

Food Groups that Exacerbate Sinusitis among Saudi Patients

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Abstract

Objective This study aimed to identify associations between specific food categories and aggravation of symptoms of chronic rhinosinusitis.

Methods This was a prospective, cross-sectional questionnaire study. Patients provided details about the categories of food that they consumed, as well as symptoms related to sinusitis. The data was extracted onto a spreadsheet and analysed using chi-square testing.

Results A small percentage of patients (4%) associated food categories with exacerbations of sinus symptoms. Chocolate was the most common trigger, followed by white flour foods. Several patients (33%) were not aware of the association between food and sinus symptoms.

Conclusion Some food categories can exacerbate sinusitis in a specific population subset. Patients should be encouraged to maintain a food diary so that they can identify relevant triggers and these can be avoided in the future.

Keywords Rhinosinusitis, cross-sectional study, food allergy, histamine, chocolate, white flour

Introduction

Rhinosinusitis is an extremely common health complaint, and affects up to 14.7% of the population in the United States each year. Although this condition is not associated with extreme morbidity or mortality, it is nevertheless responsible for a decrease in the quality of life and loss of productivity. The direct healthcare costs owing to this condition are estimated to be \$2.4 million each year, excluding the cost of radiographic imaging and surgery.¹

Acute rhinosinusitis is usually of viral origin, and the disease is self-limiting. On the other hand, chronic rhinosinusitis is extremely difficult to manage, and its etiology remains obscure. While it was earlier suggested that pathogens play a role in the emergence of chronic rhinosinusitis, experts now concur that this condition occurs due to an imbalance between the host, micro-organisms and other exogenous factors such as allergens.²

Recent studies have attributed greater importance to the role of food allergens in the development of chronic sinusitis. Food allergens are already known risk factors for lower respiratory tract conditions such as asthma.³ Few studies have also established that patients with chronic rhinosinusitis are more likely to have food allergies as compared to controls.^{4,5} Moreover, food allergens and aeroallergens have been shown to have cross-reactivity.⁶

In this context, it would be helpful to document specific foods that are known to trigger episodes of rhinosinusitis in the adult population. Although several anecdotal reports are available pertaining to foods that must be avoided in chronic sinusitis, quantitative scientific evidence on this subject is lacking. Therefore, the aim of the current study was to identify

specific categories of foods that could trigger exacerbations of rhinosinusitis.

Patients and Methods

The current study was a cross-sectional, questionnaire study. This study was conducted in accordance with the STROBE guidelines for cross-sectional studies,⁷ and ethical approval was obtained from the Institutional Review Board prior to beginning the study.

The source of samples for the study included patients who attended the outpatient Department of Family Medicine at King Abdulaziz University in the Kingdom of Saudi Arabia. Patients aged between 18 to 80 years, who were diagnosed with chronic rhinosinusitis were included in the study. Patients outside this age group, and who did not receive a definite diagnosis of chronic rhinosinusitis were excluded. Patients who already had documented food allergies were also excluded.

A written informed consent was obtained from all patients who met the inclusion criteria and consented to be a part of the study. These patients were asked to complete a questionnaire. Apart from demographic details, the questionnaire collected information pertaining to five specific food groups – processed foods, high-calorie foods, fried foods, fatty meats, and foods high in sugar. Participants were questioned on the development of symptoms of sinusitis in relation to these food groups.

Information from the questionnaire study was collected and extracted onto a digital spreadsheet. Descriptive analysis of all the data was performed. The frequency of symptoms between the different food groups was assessed using the chi square test or Mc Nemar's exact test. All data analysis was carried out using SPSS version 22.

Results

A total of 630 patients were recruited for the study. Of these, 481 patients were female (76.35%) and 149 patients were male (23.65%). The age of all the patients ranged from 18 to 77 years, with a mean age of 30.48 years. While all patients had been suffering from chronic rhinosinusitis, the duration of the current episode varied. At least 65.14% of all patients had been experiencing exacerbations for 2–8 weeks, and 43.6% of the patients had experienced exacerbations for longer than 12 weeks. Only 13% of the patients reported that the current episode lasted for 4 to 8 weeks.

