%] vs 28 [15.8%]; relative risk, 1.54; 95% CI, 1.02-2.31; $P = .03$). Of the 449 patients in the group with anogenital involvement only, 227 (50.6%) had 1 or more relevant reaction with patch testing. Allergens that were statistically significantly more common in patients with anogenital involvement compared with those without anogenital involvement included medicaments such as dibucaine (10 of 250 patients tested [4.0%] vs 32 of 17 494 patients tested [0.2%]; relative risk, 22.74; 95% CI, 11.05-46.78; $P < .001$) and preservatives such as methylchloroisothiazolinone and methylisothiazolinone (30 of 449 patients tested [6.7%] vs 1143 of 27 599 patients tested [4.1%]; relative risk, 1.61; 95% CI, 1.14-2.41; $P = .008$). A total of 152 patients met the definition for anogenital allergic contact dermatitis, which is defined as anogenital involvement only, allergic contact dermatitis as the only diagnosis, and 1 or more positive reaction of current clinical relevance.

CONCLUSIONS AND RELEVANCE For patients with anogenital involvement only who were referred for patch testing, male patients were more likely to have allergic contact dermatitis, whereas female patients were more likely to have other dermatoses. Common allergens or sources consisted of those likely to contact the anogenital area. For individuals with anogenital involvement suspected of having allergic contact dermatitis, reactions to preservatives, fragrances, medications (particularly topical anesthetics), and topical corticosteroids should be tested.

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Contact dermatitis in the anogenital area is associated with sleep disturbance and dyspareunia and can profoundly affect quality of life. It is likely that irritant contact dermatitis and/or other anogenital skin conditions precede the development of allergic contact dermatitis (ACD).¹ A total of 13% to 63% of patients with anal and/or genital dermatitis who undergo patch testing have a reaction to 1 or more allergens.²⁻⁹ A prior analysis of North American Contact Dermatitis Group (NACDG) patients with anogenital dermatitis spanned from 1994 to 2004.⁹ Since that study, several studies have identified allergens in patients with anal and/or genital dermatitis (Table 1),²⁻⁹ but those studies are limited by small sample size or lack of information on the clinical relevance of the allergens. Because contact allergen trends change with consumer and industrial practices, we sought to update the previous NACDG study with recent data.

Methods

The methods used in this study were similar to those in the previous NACDG study.⁹ In brief, 28 481 patients underwent patch testing from January 1, 2005, to December 31, 2016, for the NACDG screening series (65-70 allergens); data were collected using standard NACDG methods.⁹ Several subgroups were identified a priori: (1) patients referred for patch testing with anogenital involvement only (AG), (2) patients referred for patch testing without anogenital involvement (noAG), (3) patients with anogenital ACD (AG-ACD: AG plus ACD as the only diagnosis and ≥ 1 currently relevant positive reaction), and (4) patients with AG plus dermatitis at 1 or more other body site (AG+). This cross-sectional analysis of deidentified data was approved by the Minneapolis Veterans Affairs Medical Center Subcommittee on Human Studies, waiving patient informed consent. Statistical analyses were performed using SAS, version 9.2 (SAS Institute Inc) with 2-sided χ^2 tests; $P < .05$ was considered statistically significant.

Results

Patients With or Without Anogenital Involvement

Of 28 481 patients tested during the study period, 832 patients (336 men and 496 women; mean [SD] age, 50.1 [26.5] years) had anogenital involvement and 449 patients (177 men and 272 women; mean [SD] age, 49.6 [17.4] years) had anogenital dermatitis only. A comparison of the AG ($n = 449$) and noAG ($n = 27\,649$) groups found that male patients were significantly more likely than female patients to present with anogenital involvement (177 male patients [39.4%] in the AG group vs 8857 male patients [32.0%] in the noAG group; relative risk, 1.37; 95% CI, 1.14-1.66; $P < .001$). Individuals in the AG group were significantly less likely than individuals in the noAG group to have an atopic predisposition or an occupationally related skin problem (eTable in the Supplement).

Key Points

Question For patients with anogenital dermatitis referred for patch testing, what are common relevant allergens?

