Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

sampling and predetermined challenge criteria in infants. *J Allergy Clin Immunol*. 2011;127(3):668–676.
9. Schuller A, Barnig C, Matau C, Geny S, Gosselin M, Moal MC, et al. Transfer of peanut allergy following lung transplantation: a case report. *Transplant Proc*. 2011;43(10):4032–4035.
10. Muller YD, Vionnet J, Beyeler F, Eigenmann P, Caubet J, Villard J, et al. Swiss Transplant Cohort study. Management of allergy transfer upon solid organ transplantation. *Am J Transplant*. 2020;20(3):834–843.
11. de Blok BM, Vlieg-Boerstra BJ, JN Oude Elberink, Duiverman EJ, DunnGalvin A, Hourihane J O'B, et al. A framework for measuring the social impact of food allergy across Europe: a EuroPrevall state of the art paper. *Allergy*. 2007;62(7):733–737.

Social well-being among children with vs without food allergy before and during coronavirus disease 2019

Check for updates

Prepandemic studies note high rates of bullying among children with food allergy, specifically because of their condition, often on school grounds such as on the playground or in the classroom.[1] In addition, we have recently reported that, among mothers of children with food allergy, 44% reported symptoms indicative of clinical anxiety.[2] Whereas anxiety has increased in children and their families, children who experience bullying at school—such as those with food allergy—may have indirectly experienced a reprieve as a result of pandemic-related physical distancing and public health restrictions. This is the first study to analyze the outcomes of distanced learning and bullying of children with food allergy.

This analysis makes use of data from 2 cohorts on the costs of food allergy, collected in the year before the coronavirus disease 2019 pandemic and 2 months during the pandemic (May 1-June 30, 2020) when schools were largely closed to in-person learning. Both cohorts completed similar questionnaires based on the EcoQ questionnaire.[3] Each cohort consisted of cases and controls without food allergy. In the prepandemic cohort, cases were recruited from a tertiary pediatric allergy clinic during food allergy-related follow-up visits, controls were recruited via convenience and snowball sampling, and caregivers completed a paper version of the questionnaire. This cohort included participants from the Province of Manitoba, Canada, only. The pandemic cohort was recruited via convenience sampling through e-mail and social media advertisements. Cases were defined as the oldest child (aged 0-18 years) in the family, and who were reported to have 1+ food allergy. Controls were also defined as the oldest child in the family (as this provided best-scenario age matching with the cases), but who did not have reports of food allergy. The pandemic cohort completed an online version of the caregiver-completed questionnaire, with participants recruited from across Canada. Data were described using n/N, %, and mean ± SD and compared using χ^2 tests, with statistical significance set at P less than .05, using Stata version 15.1 (College Station, Texas). Families reporting monthly .household income in excess of $30,000 (ie, half the annual median household income in Canada) were excluded from the calculations of income to prevent skewing of the data (prepandemic cohort: 2 cases, 2 controls; pandemic cohort, 2 cases, 3 controls).[4] This study was approved by the University of Manitoba Health Research Ethics Board (H2018:319 [HS22066]).

The prepandemic cohort included 65 cases (55.1%) and 53 controls (44.9%), with corresponding numbers of 62 (60.8%) and 40 (39.2%) from the pandemic cohort (Table 1). Gender distribution was comparable between the cohorts, although slightly more boys than girls were cases in the pandemic cohort (72.1% vs 27.9%). The prepandemic cohort was approximately 2 years younger than the pandemic cohort [(prepandemic: cases—mean 6.9 [median 6.0] years, controls—mean 7.4 [median 6.0] years); (pandemic: cases—mean 9.2 [median 10.0] years, controls—mean 8.7 [median 7.0] years)]. Monthly household income was comparable between the cohorts, and children were typically part of a 4-person (2 adults, 2 children) household. Among the cases, the 3 most common food allergies were, among the prepandemic cohort, as follows: peanut and/or tree nut (81.5%), egg (29.2%), and fish (21.5%); and, among the pandemic cohort: peanut/tree nut (51.6%), milk (32.3%), and egg (27.4%).

Within each cohort, cases and controls had similar frequencies of parent-reported anxiety and/or depression, bullying, and isolation. At baseline, anxiety was comparable and not statistically different between the cases and controls (19.0% vs 29.4%, respectively; $P < .20$). With consideration to the prepandemic vs pandemic cohorts, anxiety was more common among both cases (19.0% vs 67.2%; $P < .001$) and controls (29.4% vs 59.5%; $P < .005$) during the pandemic; bullying decreased among the cases (31.0% vs 6.9%; $P < .008$), but not controls (20.0% vs 16.2% $P = .66$); and social isolation did not change significantly among the cases (31.0% vs 51.7%; $P = .07$), but it did increase among the controls (19.6% vs 48.7%; $P < .005$).