Six categories of foods were studied as potential sinus irritants. On an average, 4% of patients associated sinus exacerbations with different categories of foods. The highest food irritant appeared to be chocolate, which triggered sinus symptoms in 7.6% of all patients; followed by white flour foods, which triggered symptoms in 6.3% of all patients. The food that was least associated with sinus symptoms was mashed potatoes, which only exacerbated symptoms in 1.7% of all patients. The frequency of sinusitis exacerbations with different food groups is outlined in Table 1.

We performed cross-comparisons of each of these food categories with each other. This is outlined in Table 2. In the cross-comparisons, it was noted that the frequency of sinus symptom exacerbation with mashed potatoes was significantly less as compared to the other food groups. The frequency of symptom exacerbation was significantly higher with chocolate as compared to pastries, fatty meats, white sugar and fried foods. A significantly high increase in symptom frequency was also observed when white flour foods were consumed, as compared to white sugars. None of the other comparisons showed significant differences.

One important finding that emerged from this questionnaire study was the lack of awareness that many patients had in correlating dietary foods to their sinusitis symptoms. Between 27% to 33% of all patients were not able to provide information on whether or not different foods triggered sinus symptoms.

Discussion

This cross-sectional questionnaire study attempted to identify specific food groups that could trigger symptoms of sinusitis in patients with already established rhinosinusitis. Overall, it was revealed that only a small percentage of symptom

exacerbations are associated with consumption of specific food groups. Nevertheless, these findings could play a key role in managing those patients in whom there are obvious food triggers.

Several alternative medicine streams believe that diet that a patient consumes is strongly related to exacerbation of chronic rhinosinusitis. Some of the foods that alternative experts recommend avoiding include dairy products, sugars, caffeine and refined foods. It has been suggested that specific food categories, such as dairy products, wheat and corn, can lead to formation of 'globular' mucus rather than 'planar' mucus that may be difficult to drain.⁸

While allopathic medicine has not moved completely in this direction, there are a few studies that have been conducted in relation to diet and chronic rhinosinusitis.

There are a few studies in literature that have evaluated the effect of diet on related conditions. Calatayud et al. assessed the effect of the Mediterranean diet on children who had recurrent colds and frequent inflammatory complications.⁹ The Mediterranean diet encourages the consumption of fresh fruits, vegetables and whole grains, as well as fish and healthy fats. Dairy consumption is suggested in moderation and meat consumption is limited. When this diet was followed by 128 children in the study, the authors noted decrease in the intensity and number of catarrhal episodes, as well as a decrease in antibiotic use and hospital visits. The influence of diet in childhood upper respiratory tract infections was confirmed by a multicentre randomized controlled trial, conducted by van der Gaag et al.¹⁰ In their study, 118 children were divided into two groups. The study group received dietary advice, advising the consumption of green leafy vegetables, beef and whole dairy. They found that patients who received dietary advice had, on an average, 2.9 lesser episodes per month as compared to the control group.

Dietary modification has also been successful in patients with other kinds of allergy-based disorders. In a separate study, Calatayud et al. studied the effect of the Mediterranean diet in childhood asthma.¹¹ The authors observed that in patients following this diet, there was a decrease in frequency of asthmatic attacks, as well as a decrease in the use of inhaled corticosteroids. Despite several study in closely related areas, there are no dietary studies in literature that specifically relate to chronic rhinosinusitis.

One explanation for triggering of symptoms in patients with chronic sinusitis could be the release of histamine. Several food items have been associated with high amounts of histamine. These include fermented foods, citrus and certain other fruits, nuts, certain types of fish and chicken. However, each of these food substances encompasses a wide variety of diets and have not been studied fully. Two separate studies assessed the effect of low-histamine diet on urticarial, which is essentially an allergic condition.^{12,13} Both these authors reported that low-histamine diets were beneficial in decreasing symptoms of urticarial and improving the quality of life.