Findings In this analysis of cross-sectional data from the North American Contact Dermatitis Group from 2005 to 2016, most individuals with anogenital involvement only referred for patch testing had relevant allergic reactions. Compared with individuals without anogenital involvement, those with anogenital dermatitis had significantly more reactions to balsam of Peru, methylchloroisothiazolinone and methylisothiazolinone, dibucaine, benzocaine, triamcinolone acetonide, budesonide, ethylenediamine dihydrochloride, lidocaine, and desoximetasone.

Meaning It is important that individuals with anogenital skin disease undergo patch testing, especially for reactions to preservatives, fragrances, topical anesthetics, and topical corticosteroids.

Patients With Anogenital Involvement Only

For the 449 patients in the AG group, the most common final diagnoses included ACD (237 [52.8%]), other dermatitis (114 [25.4%]), other dermatoses (95 [21.2%]), and irritant contact dermatitis (66 [14.7%]) (eTable in the Supplement). Stratifying by sex, we found that female patients were significantly more likely than male patients to have a final diagnosis of other dermatoses (67 of 272 female patients [24.6%] vs 28 of 177 male patients [15.8%]; relative risk, 1.54; 95% CI, 1.02-2.31; $P = .03$) and were significantly less likely than male patients to have a final diagnosis of ACD (130 of 272 female patients [47.8%] vs 107 of 177 male patients [60.5%]; relative risk, 0.78; 95% CI, 0.64-0.94; $P = .01$). There were no statistically significant associations of sex with a final diagnosis of other dermatitis or irritant contact dermatitis.

Of the 449 individuals in the AG group, 227 (50.6%) had 1 or more positive, currently relevant allergic reactions (Table 2). Allergens that were statistically significantly more common in the AG group compared with those in the noAG group included balsam of Peru, methylchloroisothiazolinone (MI)-methylisothiazolinone (MCI), dibucaine, benzocaine, triamcinolone acetonide, budesonide, ethylenediamine dihydrochloride, lidocaine, and desoximetasone. Dibucaine and triamcinolone acetonide had the highest relative effect size (dibucaine, 22.74 [95% CI, 11.05-46.78]; triamcinolone acetonide, 7.87 [95% CI, 1.86-33.31]), followed by benzocaine (7.50 [95% CI, 4.43-12.71]) and desoximetasone (6.55 [95% CI, 1.99-21.54]). Statistically significantly less frequent allergens included nickel, formaldehyde (1% concentration), paraphenylenediamine, bacitracin, cobalt, thiuram mix, and 1,3-dimethylol-5, 5-dimethyl hydantoin.

Patients With AG-ACD

Of 227 patients with 1 or more clinically relevant allergic reactions, 211 (93.0%) had a final diagnosis of ACD. Of these 211 patients, 59 (28.0%) had additional diagnoses, most frequently other dermatoses ($n = 21$), other dermatitis ($n = 18$), and irritant contact dermatitis ($n = 18$). A total of 152 patients met our strict definition of AG-ACD (anogenital involvement only, ACD as the only diagnosis, and ≥ 1 positive allergic reaction of

Table 1. Studies Published Since 2008 of Patch Test Results for Patients With Anal and/or Genital Involvement