We demonstrated that the rates of childhood anxiety doubled from the year before the pandemic to the early months of the pandemic, a finding that aligns with reports from previous pandemics.[5] Whereas children with food allergy had considerably lower rates of bullying during the pandemic, this remained unchanged among those without food allergy. This observation suggests that children with food allergy tend to be bullied on school grounds, whereas children without food allergies are bullied outside the school environment. Given that the mean ages of all cohorts were between 7 and 9 years old, it is likely that most participants have similar access to technology. However, if this is not the case, children with more access to online resources such as chat rooms or social media will be subjected to increased cyberbullying, likely unrelated to food allergy. As ages increase, increased access and comfort with technology are presumable, and cyberbullying is likely to increase as well. That being said, our findings underscore an urgent need to address food allergy-related bullying, which abruptly and considerably decreased when the pandemic started. As noted by Brown et al,[6] racialized children with food allergy may experience different kinds of bullying, specifically nonfood-allergy–related.[6] This study does not provide race-specific data on rates of bullying, which is a limitation of the study. However, previous reporting indicates that it is also of great

Disclosures: Dr Abrams is a Section Head of Food Allergy and Anaphylaxis, Canadian Society of Allergy and Clinical Immunology; a member of Food Allergy Canada's Medical Advisory Board; and does research with DBV Technologies. Dr Protudjer is a Section Head of Allied Health, Canadian Society of Allergy and Clinical Immunology; sits on the steering committee for Canada's National Food Allergy Action Plan; and reports having accepted consulting fees from Novartis. Dr Simons and Miss Merrill declare no conflicts of interest.

Funding: Funding for this study was provided by an operating grant jointly sponsored by Manitoba Medical Services Foundation and the Children's Research Institute of Manitoba. Merrill drafted this manuscript while receiving a summer studentship jointly funded between Dr Protudjer's startup funds from the Children's Research Institute of Manitoba and the Canadian Society of Allergy and Clinical Immunology.

Table 1
Demographic Characteristics of the 2 Cohorts

Characteristic	Prepandemic cohort				Pandemic cohort			
	Food allergy (N = 65)		No food allergy (N = 53)		Food allergy (N = 62)		No food allergy (N = 40)	
	n	%	n	%	n	%	n	%
Sex								
Boy	33	50.8	30	56.6	44	72.1	16	40.0
Girl	32	49.2	23	43.4	17	27.9	24	60.0
Single-parent family	3	4.6	2	3.8	5	8.1	4	10.0
	Mean ± SD		Mean ± SD		Mean ± SD		Mean ± SD	
Age (y)	6.9 ± 4.9		7.4 ± 4.8		9.2 ± 5.1		8.7 ± 5.1	
Monthly household income[a]	6265 ± 2964		6591 ± 4755		8568 ± 9916		7433 ± 8693	
Family size	3.8 ± 0.9		4.1 ± 1.1		3.8 ± 0.7		3.8 ± 0.9	
Followed by a physician for food allergy	65	100	—	—	60	96.8	—	—
Types of food allergy[b]								
Milk	10	15.4	—	—	20	32.3	—	—
Egg	19	29.2	—	—	17	27.4	—	—
PN, TN, or both	53	81.5	—	—	32	51.6	—	—
Fish	14	21.5	—	—	11	17.7	—	—
Shellfish	8	12.3	—	—	5	8.1	—	—
Soy	4	6.2	—	—	7	11.3	—	—
Wheat	4	6.2	—	—	4	6.5	—	—
Sesame	6	9.2	—	—	8	12.9	—	—
Sulfites	0	0.0	—	—	1	1.6	—	—
Other	2	3.1	—	—	12	19.4	—	—
	%		%		%		%	
Social well-being								
Anxiety	19.0		29.4		67.2		59.5	
Isolation	31.0		19.6		51.7		48.7	
Bullying	31.0		20.0		6.9		16.2	

Abbreviations: PN, peanut; TN, tree nut.
[a]Restricted to households with a monthly income of $60,000 or less.
[b]Not mutually exclusive.

importance for school staff to pay close attention to racialized students being bullied at school.

Unlike children without food allergy, children with food allergy did not report differences in isolation before vs during the pandemic. As many social events such as school and extracurriculars have been paused amidst the pandemic, it is likely that this has caused feelings of missing out. One hypothesis as to why children without food allergies would experience this considerably more than children with food allergies is that the latter feel less pressure at virtual social events, where they feel less food-related pressure.

