



Is suicidal ideation associated with allergic asthma and allergic rhinitis?

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INTRODUCTION

The prevalence of suicidal ideation (SI) in the general population is approximately 9%.⁽¹⁾ However, this prevalence seems to be higher in people with chronic diseases, such as diabetes, arthritis, COPD, and asthma.⁽²⁻⁴⁾

Suicidal behavior is a dynamic process; its initial manifestation is ideation that can lead to suicide intent and ultimately to its consummation. To explain the propensity to suicide, a proposed model includes suicide vulnerability (personal or familial history of suicide); mood disorder vulnerability (presence of major depression or bipolar disorder); and allergy vulnerability (the production of specific IgE against pollens has been reported to be associated with this propensity).⁽⁵⁾

The evidence suggests the existence of an association between SI and allergic respiratory diseases, the majority of these results coming from epidemiological studies,^(4,6,7) and one study found no such an association.⁽⁸⁾ Therefore, our main objective was to verify whether SI is associated with allergic respiratory diseases in the clinical context of patients attending a university teaching hospital.

ABSTRACT

Objective: To investigate whether there is an association between suicidal ideation (SI) and allergic diseases in adults. **Methods:** This was a comparative cross-sectional study involving individuals ranging from 20 to 50 years of age recruited from a university hospital in the city of Guadalajara, Mexico. We included patients with a confirmed diagnosis of allergic asthma, those with a confirmed diagnosis of allergic rhinitis, and healthy controls. All subjects completed the Beck Depression Inventory-II (BDI-II), which includes an item that evaluates the presence of suicidal thoughts or desires within the last two weeks, in order to identify SI. **Results:** The sample comprised 115 patients with allergic asthma, 111 patients with allergic rhinitis, and 96 healthy controls. The number of individuals identified with SI in the three groups were, respectively, 17 (14.8%), 13 (11.7%), and 8 (8.3%). Regarding the presence of SI, no statistically significant association was found in the allergic asthma group (OR = 1.98; 95% CI: 0.78-4.64; p = 0.154) or in the allergic rhinitis group (OR = 1.46; 95% CI: 0.58-3.68; p = 0.424) when they were compared with the control group. However, the presence of depression was associated with SI in the three groups: allergic asthma (OR = 12.36; 95% CI: 2.67-57.15; p = 0.001); allergic rhinitis (OR = 6.20; 95% CI: 1.66-23.14; p = 0.006); and control (OR = 21.0; 95% CI: 3.75-117.36; p < 0,001). **Conclusions:** In comparison with the control group, no association was found between SI and the groups with allergic diseases. In contrast, there was association between SI and depression in the three groups.

Keywords: Suicidal ideation; Asthma; Rhinitis, allergic; Adult.

METHODS

The present study was carried out at a university hospital that provides health care to the population in the metropolitan area of Guadalajara, Mexico. In this comparative cross-sectional study, the subjects were recruited consecutively from an outpatient immunology and allergy clinic between March of 2013 and February of 2014.

All of the patients underwent clinical and physical evaluation. The diagnosis of asthma was established in accordance with the Global Initiative for Asthma (GINA)⁽⁹⁾ criteria and forced spirometry results showing airflow obstruction and significant improvement in FEV₁ (≥ 12% and ≥ 200 mL) after the administration of 400 µg of albuterol.⁽¹⁰⁾ Thereafter, patients were categorized by asthma severity in accordance with the GINA criteria.⁽⁹⁾

Allergic rhinitis was defined as the presence of typical symptoms: nasal congestion and hyaline rhinorrhea, as well as sneezing or nasal pruritus after aeroallergen exposure. The patients were then distributed by their clinical course in accordance with the Allergic Rhinitis

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and Its Impact on Asthma guidelines.⁽¹¹⁾ The allergic condition of asthma and rhinitis was defined by the presence of at least one positive skin prick test against a regional aeroallergen panel. The interpretation of these tests were carried out by a specialist in allergy who interpreted the results in accordance with recommendations by the European Academy of Allergy and Clinical Immunology.⁽¹²⁾

The patients (20-50 years of age) diagnosed with allergic asthma or allergic rhinitis were divided into two groups. Those with a history of diabetes, hypertension, cancer, rheumatic diseases, or any other chronic disease were excluded. Pregnant or breastfeeding women were also excluded. Healthy blood donors who came to the hospital during the study period and volunteered to participate in the study formed a third group (control). All participants gave written informed consent.