Source	Patch-Tested Patients, No. (% Female)	Study Population	Age, Mean (range), y	Patients		Main Findings
				With ≥ 1 Positive Allergic Reaction, No. (%)	With ≥ 1 Currently Relevant Reaction, No. (% of Patients Tested)	
Bauer et al, ⁸ 2011 (2004-2008; Europe)	1374 (41)	Patients with anogenital, genital, or anal dermatosis	NR (75% of patients >40 y)	632 (46)	NR	Bufexamac significantly more common with anogenital symptoms than without; nickel, BOP, and fragrance mix are most common positive allergens in anogenital involvement; patients with anal dermatoses more likely to develop sensitization than those with genital dermatoses
Warsaw et al, ⁹ 2008 (1994-2004; North America)	347 (61)	Patients with anogenital dermatitis	47.2 (0-92)	NR	220 (63)	Cinnamal and topical medications significantly more common allergens
Abu-Asi et al, ² 2016 (2005-2015; United Kingdom)	150 (47)	Patients with perianal dermatoses and/or pruritus ani	45.2 (5-88)	60 (40)	32 (21)	MI-MCI was the most common relevant allergen
Vermaat et al, ⁶ 2008 (2002-2006; the Netherlands)	53 (100)	Patients with chronic anogenital, vulvar, or perianal symptoms	35.3 (16-64)	35 (66)	7 (13)	Topical fragrances and ingested spices were the most common relevant allergens
Haverhoek et al, ⁴ 2008 (Australia)	43 (100)	Patients with vulvar pruritus	42.0 (20-80)	35 (81)	19 (44)	Patch testing to a wide variety of allergens is worthwhile in those with vulvar pruritus even without a diagnosis of ACD; nickel and Vagisil (benzocaine and resorcinol) were the most common relevant allergens
González-Pérez et al, ³ 2014 (2001-2012; Spain)	37 (41)	Patients with perianal eczema	56.6 (37-82)	16 (43)	10 (27)	MI-MCI was the most common relevant allergen
Bhate et al, ⁵ 2010 (1990-2006; United States)	37 (49)	Patients with genital dermatitis	43.2 (24-77)	15 (41)	11 (30)	Fragrances were the most common relevant allergens
Ljubojević et al, ⁷ 2009 (dates NR; Croatia)	33 (67)	Patients with persistent or recurrent genital erythema, pruritus, and burning	38.0 (NR)	13 (39)	7 (21)	Nickel, BOP, formaldehyde, and neomycin were the most common positive allergens

Abbreviations: ACD, allergic contact dermatitis; BOP, balsam of Peru; MI-MCI, methylisothiazolinone-methylchloroisothiazolinone; NR, not reported.

current clinical relevance). The most common allergens in this group were preservatives, fragrances, medications, emulsifiers, corticosteroids, nickel sulfate, and surfactants. The most common sources were personal care products, medications, food products, and clothing; **Table 3** summarizes the sources of these allergens.

Patients With AG+

Of 28 481 patients, 383 (1.3%) had AG+. This group included 165 male patients and 218 female patients; common additional body sites included the trunk (91 [23.8%]), hand (76 [19.8%]), and leg (67 [17.5%]). Trunk involvement was 2.09 times (95% CI, 1.66-2.64; $P < .001$) as frequent and leg involvement was 1.69 times (95% CI, 1.30-2.20; $P < .001$) as frequent in patients with AG+ compared with those in the noAG group.

Discussion

Of 28 481 patients in the 2005-2016 NACDG database, 832 (2.9%) had anogenital involvement and 449 (1.6%) had anogenital involvement only. To our knowledge, the NACDG database is the largest database that has both characterized AG

patients and identified the clinical relevance of allergic reactions.

Of 449 patients in the AG group, 237 (52.8%) had a final diagnosis of ACD, which is higher than in studies by Bhate et al⁵ (30.0%) and González-Pérez et al³ (32.4%); those studies had small sample sizes ($n = 37$ in each study). In our study, patients in the AG group had a significantly higher frequency of other dermatoses (eg, lichen planus, lichen sclerosis, balanitis, or vulvodynia) and other dermatitis (eg, lichen simplex chronicus) compared with those in the noAG group, likely owing to the high prevalence of other genital dermatoses among those suspected to have ACD.¹

Both the previous 1994-2004 NACDG study⁹ and present study found higher proportions of male patients in the AG group compared with the noAG group (39.5% vs 35.3% in the previous NACDG study⁹ and 39.4% vs 32.0% in the present study), consistent with studies by González-Pérez et al³ (59.5% vs 36.2%) and Bhate et al⁵ (51.0% vs 29.0%). We also found that, within the AG group, both the previous and current NACDG studies found a higher frequency of male patients than female patients with a final diagnosis of ACD (49.6% vs 40.5% in the previous NACDG study⁹ and 60.5% vs 47.8% in the present study). The explanation for male predominance is un-