Owing to the coronavirus disease 2019 pandemic, this study was limited to online sampling, with a reliance on internet and technology to obtain data. Unfortunately, the study was not accessible to participants without internet in their homes, limiting the sample to a specific demographic of people with access to internet. Future research should be done to include families without access to internet. In addition, further research could be done to focus on students who obtain school-supplied or government-subsidized lunches, as this provides another avenue for bullying at school.

Given that these findings provide evidence to suggest that food-allergy–related bullying takes place on school grounds, it is suggested that a zero-tolerance policy for the bullying of students with food allergy be introduced and enforced while children are on school property, more specifically where food is involved, such as in the lunchroom. Furthermore, given the finding that anxiety increased in both groups of children during the pandemic, caution should be taken with return to school to ensure that children feel safe on school grounds. As schools slowly reopen, and as we slowly move toward a postpandemic world, the time to act is now.

Kaitlyn A. Merrill, BSc[*]
Elissa M. Abrams, MD, MPH, FRCPC[†,‡]
Elinor Simons, MD, PhD, FAAAAI[†,‡]
Jennifer Lisa Penner Protudjer, PhD[†,§,‖,¶,#,**]
[*] *Department of Biochemistry*
University of Winnipeg
Winnipeg, Canada
[†] *The Children's Hospital Research Institute of Manitoba*
Winnipeg, Canada
[‡] *Department of Pediatrics*
Section of Allergy and Clinical Immunology
University of Manitoba
Winnipeg, Canada
[§] *Department of Pediatrics and Child Health*
University of Manitoba
Winnipeg, Canada
[‖] *George and Fay Yee Centre for Healthcare Innovation*
Winnipeg, Canada
[¶] *Centre for Allergy Research*
Karolinska Institutet
Stockholm, Sweden
[#] *Department of Food and Human Nutritional Sciences*
University of Manitoba
Winnipeg, Canada
Jennifer.Protudjer@umanitoba.ca

References

1. Lieberman JA, Weiss C, Furlong TJ, Sicherer M, Sicherer SH. Bullying among pediatric patients with food allergy. *Ann Allergy Asthma Immunol*. 2010;105(4):282–286.
2. Protudjer JLP, Golding M, Salisbury MR, Abrams EM, Roos LE. High anxiety and health-related quality of life in families with children with food allergy during coronavirus disease 2019. *Ann Allergy Asthma Immunol*. 2021;126(1):83–88. e1.

3. Wai HM, Middelveld R, Thörnqvist V, Ballardini N, Nilsson E, Strömquist J, et al. Pediatric food allergy-related household costs are influenced by age, but not disease severity. *World Allergy Organ J*. 2019;12:(9) 100061.
4. Statistics Canada. Canadian Income Survey. Available at: https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1110019001. Accessed March 25, 2022.
5. Etard J-F, Sow MS, Leroy S, Touré A, Taverne B, Keita AK, et al. Multidisciplinary assessment of post-Ebola sequelae in Guinea (PostEboGui): an observational cohort study. *Lancet Infect Dis*. 2017;17(5):545–552.
6. Brown D, Negris O, Gupta R, Herbert L, Lombard L, Bozen A, et al. Food allergy-related bullying and associated peer dynamics among Black and White children in the FORWARD study. *Ann Allergy Asthma Immunol*. 2021;126(3):255–263. e1.

Patch testing results in adult patients with dermatitis during the coronavirus disease 2019 pandemic

Check for updates

Allergic contact dermatitis (ACD) represents a delayed hypersensitivity reaction to a contact allergen with variable presentations, including erythema, vesiculation, or lichenification, depending on the allergen, exposure, and chronicity. Patch testing (PT) is the reference standard for identifying contact allergens implicated in ACD. Among the general adult population, ACD has a prevalence of approximately 21%.[1] Positive PT reactions in the evaluation of occupational ACD occur in up to 25% to 36% of health care workers (HCWs).[2] Relevant allergens detected in HCWs include the following: formaldehyde, formaldehyde-releasing preservatives (quarternium-15, 2-bromo-2-nitropropane-1,3-diol), glutaraldehyde, and rubber accelerators (carba mix, thiuram mix).[2] ACD related to personal protective equipment (PPE) is well documented, including during the coronavirus disease 2019 (COVID-19) pandemic. Facial mask ACD attributed to N95 or KN95 respirators or surgical masks may be linked to textile dyes, formaldehydes released in textile processing, rubber accelerators (elastic banding), preservatives and disinfectants (sterilization), or diisocyanates (polyurethane production).[3-6]

