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Clinical Communications

Sesame allergy is more prevalent among Middle Eastern/North African patients in an urban healthcare system

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Clinical Implications

- Electronic health record data were used to estimate the prevalence of sesame allergy by race/ethnicity in a large healthcare system. Despite limitations, our results suggest that sesame allergy is higher in those with Middle Eastern or North African ancestry living in the United States.

Sesame allergy is the ninth most common food allergy in the United States, and reports suggest that the prevalence is increasing.¹ Sesame allergy develops in early infancy and is seldom outgrown.² In Canadian children, sesame allergy had a higher annual rate of accidental reactions than peanut (15.9% vs 12.4%, respectively).³ Sesame-induced anaphylaxis accounts for 43% of all food-induced anaphylaxis cases in Israeli children,⁴ but little is known about the prevalence of sesame allergy among the Americans of Middle Eastern or North African descent (MENA) currently residing in the United States.⁵ We estimated the prevalence of sesame allergy at Henry Ford Health System (HFHS) and examined the association of sesame allergy with self-report of MENA ethnicity.

HFHS is a large healthcare system located in metropolitan Detroit, an area estimated to have one of the largest concentrations of MENA in the United States.⁵ In 2012, HFHS implemented Institute of Medicine recommendations for collection of patient race and ethnicity.⁶ HFHS allows patient self-report of Hispanic/Latinx ethnicity, Arab/Chaldean ethnicity, and patient self-report of ancestry (eg, Syrian and Lebanese) allowing enumeration of patients self-identifying as MENA who might otherwise be categorized as “white” according to Office of Management and Budget categories.⁶

We retrieved electronic medical record (EMR) data for all patients aged 0 to 18 years, seen at HFHS between November 1, 2015, and February 28, 2019, with International Classification of Diseases, Tenth Revision (ICD10) codes for food allergy and/or with a food allergy on the Epic allergy list. Because there is no ICD10 code distinguishing sesame from tree/nut allergy, sesame allergy was considered present if 2 or more of the following criteria were met: (1) laboratory results for sesame specific IgE >0.35 IU/mL; (2) sesame allergy listed in the Epic allergy list; or (3) documented order for epinephrine autoinjector (Figure 1). We corroborated sesame allergy cases through a medical chart review conducted by a board-certified allergist (HK). We also retrieved patient

demographics, insurance, allergist visits during the study period, and ICD10 codes for eczema and asthma.

The prevalence of sesame allergy for the study period was calculated by dividing the number of persons meeting sesame allergy criteria by total patients making encounters during that period. The association of patient characteristics with sesame allergy was described using χ^2 tests. Odds ratios (ORs) (95% confidence intervals) were calculated using logistic regression. All tests were 2-sided using $P < .05$ for statistical significance.

A total of 334,175 unique patients had ≥ 1 encounter during the study period, and 15,056 (4.5%) had evidence of a food allergy. Among those with food allergy, 140 (0.93%) had sesame allergy, corresponding to an overall prevalence = 0.042% (0.035%, 0.050%). Seventy-five percent of patients meeting criteria for sesame allergy had an ICD10 code for food allergy.

A total of 18,681 patients, 5.6% (5.5%, 5.7%), reported MENA ethnicity by selecting Arab/Chaldean or ancestry aligned with MENA countries⁷ (compared with an estimated 3.9% of MENA patients visiting HFHS in 2018). MENA patients were more likely to have sesame allergy compared with other food allergies and compared with no food allergy; OR = 3.15 (1.85-5.08) and 2.75 (1.63-4.41), respectively, $P < .001$ for both comparisons (Table 1). Compared with other food allergies, persons with sesame allergy were younger, more likely to have a past allergist visit, and more likely to have EMR evidence of eczema. Non-Hispanic black race was inversely related to sesame allergy. Patients with sesame allergy were more likely to be sensitized to peanut (59%) and tree nut/seeds (63%). Adjusting for patient demographics and other variables, MENA ethnicity remained associated with sesame allergy relative to other and no food allergy; adjusted OR = 3.15 (1.85-5.08) and 2.75 (1.63-4.41), respectively, $P < .001$. Allergist chart review corroborated 75% of EMR-identified sesame allergy cases. Results were similar when restricting analysis to these cases; adjusted OR = 3.76 (2.12, 6.31) for other food allergy and 3.33 (1.89, 5.56) for no food allergy, $P < .001$.

