
Prevalence and food avoidance behaviors for gustatory rhinitis

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Background: Gustatory rhinitis is a type of nonallergic rhinitis that is usually associated with ingestion of hot or spicy foods. Characteristics of this condition and its impact on food choices have not been studied.

Objective: To survey individuals regarding causative foods, association with atopic conditions, and food avoidance behaviors for gustatory rhinitis.

Methods: An original, self-administered questionnaire was distributed to children and adults who were seen in a busy outpatient dermatology clinic. Atopic history, frequency of rhinorrhea after food ingestion, intake of foods associated with gustatory rhinitis, symptom severity, and food avoidance were evaluated.

Results: Of the 571 participants who completed the survey, 396 (69%) indicated at least 1 food resulted in gustatory rhinitis symptoms. Patients with allergic rhinitis ($P < .001$) and a history of smoking ($P = .049$) were more likely to have experienced gustatory rhinitis. Bread (6%) and hot chili peppers (49%) represented the least and most common foods identified, respectively. A total of 65% of patients who experienced gustatory rhinitis never avoided the causative food, whereas 46% were never bothered by their symptoms. Patients who reported more causative foods were also more likely to use medications before eating to lessen their symptoms ($P = .03$).

Conclusion: The results presented herein suggest that almost all foods can be implicated, both children and adults develop this condition, and patients with a history of allergic rhinitis or smoking are more likely to report gustatory rhinitis symptoms. Most patients though do not avoid the causative food(s) and are not significantly bothered by symptoms.

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INTRODUCTION

Chronic rhinitis, which may be allergic, nonallergic, or both, affects up to 80 million people in the United States.¹ The exact prevalence of nonallergic rhinitis is unknown, but vasomotor rhinitis, nonallergic rhinitis with eosinophilia, and chronic sinusitis represent the most common subtypes.² Gustatory rhinitis, another type of nonallergic rhinitis, is the condition of watery rhinorrhea that occurs during food ingestion.² Gustatory rhinitis is often described as a condition that occurs primarily in older individuals³ and is typically associated with hot or spicy foods.^{4–6} Limitations of previous studies of this condition include enrolling cohorts of patients with chronic rhinitis, not analyzing its association with age and sex, and not assessing the impact of gustatory rhinitis on food avoidance behaviors. The objectives of this study were to determine the prevalence of self-reported gustatory rhinitis symptoms in an outpatient clinic setting and to investigate the

association of food-related symptoms with food avoidance behaviors and medication use.

METHODS

Survey Methods

A 4-page questionnaire (Fig 1) was provided to patients in the dermatology clinic at Dwight D. Eisenhower Army Medical Center (Fort Gordon, Georgia) from January 2006 through June 2006. Participants were given the opportunity to complete a questionnaire while waiting to see the physician. All patients were asked to participate regardless of reason for their health care visit.

The study was approved by the institutional review board. Patients 5 years and older were eligible to participate in the study. Parents of children 5 through 17 years old were asked to help complete the questionnaire, and participants were able to contact a study investigator if there were any questions.

Food Questionnaire

The questionnaire was developed by the authors (K.H.W. and C.C.C.) with the assistance of a hospital nutritionist (Fig 1). The questionnaire was pilot-tested before data collection to refine questions and query respondents' interpretation of questions. A brief introduction was provided explaining that "gustatory rhinitis is a medical term for when you eat some type of food that causes a runny nose" and "the most common foods causing this reaction are hot, spicy foods, although other foods may cause this reaction."

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Introduction: We would like you to complete this brief survey that will provide us with valuable information about a specific food reaction called "gustatory rhinitis." It should take approximately 5-10 minutes.

The most common foods causing this reaction are hot, spicy foods, although other foods may cause this reaction.

Participation is completely voluntary. There are no costs or reimbursements associated with this survey. While there is no direct benefit to you/your child as a participant, the information learned is likely to increase our general knowledge regarding this reaction and may improve awareness and further research regarding treatment.

We ask that you do not write your name or other personal identifiers such as your phone number or address. If you have any questions or would like to contact the investigators (MAJ Kirk Waibel) of this study, please call 706-787-4154.

Instructions: Please answer each question. If you are here with your children, please complete a separate survey for yourself and your children.