Table 2. Most Common Currently Clinically Relevant Allergens Among Patients in the AG Group vs Patients in the noAG Group

Allergen	AG			noAG			AG vs noAG	
	No. of Patients Tested	Clinically Relevant Reaction, No. (%)	Rank Order	No. of Patients Tested	Clinically Relevant Reaction, No. (%)	Rank Order	P Value	RR (95% CI)
Significantly higher in AG group vs noAG group								
Dibucaine 2.5% pet	250	10 (4.0)	9	17 494	32 (0.2)	62	<.001	22.74 (11.05-46.78)
Triamcinolone acetonide 1% pet	117	2 (1.7)	25	9292	20 (0.2)	62	.04	7.87 (1.86-33.31)
Benzocaine 5% pet	449	15 (3.3)	12	27 613	123 (0.5)	57	<.001	7.50 (4.43-12.71)
Desoximetasone 1% pet	410	3 (0.7)	48	23 258	26 (0.1)	64	.01	6.55 (1.99-21.54)
Ethylenediamine dihydrochloride 1% pet	448	6 (1.3)	28	27 623	112 (0.4)	59	.002	3.30 (1.46-7.47)
Lidocaine hydrochloride 15% pet	449	5 (1.1)	31	27 596	120 (0.4)	58	.03	2.56 (1.05-6.23)
Budesonide 0.01% or 0.1% pet	449	7 (1.6)	26	27 619	192 (0.7)	50	.03	2.24 (1.06-4.74)
Methylchloroisothiazolinone and methylisothiazolinone 0.01% aq (100 ppm)	449	30 (6.7)	4	27 599	1143 (4.1)	9	.008	1.61 (1.14-2.41)
Balsam of Peru 25% pet	449	45 (10.0)	2	27 637	2095 (7.6)	4	.04	1.38 (1.01-1.88)
Significantly lower in AG group vs noAG group								
Thiuram mix 1% pet	449	4 (0.9)	39	27 620	727 (2.6)	19	.02	0.034 (0.13-0.90)
1,3-Dimethylol-5, 5-dimethyl hydantoin 1% pet	449	1 (0.2)	57	27 618	423 (0.5)	30	.02	0.15 (0.02-1.03)
Cobalt chloride 1% pet	449	5 (1.1)	31	27 608	964 (3.5)	12	.006	0.32 (0.13-0.76)
Bacitracin 20% pet	449	6 (1.3)	29	27 610	927 (3.4)	13	.02	0.40 (0.18-0.88)
Paraphenylenediamine 1% aq	449	8 (1.8)	22	27 576	1069 (3.9)	10	.02	0.46 (0.23-0.92)
Nickel sulfate 2.5% pet	448	26 (5.8)	5	27 538	2938 (10.7)	2	<.001	0.54 (0.37-0.79)
Formaldehyde 1% aq	449	15 (3.3)	12	27 626	1668 (6.0)	6	.02	0.55 (0.34-0.91)
No significant difference between AG group vs noAG group								
Dithiomorpholine 1% pet	39	1 (2.6)	19	4309	41 (1.0)	40	.32	2.69 (0.38-19.10)