Our objective was to determine the prevalence of sesame allergy in a large health system, during a specified observation period, using evidence from the EMR. The criteria used cannot be said to represent a definitive diagnosis of sesame allergy, and for this reason, we included a chart review by an allergist and associations with MENA were stronger when the analysis was limited to these cases. We do not suspect that potential misclassification would differ by MENA ethnicity. Our denominator (persons with ≥ 1 health system encounter during the observation period) may not be entirely representative of the healthcare system's patient population, because it comprises patients referred or patients who visited HFHS no more than once. Over-representation of MENA patients in allergy cases may be driven by sesame allergy. If patients who have sesame allergy are more likely to visit HFHS allergists, or if patients who self-report as MENA are more likely to visit or be referred to HFHS allergists, our results could be biased.

We are unaware of other US reports that include an assessment of ethnicity at a granular level showing that MENA

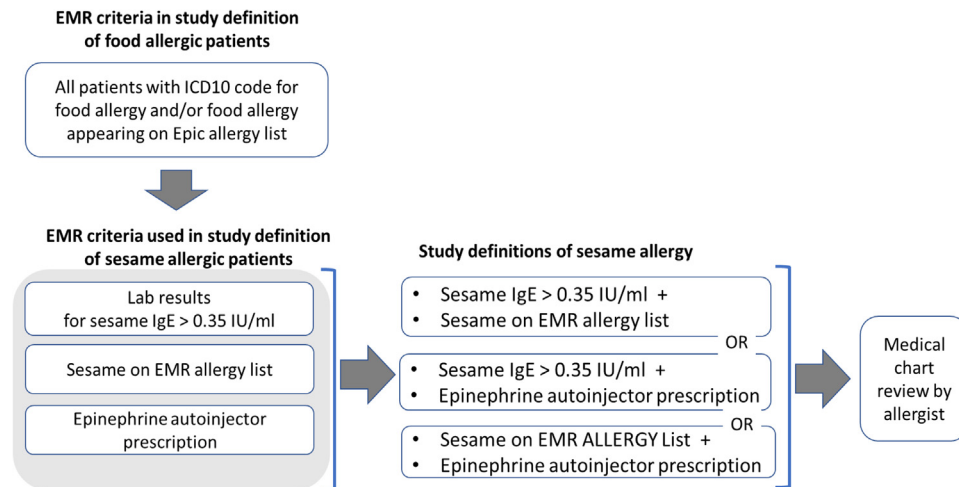


FIGURE 1. Identifying sesame-allergic patients using the electronic medical record (EMR). *ICD10*, International Classification of Diseases, Tenth Revision.

individuals in the United States may be at increased risk of sesame allergy. Sesame allergy is associated with severe reactions, and in this analysis, most sesame-allergic patients also had evidence of a peanut allergy, which is also associated with higher incidence of anaphylaxis. Evidence of an increased likelihood of visits to an allergist among sesame allergy patients may reflect disease severity.

Given that the United States is home to a growing diaspora of MENA individuals and that sesame reactions can be serious, modifiable dietary factors increasing the likelihood of sesame allergy should be investigated. Roasted forms of sesame, such as tahini, exhibit the presence of IgE-specific proteins in sesame-allergic patients. These same IgE-specific proteins are not present in commercially available extracts, suggesting that roasting may increase allergenicity.⁸ Cultural factors related to dietary exposures during infancy may play a role in our results.^{4,9} For example, sesame allergy may be more readily diagnosed if children of MENA descent are more likely to be exposed to sesame-containing foods, or if sesame-allergic patients are more likely to be allergic to multiple foods. Identifying modifiable factors related to severe anaphylaxis due to sesame allergy could contribute to life-saving advances.

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C. L. M. Joseph developed the research question, interpreted statistical results, and wrote the manuscript. A. R. Sitarik conducted the analyses, interpreted statistical results, and reviewed and edited the manuscript. R. Kado and G. Bassirpour provided clinical oversight in conceptualization of the research question, in the interpretation of clinical data, and reviewed/edited the manuscript. C. A. Miree and M. Taylor conducted the literature review, coordinated manuscript preparation activities, and reviewed/edited the manuscript. H. Kim provided supervision and oversight to conceptualization of the research question, interpretation of clinical data, and reviewed and edited the manuscript.