A1. Age: _____ (years)

A2. Sex: male / female (Circle one)

A3. Ethnic origin (check one only) ☐ a. Hispanic ☐ b. White or Caucasian ☐ c. Black or African-American ☐ d. Asian
☐ e. American Indian/Alaskan native ☐ f. Native Hawaiian or other pacific islander

circle one

B1. Have you EVER been diagnosed with hay fever (Allergic rhinitis)? Yes / No

B2. Have you EVER been diagnosed with asthma? **Yes / No**

B3. Have you EVER been diagnosed with a food allergy? Yes / No If YES, please list : _____

B4. Have you EVER smoked (cigarettes, pipe, cigars)? Yes / No

B5. Have you EVER been diagnosed with atopic dermatitis or eczema? Yes / No

B6. In the past 12 months (one year), have you EVER had a runny nose after eating a particular food such as a hot or spicy food/beverage? Yes / No

EXAMPLE	Never	Sometimes	Always
Tea	0	1	0

	Never	Sometimes	Always		Never	Sometimes	Always
Miscellaneous foods				Starches			
Coffee	o	o	o	White bread	o	o	o
Tea	o	o	o	Dinner roll	o	o	o
Cider	o	o	o	Whole wheat bread or rye	o	o	o
Hot chili peppers	o	o	o	Pasta	o	o	o
Horseradish	o	o	o	Rice	o	o	o
Red cayenne pepper	o	o	o	Bagel, large	o	o	o
Tabasco sauce	o	o	o	Bagel, small	o	o	o
Onion	o	o	o	Pretzels	o	o	o
Vinegar	o	o	o	Crackers, or snack crackers	o	o	o
Mustard	o	o	o	Hot cereal (oatmeal, farina)	o	o	o
Hot and sour soup	o	o	o	Baked, boiled or mashed potato	o	o	o
				Pancakes or waffles	o	o	o
Protein Sources				Fruits and Vegetables			
Beef, Veal (roast, steak, cubes)	o	o	o	Raw fruit	o	o	o
Pork	o	o	o	100% fruit juice	o	o	o
Ham	o	o	o	Canned fruit	o	o	o
Lean lunch meat	o	o	o	Dried fruit	o	o	o
Poultry (chicken or turkey) not fried	o	o	o	Green salad	o	o	o
Salmon	o	o	o	Vegetable juice	o	o	o
Fish, white	o	o	o	Vegetable soup or stew	o	o	o
Shellfish (crab, lobster, shrimp)	o	o	o	Tomato sauce	o	o	o
Soy protein meat substitute (example vegetarian burgers)	o	o	o	Cooked vegetables	o	o	o
Beans, legumes (baked beans, lentils)	o	o	o	Raw vegetables	o	o	o
Eggs or egg substitute	o	o	o				
Ground beef, hamburgers, meatballs	o	o	o	Protein Sources			
Ground turkey or chicken	o	o	o	Bacon, breakfast sausage	o	o	o
Fried chicken	o	o	o	Peanut butter	o	o	o
Hot Dogs: regular, Polish, or Italian	o	o	o	Nuts (peanuts, cashews)	o	o	o
Pepperoni, salami or bologna	o	o	o				

Figure 1. Food survey questionnaire.

Section C (continued). Foods causing runny nose while eating

	Never	Sometimes	Always		Never	Sometimes	Always
Dairy Products				Spices			
Milk (1%, 2%, or whole)	0	0	0	Celery Seed	0	0	0
Cheese	0	0	0	Chives	0	0	0
Cottage cheese	0	0	0	Cilantro	0	0	0
Yogurt (not frozen)	0	0	0	Cinnamon	0	0	0
				Cloves	0	0	0
Combination Foods / Other				Coriander	0	0	0
Pizza	0	0	0	Cream of Tartar	0	0	0
French Fries, hash browns	0	0	0	Cumin	0	0	0
Frozen food entrée (ex. Stouffers)	0	0	0	Curry Powder	0	0	0
Lasagna, Chili	0	0	0	Dill	0	0	0
Chinese food	0	0	0	Fennel Seed	0	0	0
				Garlic	0	0	0
Fats, Oils and Sweets				Ginger	0	0	0
Ice cream	0	0	0	Marjoram	0	0	0
Potato chips, nacho chips, flavored popcorn, etc.	0	0	0	Mint	0	0	0
Donuts, pastries or danishes	0	0	0	Mustard Seed	0	0	0
Muffins	0	0	0	Nutmeg	0	0	0
Cookies	0	0	0	Oregano	0	0	0
Cake or pie	0	0	0	Paprika	0	0	0
Chocolate or chocolate bar	0	0	0	Parsley	0	0	0
Salad dressing	0	0	0	Pepper	0	0	0
Mayonnaise	0	0	0	Poppy seeds	0	0	0
Butter or margarine	0	0	0	Red Pepper	0	0	0
Cream cheese or sour cream	0	0	0	Rosemary	0	0	0
				Saffron	0	0	0
Spices				Sage	0	0	0
All spice	0	0	0	Sesame Seed	0	0	0
Basil, Sweet	0	0	0	Tarragon	0	0	0
Bay Leaves	0	0	0	Thyme	0	0	0
Caraway Seed	0	0	0	Turmeric	0	0	0
Cardamom	0	0	0	Vanilla	0	0	0
Cayenne Pepper	0	0	0				