In order to identify SI, all of the subjects from each group completed the Spanish-language version of Beck Depression Inventory-II (BDI-II),⁽¹³⁾ a 21-item list of symptoms, with corresponding multiple-choice questions (with a score ranging from 0 to 3). Depression was confirmed if the final score was greater than 13 points. Item 9 of BDI-II evaluates the presence of suicidal thoughts or wishes within the past two weeks and has the following response options: 0) "I don't have thoughts of killing myself;" 1) "I have thoughts of killing myself, but I would not carry them out;" 2) "I would like to kill myself;" and 3) "I would kill myself if I had the chance." SI was defined as any response other than 0 to that item.

The physicians (previously trained by a psychologist) responsible for the medical attention of the patients applied the BDI-II to the patients on the same day they received their diagnosis, as well as to the volunteers when they gave written informed consent.

In order to identify the proportion of depression and SI in the three groups, the relative frequency was calculated; in addition, we used descriptive statistics. To establish the association of SI with atopic respiratory diseases and the association of depression with SI, we calculated the odds ratios with a 95% confidence

interval. Any p value smaller than 0.05 was considered significant. The analyses were performed with the use of the IBM SPSS Statistics software package, version 20.0 (IBM Corporation, Armonk, NY, USA).

The present study was supervised and approved by the research ethics committee of the university hospital. During the study period, all the participants who were found to have SI or depression symptoms were sent to a psychologist for specialized attention and care.

RESULTS

The sample comprised 322 individuals, divided into three groups: allergic asthma (n = 115), allergic rhinitis (n = 111), and control (n = 96). The majority of the subjects were in the fourth decade of life (Table 1). A significant predominance of females was found in the two study groups. Alcohol consumption was significantly higher in the control group than in the allergic asthma and allergic rhinitis groups (p < 0.001). The proportion of current smokers was higher in the control group than in the allergic asthma group (p < 0.001), but it was similar between the allergic rhinitis group and the control group (p > 0.05). The BDI-II scores were significantly higher in the allergic asthma and allergic rhinitis groups than in the control group; however, only the subjects with allergic asthma showed a significant higher frequency of depression when compared with the control group (p < 0.001). The proportions of subjects presenting with SI in allergic asthma group, allergic rhinitis group, and control group were, respectively, 14.8% (17/115), 11.7% (13/111), and 8.3% (8/96; Table 2). There was no statistically significant difference in the frequency of SI in relation to the severity of allergic diseases (p > 0.05; Table 3).

The presence of SI showed no statistically significant difference in the allergic asthma or allergic rhinitis groups (OR = 1.98; p = 0.154; and OR = 1.46; p = 0.424, respectively) when they were compared with the control group (Table 4). However, the presence of SI did show a significant association with the presence of depression in the three groups (Table 5).

Table 1. Clinical characteristics of the population studied.^a

Variable	Group		
	Allergic asthma (n = 115)	Allergic rhinitis (n = 111)	Control (n = 96)
Age, years	36.2 ± 8.8	32.0 ± 10.4	32.1 ± 9.7
Female sex	100 (87.0)*	82 (73.9)**	37 (38.5)
Current smoking	8 (7.0)*	9 (8.1)	14 (14.5)
Current alcohol consumption	21 (18.3)*	27 (24.3)**	49 (51.0)
Physical activity, active	57 (49.6)*	68 (61.3)	71 (74.0)
Hours of sleep	7.3 ± 1.4	7.1 ± 1.7	7.5 ± 1.2
BMI, kg/m ²	28.2 ± 6.4	26.1 ± 5.7	26.9 ± 3.7
BDI-II score	13.0 ± 8.8*	9.7 ± 8.7*	6.7 ± 7.0
Depression	52 (45.2)*	29 (26.1)	17 (17.7)

BMI: body mass index; and BDI-II: Beck Depression Inventory-II. ^aValues expressed as n (%) or mean ± SD. *p < 0.001 (allergic asthma vs. control). **p < 0.05 (allergic rhinitis vs. control).

DISCUSSION

Our results show no association between SI and allergic respiratory diseases in adults. However, they support the association between depression and SI.