We conducted an institutional review board–approved, retrospective chart review of adult patients (≥ 18 years) who underwent PT with the North American Contact Dermatitis panel in our office for the evaluation of suspected ACD from January 2018 to March 2021. Patients were identified by coding query (CPT 95044). Metal PT data were excluded. Time periods were defined as follows: pre–COVID-19 (January 2018-February 2020) and COVID-19 pandemic (July 2020-March 2021). PT was deferred from March 2020 to June 2020. Data gathered included patient demographics, dermatitis history (location, duration, clinical features), atopic dermatitis (AD) history, and PT results. Patients had at least 2 PT readings performed by the same reader, at 48 hours (PT removal) and 72 or 96 hours after application. Readings were graded using the International Contact Dermatitis Research Group system.[7] Reactions of 1 +, 2 +, or 3 + were considered positive PT readings. Statistical analyses were performed using the χ^2 or Fisher's exact tests. Results with P less than .05 were considered statistically significant.

A total of 99 patients (median age: 49 years [interquartile range, 37-59 years], 91% women, 21% HCWs) had suspected ACD evaluated with PT. Clinical characteristics including age and sex, HCW occupation history, and AD history were comparable among the pre–COVID-19 (n = 65) and COVID-19 pandemic (n = 34) groups, respectively: (median age: 50 vs 47 years; female sex: 89% vs 94%; HCW: 22% vs 21%; AD history: 11% vs 20%). The dermatitis pattern was documented on the face (59%), extremities (28%), trunk (19%), and generalized (17%). The dermatitis location, duration, and documented descriptions were comparable between the groups.

The rates of positive PT reaction to any allergen were 54% in the pre–COVID-19 group and 88% in the COVID-19 pandemic group (P < .001). Among all dermatitis cases, positive PT reactions to fragrance mix-I (FM) and glutaraldehyde were detected at significantly higher rates in the COVID-19 pandemic cohort compared with the pre–COVID-19 group (32% vs 9%; P = .004, and 18% vs 3%; P = .01), respectively. Table 1 illustrates the PT results among all dermatitis cases. There were no differences in positive PT allergens in HCWs (n = 21) in the pre–COVID-19 and COVID-19 pandemic groups. Some patients had positive PT reactions with personal products (COVID-19 pandemic: n = 5, pre–COVID-19: n = 2). One product in each group contained FM components and other fragrances, but none contained glutaraldehyde.

Facial dermatitis occurred in 54% (n = 35) of patients in the pre–COVID-19 group and 68% (n = 23) in the COVID-19 pandemic group. The COVID-19 pandemic group consisted of more patients with AD history (22% vs 3%; P = .03); otherwise, clinical characteristics and dermatitis features were comparable. Among patients with facial dermatitis, positive PT reaction to FM was detected at a significantly higher rate in the COVID-19 pandemic group (39% vs 11%; P = .02). Other positive PT allergens in patients with facial dermatitis included the following (COVID-19 pandemic vs pre–COVID-19): formaldehyde (22% vs 6%), glutaraldehyde (17% vs 6%), and textile dye mix (13% vs 0%).

To the best of our knowledge, this is the first descriptive study comparing PT results in the evaluation of suspected ACD before and during the COVID-19 pandemic. Our data reveal significantly higher rates of positive PT reaction to FM and glutaraldehyde in the COVID-19 pandemic period. In addition, a significantly higher rate of positive PT reaction to FM in patients with facial dermatitis was noted.

FM represents a common positive PT allergen with an overall prevalence of up to 9.2%, and its components are found in personal care products, cleaning solutions or detergents, hand soaps, and sanitizers.[8] Positive PT reaction to FM was detected at a higher than usual reported rate in the COVID-19 pandemic group. This may be attributed to small sample size or a true increase in FM sensitization in our cohort. One patient in each group also exhibited positive PT reaction to personal products containing fragrances, suggesting high clinical relevance. Increased exposure to fragrance-containing products, including FM components (alpha-amylcinnamaldehyde, cinnamic aldehyde, cinnamic alcohol, eugenol, isoeugenol, geraniol, hydroxycitronellal, oak moss), balsam of Peru, linalool, limonene, or essential oils, for hand hygiene and cleaning of reusable masks could increase susceptibility to developing ACD.

Glutaraldehyde, a disinfecting agent and preservative, is used for sterilizing medical equipment. Thus, HCWs may exhibit higher sensitization rates through occupational exposures. In 1 study, glutaraldehyde had a 3.6% positive PT prevalence among HCWs and non-HCWs.[9] Glutaraldehyde-positive PT reaction was noted

Disclosures: The authors have no conflicts of interest to report.
Funding: The authors have no funding sources to report.