Section D. Treatment

D1. Do you avoid eating the foods that make your nose run?

CIRCLE ONE: Never avoid Sometimes avoid Always avoid

D2. How BOTHERED are you regarding getting a runny nose when eating certain foods?

CIRCLE ONE: Never bothered Just a little bothered Somewhat bothered Very bothered Extremely bothered

D3. BEFORE eating foods that make your nose run, HAVE YOU ever tried a medication or health product to decrease your runny nose?

Circle ALL that apply:

1. No, never tried.
2. Herbal supplement or over-the-counter medication (Please list: _____)
3. Decongestant (Please list: _____)
4. Nasal spray (Please list: _____)
5. Other: (Please list: _____)

E. Confidentiality:

Each questionnaire will be answered without disclosure of your identity, except age and ethnicity.

STOP

SURVEY COMPLETE. THANK YOU AGAIN FOR YOUR TIME

**PLEASE RETURN THIS SURVEY TO THE
your nurse, the front desk staff, or your doctor.**

Figure 1. Continued

Medical history questions included 6 yes/no questions regarding previous history of atopy (allergic rhinitis, asthma, food allergy, atopic dermatitis), history of smoking, and gustatory rhinitis symptoms in the past 12 months. The food questionnaire consisted of 109 items that were divided into broad categories, including miscellaneous; protein sources; starches; fruits and vegetables; dairy products; fats, oils, or sweets; and spices. Participants indicated the frequency of rhinorrhea after food ingestion of each of the 109 items on a scale of 0 (have not eaten or unsure), 1 (never having symptoms when eating), 2 (sometimes having symptoms), or 3 (always having symptoms). Two quality-of-life questions were asked: (1) Do you avoid eating the foods that make your nose run? (never avoid, sometimes avoid, or always avoid) and (2) How bothered are you regarding getting a runny nose when eating certain foods? (never, just a little, somewhat, very, or extremely). Finally, participants were asked whether they had ever tried a medication or other product before eating to decrease their symptoms. Surveys that did not have all sections completed were excluded from data analysis.

Statistical Analysis

Data management and statistical analysis were performed using SPSS statistical software, version 14.0 (SPSS Inc, Chicago, Illinois). Prevalence of disease was taken to be the percentage of patients with gustatory rhinitis. The Fisher exact test was used for categorical variables to evaluate statistical significance of differences in percentages of patients with gustatory rhinitis in different subgroups. Odds ratios (ORs), both unadjusted and adjusted, and their 95% confidence intervals (CIs) were calculated to estimate the odds of gustatory rhinitis for each subgroup (eg, male sex, history of allergic rhinitis). Descriptive statistical analyses were used to evaluate food-associated rhinitis frequency, avoidance behaviors, and bothersome scores. The *t* test for comparing the means of 2 independent samples was used to analyze variables measured on a continuous scale (eg, age). Null hypotheses were tested against 2-directional alternatives. *P* < .05 was considered statistically significant.

RESULTS

Participation Rate and Demographics

A total of 740 questionnaires were distributed. Ninety-one surveys returned were blank (participants did not have time to

complete, did not desire to complete, or forgot to complete the questionnaire). Seventy-eight surveys (11%) were incomplete, with absent responses to 1 or more of the questions. The remaining 571 surveys (77%) were completed correctly and included for analysis. The median age was 38 years (range, 5–76 years), 52% of respondents were women, and 56% were white.

Medical History

Twenty percent of participants had been diagnosed as having allergic rhinitis, 14% reported a history of asthma, 9% had been diagnosed as having a food allergy, and 16% reported a history of atopic dermatitis or eczema. Forty-two percent admitted to smoking, either currently or in the past. Participants who experienced gustatory rhinitis symptoms to 1 or more foods were more likely to have allergic rhinitis (OR, 2.70; 95% CI, 1.53–4.78; *P* < .001) or a history of smoking (OR, 1.47; 95% CI, 1.00–2.16; *P* = .049). A history of asthma, food allergy, atopic dermatitis, or sex was not associated with gustatory rhinitis (Table 1).