Lavender oil 2% pet	332	2 (0.6)	53	18 319	58 (0.3)	60	.29	1.90 (0.47-7.76)
Mercapto mix 1% pet	192	2 (1.0)	35	13 472	76 (0.6)	55	.30	1.85 (0.46-7.46)
Benzyl alcohol 1% pet	410	8 (2.0)	21	23 277	248 (1.1)	37	.09	1.83 (0.91-3.68)
Carvone 5% pet	332	3 (0.9)	37	18 318	104 (0.6)	54	.44	1.59 (0.51-4.99)
Neomycin sulfate 20% pet	449	17 (3.8)	10	27 594	664 (2.4)	20	.06	1.57 (0.98-2.52)
Clobetasol propionate 1% pet	449	2 (0.5)	55	27 609	79 (0.3)	61	.37	1.56 (0.38-6.31)
Majantole 5% pet	133	2 (1.5)	27	8224	85 (1.0)	39	.40	1.45 (0.37-5.77)
Iodopropynyl butylcarbamate 0.1% or 0.5% pet	449	18 (4.0)	7	27 609	820 (3.0)	17	.46	1.35 (0.85-2.13)
Paraben mix 15% pet	449	5 (1.1)	31	27 617	237 (0.9)	44	.56	1.30 (0.54-3.13)
Di-α-tocopherol 100%	449	4 (0.9)	39	27 608	202 (0.7)	48	.58	1.22 (0.45-3.26)
Disperse blue 106 or 104/126 mix 1% pet	449	4 (0.9)	39	27 597	205 (0.7)	47	.58	1.20 (0.45-3.21)
Lanolin alcohol 30% or 50% pet	449	16 (3.6)	11	27 629	831 (3.0)	16	.49	1.18 (0.73-1.93)
Methylisothiazolinone 0.2% aq (2000 ppm)	199	26 (13.1)	1	10 091	1113 (11.0)	1	.36	1.18 (0.82-1.70)
Bronopol 0.5% pet	449	8 (1.8)	22	27 613	425 (1.5)	29	.68	1.16 (0.58-2.32)
Mercaptobenzothiazole 1% pet	449	3 (0.7)	50	27 628	161 (0.6)	53	.75	1.15 (0.37-3.58)
Cinnamic aldehyde 1% pet	449	15 (3.3)	12	27 610	806 (2.9)	18	.60	1.14 (0.69-1.89)
Fragrance mix								
I 8% pet	449	42 (9.4)	3	27 616	2610 (9.5)	3	.94	0.99 (0.74-1.32)
II 14% pet	410	18 (4.3)	6	23 275	1036 (4.5)	8	.95	0.99 (0.63-1.56)
Jasmine absolute 2% pet	293	2 (0.7)	49	17 234	119 (0.7)	51	>.99	0.99 (0.25-3.98)
Propylene glycol 100% aq	199	6 (3.0)	16	10 095	319 (3.2)	14	.91	0.95 (0.42-2.16)
Methyldibromo glutaronitrile and phenoxyethanol 2% pet	449	13 (2.9)	18	27 607	871 (3.2)	15	.75	0.92 (0.54-1.57)
Amidoamine 0.1% aq	449	5 (1.1)	31	27 613	330 (1.2)	35	.87	0.93 (0.39-2.24)
Shellac 20% alc	133	1 (0.8)	47	8224	67 (0.8)	46	>.99	0.92 (0.13-6.60)
Oleamidopropyl dimethylamine 0.1% aq	332	7 (2.1)	20	18 318	439 (2.4)	22	.73	0.88 (0.42-1.84)