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TABLE I. Description and characteristics of the Henry Ford Health System study sample by food allergic status

| Characteristic | Allergic status | | | | | | | | | | | |
|-----------------------------|--------------------------|----|---------------------------------|----|------------------|--------------|-------|-------------------------------|----|------------------|---------------|-------|
| | A | | B | | A vs B | | | C | | A vs C | | |
| | Sesame allergy (n = 140) | | Other food allergy (n = 14,916) | | OR | (95% CI) | P | No food allergy (n = 319,119) | | OR | (95% CI) | P |
| n | Col % | n | Col % | n | | | | Col % | | | | |
| Age (y)* | | | | | | | | | | | | |
| 0-4 | 37 | 26 | 2,556 | 17 | 3.08 | (1.68, 6.02) | .001 | 71,043 | 22 | 2.52 | (1.37, 4.92) | .004 |
| 5-11 | 58 | 41 | 4,644 | 31 | 2.65 | (1.5, 5.07) | .002 | 85,345 | 27 | 3.28 | (1.86, 6.26) | <.001 |
| 12-18 | 32 | 23 | 4,953 | 33 | 1.37 | (0.74, 2.71) | .336 | 99,939 | 31 | 1.55 | (0.83, 3.05) | .185 |
| 19-22 | 13 | 9 | 2,763 | 19 | <i>Reference</i> | | | 62,792 | 20 | <i>Reference</i> | | |
| Sex | | | | | | | | | | | | |
| Male | 79 | 56 | 7,524 | 50 | 1.27 | (0.91, 1.79) | .159 | 158,896 | 50 | 1.31 | (0.94, 1.83) | .118 |
| Female | 61 | 44 | 7,392 | 50 | | | | 160,192 | 50 | | | |
| Unknown | 0 | 0 | 0 | 0 | | | | 31 | 0 | | | |
| Race-ethnicity | | | | | | | | | | | | |
| Non-Hispanic white | 72 | 51 | 5,820 | 39 | <i>Reference</i> | | | 149,605 | 47 | <i>Reference</i> | | |
| Non-Hispanic black | 17 | 12 | 5,701 | 38 | 0.24 | (0.14, 0.4) | <.001 | 81,571 | 26 | 0.43 | (0.25, 0.72) | .002 |
| Non-Hispanic other | 20 | 14 | 1,094 | 7 | 1.48 | (0.87, 2.39) | .126 | 23,914 | 7 | 1.74 | (1.03, 2.79) | .029 |
| Hispanic | 3 | 2 | 511 | 3 | 0.47 | (0.12, 1.28) | .207 | 15,535 | 5 | 0.40 | (0.1, 1.08) | .121 |
| Unknown | 28 | 20 | 1,790 | 12 | 1.26 | (0.8, 1.94) | .296 | 48,494 | 15 | 1.20 | (0.76, 1.83) | .414 |
| MENA | | | | | | | | | | | | |
| Yes | 19 | 14 | 627 | 4 | 3.58 | (2.13, 5.7) | <.001 | 18,035 | 6 | 2.62 | (1.57, 4.14) | <.001 |
| No | 121 | 86 | 14,289 | 96 | | | | 301,084 | 94 | | | |
| HAP insurance | | | | | | | | | | | | |
| Yes | 29 | 21 | 2,226 | 15 | 1.49 | (0.97, 2.21) | .058 | 29,555 | 9 | 2.56 | (1.67, 3.8) | <.001 |
| No | 111 | 79 | 12,690 | 85 | | | | 289,564 | 91 | | (1.67, 3.8) | <.001 |
| Past allergist visit | | | | | | | | | | | | |
| Yes | 76 | 54 | 2,299 | 15 | 6.52 | (4.66, 9.14) | <.001 | 3,280 | 1 | 114.3 | (81.9, 160.1) | <.001 |
| No | 64 | 46 | 12,617 | 85 | | | | 315,839 | 99 | | | |
| Eczema | | | | | | | | | | | | |
| Yes | 68 | 49 | 3,605 | 24 | 2.96 | (2.12, 4.14) | <.001 | 26,004 | 8 | 10.65 | (7.63, 14.84) | <.001 |
| No | 72 | 51 | 11,311 | 76 | | | | 293,115 | 92 | | | |
| Asthma | | | | | | | | | | | | |
| Yes | 43 | 31 | 3,621 | 24 | 1.38 | (0.95, 1.97) | .078 | 20,987 | 7 | 6.30 | (4.36, 8.95) | <.001 |
| No | 97 | 69 | 11,295 | 76 | | | | 298,132 | 93 | | (4.36, 8.95) | <.001 |

CI, Confidence interval; HAP, Health Alliance Plan; MENA, Middle Eastern/North African; OR, odds ratio.

*This is age at the end of the study period. All individuals were 0-18 years at some time during the study period.