Gustatory Rhinitis Symptoms and Foods

A total of 396 participants (69%) experienced rhinorrhea after at least 1 food in the past. The mean $\pm$ SD age of participants with gustatory rhinitis (39.2 ± 14.1 years) was older than those without gustatory rhinitis (35.1 ± 17.2 years) (*P* = .0006). Peak prevalence of gustatory rhinitis symptoms occurred between the ages of 20 and 60 years old (Fig 2). The number of foods reported to cause gustatory rhinitis ranged from 1 to 102. Bread was the least likely food, whereas spicy foods were the most commonly identified foods (Table 2). Of 396 participants with gustatory rhinitis, 274 (69%) had experienced symptoms within the past 12 months.

Quality-of-Life Responses

Interestingly, of the 396 participants who had experienced gustatory rhinitis, 65% “never” avoided the food that resulted in symptoms, whereas 30% “sometimes” avoided the food, and 5% “always” avoided the food. No significant age or sex difference was found regarding avoidance behavior. Of the 396 participants who had gustatory rhinitis, 183 (46%) were “never bothered” by the food that caused the rhinorrhea, whereas 39% were bothered “just a little,” 12% were “somewhat bothered,” 2% were “very bothered,” and 1% were “extremely bothered.” Only 18 participants (4%) who re-

Table 1. Relationship Among Gustatory Rhinitis, Sex, and Self-Reported Allergic Rhinitis, Asthma, Food Allergy, History of Smoking, and Atopic Dermatitis^a

Variable	No. (%) of patients (n = 571)	Crude OR (95% CI)	P value	Adjusted OR (95% CI)	P value
Male	276 (48)	0.80 (0.56–1.14)	.24	0.78 (0.53–1.14)	.20
Allergic rhinitis (ever)	113 (20)	2.97 (1.71–5.16)	<.001	2.70 (1.53–4.78)	<.001
Asthma (ever)	80 (14)	1.49 (0.86–2.59)	.19	1.15 (0.65–2.06)	.62
Food allergy (ever)	50 (9)	1.85 (0.90–3.78)	.11	1.37 (0.65–2.88)	.41
Smoker (ever)	242 (42)	1.32 (0.92–1.90)	.14	1.47 (1.00–2.16)	.049
Atopic dermatitis (ever)	91 (16)	1.37 (0.82–2.28)	.26	1.16 (0.68–1.97)	.58

Abbreviations: CI, confidence interval; OR, odds ratio.

^a Gustatory rhinitis was defined as symptoms occurring after more than 1 reported food.

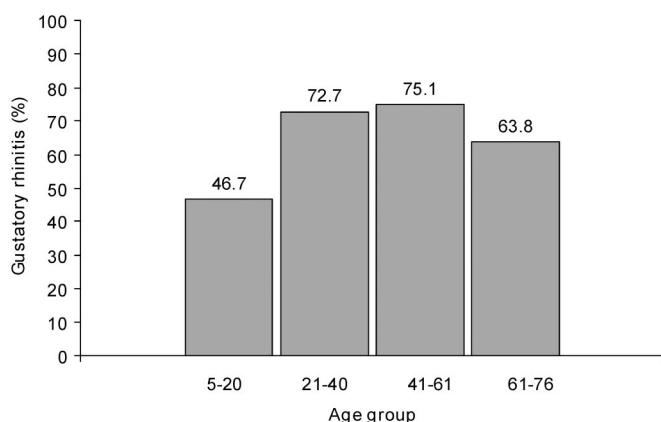


Figure 2. Percentage of respondents by age who reported gustatory rhinitis.

Table 2. Least Likely and Most Common Foods Associated With Gustatory Rhinitis

Food	Patients, %
Never associated	
White bread	94
Cracker	94
Pasta	94
Pretzels	94
Dinner roll	94
Whole wheat bread	94
Rice	94
Bagel	93
Beef, veal	93
Sometimes or always associated	
Hot chili peppers	49
Red cayenne	45
Tabasco sauce	45
Red pepper	38
Horseradish	30
Black pepper	25
Hot and sour soup	24
Onion	24
Chili	20

ported gustatory rhinitis symptoms had ever tried to use a medication to reduce symptoms before eating a food. The group with gustatory rhinitis who used medication before eating ($n = 18$) were affected by a significantly greater number of foods than those not using medications ($n = 378$) (19.7 ± 21.6 vs 11.3 ± 16.1 ; $P = .03$).