The frequency of SI in the allergic asthma group was 14.8%; this proportion is within the range of the results in two major epidemiological studies, which showed a disagreement in terms of SI prevalence among patients with asthma: Clarke et al.⁽⁴⁾ reported a prevalence of SI (without suicidal intent) of 12.1%, whereas Druss et al.⁽¹⁴⁾ reported an SI prevalence of 30.4%. These differences in the prevalence of SI can be partially explained by the way SI and asthma were defined. When the results are obtained from a clinical setting (11.5% to 12.6%),^(15,16) the proportion of asthma patients with SI is more consistent with our results. In relation to the prevalence of SI in patients with allergic rhinitis, very few studies are available; our study provides valuable information on that account, since 11.7% of participants had SI, which is similar to the results by Messias et al.,⁽⁶⁾ in which 10.5% of the interviewed population were seriously considering to commit suicide.

Previous studies have shown an increase in the risk of SI among patients with asthma. Druss et al.⁽¹⁴⁾ reported that subjects with asthma had an up to two-third increase in the possibility of having SI (OR = 1.69; p = 0.01). In 2003, Goodwin et al.⁽¹⁶⁾ studied patients selected from primary care units and reported that asthma was associated with SI (OR = 1.9; 95%

CI: 1.3-3.4; p < 0.05), even after adjusting for other mental conditions. In 2012, Goodwin et al.⁽⁷⁾ reported a similar finding, since current asthma was significantly associated with an increased risk of SI (OR = 1.77; 95% CI: 1.97-5.39); however, that same group of researchers partially failed to document this association by means of a population study (OR = 1.09; 95% CI: 0.81-1.45), since they could only find it when SI was accompanied by suicidal intent (OR = 1.98; 95% CI: 1.42-2.76).⁽⁴⁾ We consider that the positive association between asthma and SI shown in those previous studies can be a consequence of inadequate diagnostic evaluation and lack of categorization of asthma phenotypes, as well as the absence of chronic disease-free individuals. In our study, no association was found between asthma and SI, even after diagnostic confirmation by means of pulmonary function tests; however, the fact that we included only patients with allergic sensitization might have influenced the results, since atopic patients have a less severe clinical course, are younger, and present with an earlier onset of the disease when compared with nonallergic asthma patients.⁽¹⁷⁾ This circumstance could allow their better coping with and accepting their disease, reducing the possibility of having suicidal thoughts. However, we found no association between asthma severity (in accordance with the GINA criteria)⁽⁹⁾ and the frequency of SI; this supports the fact that neither asthma nor atopy is a factor related to SI and that depression is the most likely origin of it. Finally, the use of medications for asthma control has also been implicated in the etiology of SI.⁽¹⁵⁾ This circumstance was beyond the scope of our study, because most of the patients used bronchodilators as the only therapeutic measure (data not shown).

Table 2. Prevalence of suicidal ideation in relation to the type of respiratory disease.

Group	Participants, n	Suicidal ideation	
		n	% (95% CI)
Allergic asthma	115	17	14.8 (8.3-21.3)
Allergic rhinitis	111	13	11.7 (5.7-17.7)
Control	96	8	8.3 (2.8-13.8)

Table 4. Association between atopic respiratory diseases and suicidal ideation in the groups studied.

Group	OR	95% CI	p
Control	1 (reference)	---	---
Allergic Asthma	1.98	0.78-4.64	0.154
Allergic rhinitis	1.46	0.58-3.68	0.424

Table 3. Frequency of suicidal ideation in relation to the degree of severity of the allergic disease.^a

Group	Symptom	Suicidal ideation		p*
		Yes	No	
Allergic rhinitis (n = 111)	Frequency			0.85
	Intermittent	3 (10.7)	25 (89.3)	
	Persistent	10 (12.0)	73 (88.0)	0.67
	Severity			
Mild	2 (9.1)	20 (90.9)	0.70	
Moderate/severe	11 (12.4)	78 (87.6)		
Allergic asthma (n = 115)	Severity			0.70
	Mild	8 (18.2)	36 (81.8)	
	Moderate	6 (12.0)	44 (88.0)	
	Severe	3 (14.3)	18 (85.7)	

^aValues expressed as n (%). *Chi-square test.

Table 5. Association between suicidal ideation and depression in the three groups studied.^a

Group	OR	95% CI	p
Allergic asthma	12.36	2.67-57.15	0.001
Allergic rhinitis	6.20	1.66-23.14	0.006
Control	21.0	3.75-117.36	0.0005

^aThe comparison group comprised the subjects without depression.