(continued)

Table 2. Most Common Currently Clinically Relevant Allergens Among Patients in the AG Group vs Patients in the noAG Group (continued)

Allergen	AG			noAG			AG vs noAG	
	No. of Patients Tested	Clinically Relevant Reaction, No. (%)	Rank Order	No. of Patients Tested	Clinically Relevant Reaction, No. (%)	Rank Order	P Value	RR (95% CI)
Carba mix 3% pet	449	14 (3.1)	15	27 624	1015 (3.7)	11	.53	0.85 (0.51-1.43)
Tixocortol-21-pivalate 1% pet	449	6 (1.3)	29	27 613	474 (1.7)	27	.54	0.78 (0.35-1.74)
Propylene glycol 10% or 30% aq	449	8 (1.8)	22	27 619	662 (2.4)	21	.40	0.74 (0.37-1.48)
Quaternium 15 2% pet	449	18 (4.0)	7	27 622	1607 (5.8)	7	.10	0.69 (0.44-1.09)
Imidazolidinyl urea 2% aq	117	1 (0.9)	45	9303	118 (1.3)	34	.69	0.67 (0.09-4.78)
Cocamidopropyl betaine 1% aq	449	4 (0.9)	39	27 614	395 (1.4)	32	.42	0.62 (0.23-1.66)
Propolis 10% pet	410	4 (1.0)	36	23 261	390 (1.7)	28	.43	0.58 (0.22-1.55)
Compositae mix 6% pet	449	3 (0.7)	50	27 608	329 (1.2)	36	.50	0.56 (0.18-1.74)
Colophony 20% pet	449	3 (0.7)	50	27 629	358 (1.3)	33	.39	0.52 (0.17-1.60)
Dimethylaminopropylamine 1% aq	332	3 (0.9)	37	18 326	321 (1.8)	26	.39	0.52 (0.17-1.60)
Imidazolidinyl urea 2% pet	449	4 (0.9)	39	27 620	493 (1.8)	25	.20	0.50 (0.19-1.33)
Formaldehyde 2% aq	199	6 (3.0)	16	10 093	642 (6.4)	5	.05	0.47 (0.21-1.05)
Diazolidinyl urea 1% aq	117	1 (0.9)	45	9288	171 (1.8)	24	.73	0.46 (0.07-3.29)
Black rubber mix 0.6% pet	449	1 (0.2)	57	27 628	146 (0.5)	56	.73	0.42 (0.06-3.00)
Diazolidinyl urea 1% pet	449	4 (0.9)	39	27 619	582 (2.1)	23	.09	0.42 (0.16-1.13)
4-Tert-butylphenol formaldehyde resin 1% pet	449	1 (0.2)	57	27 625	178 (0.6)	52	.54	0.35 (0.05-2.46)
2-Hydroxyethyl methacrylate 2% pet	410	2 (0.5)	54	23 256	339 (1.5)	31	.14	0.33 (0.08-1.34)
Methyl methacrylate 2% pet	449	1 (0.2)	57	27 608	198 (0.7)	49	.38	0.31 (0.04-2.21)
Bisphenol A epoxy resin 1% pet	410	1 (0.2)	56	23 276	207 (0.9)	42	.28	0.27 (0.04-1.95)
Tea tree oil, oxidized, 5% pet	449	1 (0.2)	57	27 604	230 (0.8)	45	.28	0.27 (0.04-1.90)
Cocamide DEA 0.5% pet	449	1 (0.2)	57	27 614	242 (0.9)	43	.19	0.25 (0.04-1.81)
Glyceryl thioglycolate 1% pet	449	1 (0.2)	57	27 577	253 (0.9)	41	.20	0.24 (0.03-1.73)
Ylang-ylang oil 2% pet	449	1 (0.2)	57	27 608	291 (1.1)	38	.10	0.21 (0.03-1.50)

Abbreviations: AG, anogenital involvement only; alc, alcohol; aq, aqueous; DEA, diethanolamine; mix, mixture; noAG, no anogenital involvement; pet, petrolatum; RR, relative risk.

clear but could be due to biostructural differences, sexual behaviors, product choices, and/or hygiene practices. It could also be due to female patients seeking care from obstetricians or gynecologists rather than dermatologists for anogenital symptoms. However, no studies, to our knowledge, have investigated these factors.

Currently Clinically Relevant Allergens and Sources

Of 449 patients in the AG group, 227 (50.6%) had 1 or more positive allergic reactions of current clinical relevance, similar to other studies (Table 1).²⁻⁹ This finding is lower than that in the prior NACDG study (63%)⁹; the significance of this difference is unclear. Compared with the prior NACDG study of patients with anogenital dermatitis, statistically significantly more common allergens in the AG vs noAG groups were similar. One exception was preservatives. Compared with individuals in the noAG group, those in the AG group had a significantly higher frequency of relevant reactions to MI-MCI and ethylenediamine, which was not seen in the prior NACDG study.⁹ This finding is not surprising given the worldwide epidemic of MI allergy.¹⁰ Two other studies found that MI-MCI was the most common relevant allergen among patients with AG.^{3,5} Although MI allergy was not significantly more frequent among patients with AG in the present study, the NACDG began testing for this allergen in 2013; thus, the numbers may be too small

to detect significance. Historically, MI and MI-MCI were common relevant allergens in wet wipes, although wipe manufacturers may be decreasing the use of MI and MCI.¹¹ Ethylenediamine is an emulsifier and stabilizer in generic nystatin and triamcinolone cream.¹²