DISCUSSION

Before this report, only a limited number of articles focused on gustatory rhinitis. A MEDLINE search for the keyword *gustatory rhinitis* yielded only 6 pertinent articles⁶⁻¹¹; only 1 article had a limited food survey of 60 adults.⁶ In this study of 571 patients, 69% indicated experiencing gustatory rhinitis to at least 1 food, whereas 31% of respondents experienced

no gustatory rhinitis symptoms whatsoever, regardless of the food. We were surprised to find that 44 respondents (8%) implicated more than 20 foods and that no single food was tolerated by all 571 participants. Spicy foods were identified as the most common culprit in our study (49%), which is in general agreement with 2 studies that reported prevalence of 38%⁵ and 73%⁶ for similar spicy foods.

This study disclosed several other important observations and features of gustatory rhinitis. Sex and a history of asthma, food allergy, or atopic dermatitis was not associated with gustatory rhinitis, whereas a history of allergic rhinitis and smoking was associated with gustatory rhinitis (Table 1). Also, although gustatory rhinitis was observed in all age groups, peak prevalence occurred in 20- to 60-year-olds but actually decreased in the group older than 60 years (Fig 1), which is contrary to the typical belief that this condition mainly occurs in “older patients.”³

Perhaps in agreement with the usually cursory discussion of this phenomenon suggesting its limited clinical importance, 65% of respondents who had gustatory rhinitis never avoided the causative food(s) and 46% were never bothered by their runny nose. On the other hand, approximately one-third of patients made conscious food selection changes based on their symptoms, and more than half of patients were bothered by their symptoms; similar quality-of-life changes have been reported for patients with perennial nonallergic and allergic rhinitis.¹²

This study has several limitations, some in regard to the survey and others concerning self-reported medical diagnoses and interpretation of gustatory rhinitis symptoms. Participants enrolled were patients at a major medical center outpatient clinic. We chose to administer the survey in an unrelated specialty clinic to limit reporting bias in patients who present with a chief concern of rhinitis. Allergic rhinitis, which was associated with gustatory rhinitis in this survey, was self-reported and may have been subject to interpretation bias. However, the prevalence of allergic rhinitis (20%), asthma (14%), and atopic dermatitis (16%) in our survey approximated current reports.^{1,13} Also, reported smoking history did not distinguish between active and prior smokers or habits such as smoking during meals. Finally, we introduced potential bias in the questionnaire introduction by describing “the most common causes of gustatory rhinitis are hot, spicy foods.” We included this survey statement, because most patients who underwent pilot-testing before starting this study needed a better example of gustatory rhinitis and would have potentially interpreted rhinorrhea during food ingestion as ongoing allergic or nonallergic rhinitis. Currently, there are no validated or gold standard procedures for the diagnosis of gustatory rhinitis, so survey answers could not be validated. Also, our finding that prevalence of gustatory rhinitis decreased after the age of 60 years may have been attributable to fewer participants sampled in the older than 60-year-old group ($n = 47$) compared with 77, 242, and 205 sampled in the 5- to 20-, 21- to 40-, and 41- to 60-year-old groups, respectively. Finally, we could not differentiate the causes of

food-related symptoms. Participants with oral allergy syndrome, IgE-mediated food allergy, or auriculotemporal syndrome could have misinterpreted their symptoms as “gustatory rhinitis” despite defining gustatory rhinitis as rhinorrhea alone with food ingestion.

Smoker’s rhinitis is another type of nonallergic rhinitis that results from irritation of the nasal lining and increased nasal secretion.¹⁴ Smoking has been shown to have a combined effect on nonspecific airway hyperresponsiveness in patients with allergic rhinitis compared with smokers who did not have allergic rhinitis.¹⁵ Whether smoking has a direct or combined effect for the parasympathetic-mediated gustatory rhinitis is unknown.

In summary, this study represents the largest known survey of gustatory rhinitis and the first to evaluate food and avoidance behavior. Clearly, allergic and nonallergic rhinitis coexist, but further study is recommended to establish a validated measurement for gustatory rhinitis and exploration of the increased association of gustatory rhinitis with allergic rhinitis and a history of smoking that was observed in this survey.

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