In our study, we were unable to confirm the association between allergic rhinitis and SI. This result differs from those found in another study, in which seasonal allergic rhinitis was statistically related to SI (OR = 1.27; 95% CI: 1.01-1.59) but not with a history of suicide intent (OR = 1.16; 95% CI: 0.89-1.52).⁽⁶⁾ However, similarly to asthma, this association must be interpreted with caution, since the clinical behavior of seasonal allergic rhinitis differs from the perennial type; moreover, the intensity of symptoms might be an intervening factor in the risk for SI. In our population with allergic rhinitis, neither severity nor frequency of the symptoms was related to SI; hence, this result further supports the concept that neither asthma nor atopy is the origin of SI.

Comparing the frequencies of SI in our sample with those obtained from a wide epidemiological study carried out in Mexico⁽¹⁸⁾ (from 7.1% to 11.48% according to age group), we can confirm that the results are similar. It would appear that, considering the Mexican population at least, the association of asthma and allergic rhinitis with SI is unlikely and that other factors are the major source of this type of behavior.

The most significant factor associated with SI in patients with allergic respiratory diseases was depression. A similar finding was reported by Botega et al.⁽¹⁹⁾ using a cohort of patients admitted to the infectious diseases, oncology, and hematology departments in a university hospital (OR = 9.1; 95% CI: 6.4-12.9; p = 0.0001). In another study,⁽²⁰⁾ the results were conflicting, since the research showed that thyroid problems, seizures, syncope, and hepatic diseases were associated with SI regardless of the age of the patients and the presence of depression. However, they found no association between SI and major stroke events (OR = 1.63; 95% CI: 0.78-3.40; p = 0.19), in which depression was the generating factor of SI.⁽²⁰⁾ Based on the results found in our sample, we believe that the disease in itself is not the most important promoting factor of SI, since we found that depression was the component that explained this behavior; this has been further established, since the subjects in the control group showed this similar finding. Additionally, other factors, such as unemployment, smoking, alcohol consumption, depression, hospitalization, low income, history of financial crisis, chronic pain, history of psychiatric disease, and sleep disorders, among others, must be considered as factors that intervene in the development of SI as well.^(1,21-23)

A population-based study carried out in Denmark showed that people with a history of atopic disease were at a higher risk of suicide.⁽²⁴⁾ Additionally, there are regions in the world where a substantial increase in the number of suicides are reported during spring. A possible explanation of these phenomena has to do with pollen concentrations in the air.⁽²⁵⁾ However, this is not the case for all types of pollen, and, apparently, it was only observed in women.⁽²⁶⁾ In addition, a recent study was unable to replicate those findings.⁽⁸⁾ To the best of our knowledge, studies regarding the relationship between SI and allergic diseases are scarce, and, in that sense, our study provides relevant information.

From a molecular perspective, there is increasing evidence that various mediators of inflammation play an important role in the physiopathology of major depression and suicidal behavior, since a positive association between suicidal tendencies and serum levels of IL-2, IL-6, IL-8, TNF- α and VEGF has been documented.⁽²⁷⁾ Neuropeptides, such as the corticotropin releasing factor, neuropeptide VGF, cholecystokinin, substance P, and neuropeptide Y, have also been implicated.⁽²⁸⁾

As for the limitations of our study, the identification of SI and depression was not confirmed by means of a precise instrument. We used the BDI-II, which has been validated in multiple occasions; however, this tool only determines the presence of SI within the last two weeks, and this may reflect the presence of triggering psychological factors other than the influence of allergy on SI. With the purpose of not overestimating the frequency of SI, we excluded adolescents and elderly adults from our study, since the reported proportion of SI in these age groups is higher. Therefore, our results must be interpreted with caution regarding age. Similarly, we highlight the fact that the results of this study reflect the behavior of highly selected subjects who were also recruited from a hospital that serves the general population in an area where most patients have a low socioeconomic level. Another limitation was the gender disproportion of the allergic rhinitis and allergic asthma groups when compared with the control group. Other types of variables, such as unemployment, smoking, alcohol consumption, recent loss of loved ones, and sleep disorders, were not considered in the data analysis. Nevertheless, among the strengths of the present study, we must highlight that the diagnosis of allergic asthma was not made based on questionnaires or on the review of medical records; it has been established by clinical history, physical examination, and pulmonary function tests compatible with reversible airway obstruction, whereas atopy was defined by a positive result in a skin prick test against regional aeroallergens.

In summary, our findings contradict the hypothesis of an association between allergic respiratory diseases or their severity and SI; in fact, our results show that SI is another component of the spectrum of depression symptoms.

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