In the current study, chocolate was identified as the most significant trigger for symptoms of rhinosinusitis. Chocolate is technically a form of fermented food, as it is derived from cocoa beans, which are fermented forms of cacao seeds. It is high in histamine and also triggers histamine release in the body.¹⁴ In addition, chocolate also contains some amount of dairy content and sugar, which are possibly, by themselves, potential triggers for exacerbation of sinusitis. The next high

Table 1. Frequency of rhinosinusitis symptoms on consumption of different food groups

| Food category | No. of patients with sinus symptom exacerbation | Percentage |
|-----------------|---|------------|
| Fried foods | 27 | 4.9 |
| White sugar | 20 | 3.7 |
| White flour | 34 | 6.3 |
| Fatty meats | 23 | 4.2 |
| Mashed potatoes | 9 | 1.7 |
| Pastries | 24 | 4.4 |
| Chocolate | 41 | 7.6 |

Table 2. **Comparative analysis of food groups and their frequency in triggering symptoms of rhinosinusitis**

| Food categories | Sinusitis aggravated | No aggravation | Chi-square value | P-value |
|---------------------------------|----------------------|----------------|------------------|---------|
| Chocolate vs. white flour | 41 34 | 350 331 | 0.3309 | 0.565 |
| Chocolate vs. fried foods | 41 27 | 350 341 | 2.304 | 0.128 |
| Chocolate vs. pastries | 41 24 | 350 363 | 4.66 | 0.03 |
| Chocolate vs. fatty meats | 41 23 | 350 358 | 5.024 | 0.02 |
| Chocolate vs. white sugar | 41 20 | 350 345 | 6.38 | 0.01 |
| Chocolate vs. mashed potatoes | 41 9 | 350 383 | 21.96 | <0.0001 |
| White flour vs. fried foods | 34 27 | 331 341 | 0.94 | 0.33 |
| White flour vs. pastries | 34 24 | 331 363 | 2.56 | 0.11 |
| White flour vs. fatty meats | 34 23 | 331 358 | 2.83 | 0.09 |
| White flour vs. white sugar | 34 20 | 331 345 | 3.91 | 0.04 |
| White flour vs. mashed potatoes | 34 9 | 331 383 | 17.38 | 0.00003 |
| Fried foods vs pastries | 27 24 | 341 363 | 0.39 | 0.54 |
| Fried foods vs fatty meats | 27 23 | 341 358 | 0.51 | 0.47 |
| Fried foods vs white sugar | 27 20 | 341 345 | 1.04 | 0.31 |
| Fried foods vs mashed potatoes | 27 9 | 341 383 | 10.69 | 0.0011 |
| Pastries vs. fatty meats | 24 23 | 363 358 | 0.0091 | 0.92 |
| Pastries vs. white sugar | 24 20 | 363 345 | 0.18 | 0.67 |
| Pastries vs. mashed potatoes | 24 9 | 363 383 | 7.32 | 0.0068 |
| Fatty meat vs. white sugar | 23 20 | 358 345 | 0.11 | 0.74 |
| Fatty meats vs mashed potatoes | 23 9 | 358 383 | 6.81 | 0.009 |
| White sugar vs mashed potatoes | 20 9 | 345 383 | 5.19 | 0.022 |

trigger, white flour, has been associated with several other inflammatory conditions such as celiac disease.¹⁵ All the other food categories evaluated in this study have also been anecdotally associated with inflammation; however, we found low correlation for mashed potatoes, which was the only natural food that was being studied.

The next step to identifying known triggers is naturally to validate these triggers, followed by management solutions that involve avoidance. There is a definite need to design and implement randomized controlled trials, similar to the one designed by van der Gaag et al.,¹⁰ evaluating each of the specific food categories against controls. Once evidence based triggers are identified, proper dietary advice can go a long way

in reducing frequency and severity of symptoms in patients suffering from chronic rhinosinusitis.

Conclusion

In the current study, we were able to identify chocolate as one of the leading triggers of symptoms of rhinosinusitis. We also identified other forms of processed foods that could trigger inflammation and aggravate sinusitis. Based on the results of this study, we recommend that patients suffering from this condition must maintain a food diary and also record their symptoms. This can help identify triggers in individual patients and can guide management of this condition.

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