Compared with individuals in the noAG group, those in the AG group had a significantly higher frequency of relevant reactions to balsam of Peru. This ingredient is present in a popular anogenital product in the United States, Boudreaux's Butt Paste. Two studies^{5,6} found that fragrance and flavoring allergens were the most common allergens among those with anogenital involvement. A study of 45 patients with fragrance ACD by Salam and Fowler¹³ found that 47% improved with a low-balsam diet; 31% of patients had anogenital involvement. These patients were suspected to have a systemic contact dermatitis from ingestion of balsam of Peru; however, to our knowledge, no formal studies have evaluated this conjecture.

Compared with individuals in the noAG group, those in the AG group had a significantly higher frequency of relevant reactions to 3 topical anesthetics (benzocaine, dibucaine, and lidocaine) and 3 corticosteroids (triamcinolone, budesonide, and desoximetasone). The frequency of reactions to tixocortol pivalate were not significantly different; this finding may be due to the common use of hydrocortisone for treatment of skin conditions at all body sites.

Table 3. Sources of Currently Clinically Relevant NACDG Allergens Among Patients With Anogenital ACD

Source	No. (%) (N = 366)
Personal care products	208 (56.8)
Unspecified	131 (35.8)
Wipes	29 (7.9)
Soaps and cleansers	22 (6.0)
Moisturizers	8 (2.2)
Miscellaneous health devices ^a	6 (1.6)
Hair dyes	4 (1.1)
Shampoos	3 (0.8)
Artificial nails	2 (0.5)
Perfumes and fragrances	2 (0.5)
Deodorants	1 (0.3)
Medications	69 (18.9)
Corticosteroids	27 (7.4)
Analgesics and antipruritics	22 (6.0)
Antibiotics	9 (2.5)
Unspecified	6 (1.6)
Antifungals	5 (1.4)
Food products	31 (8.5)
Clothing and jewelry	29 (7.9)
Undergarments and swimwear	11 (3.0)
Jewelry	6 (1.6)
Gloves	5 (1.4)
Unspecified	4 (1.1)
Textiles	2 (0.5)
Socks and stockings	1 (0.3)
Unknown and other ^b	29 (7.9)

Abbreviations: ACD, allergic contact dermatitis; NACDG, North American Contact Dermatitis Group.

^a Includes condoms and diaphragms.

^b Nonskin soaps and disinfectants, paper products, miscellaneous consumer items, adhesives and glues, and material handling machinery.

Although allergy to nickel was significantly less common among patients in the AG group compared with those in the noAG group, it was the fifth most common allergen in the most restrictive group (AG-ACD). The most common reported sources of nickel were food products and jewelry. The role of dietary nickel in anogenital dermatitis is poorly understood. In a study by Vermaat et al,⁶ dietary nickel was not thought to be clearly relevant to patients' anogenital dermatitis. However, other reports showed an association between the ingestion of nickel and anogenital dermatitis.¹⁴

Not all allergens are captured by the NACDG screening series. The most common sources of relevant non-NACDG allergens were personal care products and medications (eg, pramoxine¹⁵ and clotrimazole¹⁶), none of which were on the NACDG screening series. This finding underscores the need to test beyond a screening series to include patients' personal care products.

Limitations

The limitations of this study include the following: (1) the use of cross-sectional data, (2) a tertiary referral population, (3) a strict definition of AG-ACD to confidently identify allergens related to the anogenital area, (4) the exclusion of past and unknown relevance, (5) the lack of long-term follow-up data, and (6) no data on prior patch testing.

Conclusions

It is important for patients with anogenital involvement who are suspected of having ACD to undergo patch testing because more than half will likely have 1 or more currently relevant allergic reactions. Male patients were more likely to have anogenital ACD as a final diagnosis, whereas a final diagnosis of other dermatoses was more frequent among female patients. For patients with anogenital ACD, allergens and sources were consistent with items likely to contact the anogenital region, including preservatives, fragrances, medications (particularly topical anesthetics), and topical corticosteroids.

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