Prevalence of allergic rhinitis in the United States

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The study objective was to examine the current national prevalence of allergic rhinitis by gender, age, geographic region, population density (urban/rural), and household income. A self-administered questionnaire was sent to 15,000 households representative of the U.S. population in respect to these factors. The household member who knew the most about the family's health status and health history in the previous 12 months was asked to estimate the number of days during which household members had experienced sneezing, runny nose, stuffy nose or head, itchy eyes, or watery eyes. They were also asked about physician diagnosis of hay fever, rhinitis, persistent stuffy nose or head, or allergies involving the eyes, nose, or throat. The 9946 households responding (66.3%) represented 22,285 persons, 8394 of whom had experienced the symptoms described. In a follow-up questionnaire sent to a balanced sample of 1450 responders (>90% white, slightly more females than males), subjects were asked to indicate which of the following best described their symptoms: a common cold; a seasonal allergy (i.e., hay fever); an allergy I have all the time; an allergy only when exposed to triggers (i.e., dust, pollution); or sinus problems. Of the 1065 subjects (73.4%) responding, 31.5% reported ≥7 days of nasal/ocular symptoms, and 17.7% reported ≥31 days of symptoms. Physician-diagnosed hay fever was reported by 8.2% and allergic rhinitis (seasonal plus perennial) by 14.2%. Prevalence was highest among those age 18 to 34 years and 35 to 49 years, decreasing after age 50 years. No major trends were evident with regard to other variables studied. Extrapolation based on 1993 census data suggests that at least 35.9 million persons have symptoms associated with allergic rhinitis and up to 79.5 million persons experience ≥7 days of nasal/ocular symptoms yearly. (J Allergy Clin Immunol 1997;99:S808-14.)

Key words: Allergic rhinitis, self-administered questionnaire, prevalence, hay fever, immunoglobulin E (IgE)

> Sunday, September 13, 1885—Cheyenne. "In house all day suffering more from hay fever than I have at any time this season, all for want of cocaine which give out yesterday and there is none in town . . ."
>
> From midsummer until late fall John Hunton suffered more severely from hay fever than any other man the writer has ever known. His watery eyes would swell almost shut, he breathed with much difficulty and for weeks on end would prop himself up in bed at night for fear of choking.
>
> One August day when he was in his early eighties, some thirty-five years after the above entry . . . His affliction was at its height and pitiful to see. I asked him if he had ever found anything that would bring him relief. "Yes, Mr. Flannery," he replied, "I did, but I have not taken any of it now for thirty years or more." In response to my look of bewilderment he explained with a wry smile. "You see, it was cocaine. It brought me great relief for several years. Then I decided it was getting a hold on me and quit." And the subject was not again raised between us.
>
> *John Hunton's Diary, Wyoming Territory*[1]

Allergic rhinitis is an immunologic response modulated by IgE and characterized predominantly by sneezing, rhinorrhea, nasal congestion, and pruritus of the nose.[2, 3] It may be seasonal (a condition commonly referred to as hay fever) or perennial.[2] The seasonal form is caused by allergens released during tree, grass, or weed pollination, whereas the perennial form is caused by allergies to animal dander, dust mites, or mold spores with or without associated pollinosis. Data also suggest that urban air pollutants from automobiles and other sources may have an adjunctive effect.[4, 5]

Allergic rhinitis is generally accepted as the most common atopic disorder in this country,[3] a perception that is based for the most part on a series of community-based studies conducted in the 1960s and 1970s. Prevalences in these communities, which represented Colorado,[6] Iowa,[7, 8] California,[9] Michigan,[10] and Rhode Island,[11] ranged from about 4% to 26%. More recently, a nationwide survey of physician diagnoses, recorded in 1988 under the *International Classification of Diseases,* 9th revision (ICD9), allergic rhinitis classification, found a prevalence of 9.3%.[12] A survey of children in Tucson, in whom allergic rhinitis was diagnosed by a physician by age 6, found a prevalence of 42%.[13] A questionnaire directed to parents of children aged 5 to 8 years living in Seattle found a 9% prevalence of physician-diagnosed allergic rhinitis and an additional 24% with allergic rhinitis symptoms but lacking a physician diagnosis.[14]

Because rhinitic symptoms can be caused by a variety of conditions other than allergic rhinitis and there are no standardized criteria for diagnosis of allergic rhinitis, it is possible that this wide variation in prevalence data is a result of varying selection criteria used by the investigators. In addition, geographic location, differences in the relative numbers of children and adults included, or differences in the questionnaires used may also play a role.

The present study is the first to use data from a nationwide sample of 15,000 households representing all

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geographic regions of the United States. Prevalence data were estimated by a variety of criteria and further classified according to age, household income, gender, geographic location, and population density. Physician diagnosis of allergic rhinitis was also ascertained on the basis of self report.

MATERIAL AND METHODS

Sample

Target households were selected from a nationwide panel of approximately 200,000 households maintained by National Family Opinion Inc. (NFO), Toledo, Ohio. Potential households are identified by stratified probability sampling and contacted by mail. Updated demographic information is obtained on recruited households every 2 years. Full details regarding this database have been published elsewhere.[15]

Survey

In 1993, a self-administered screening questionnaire was sent to 15,000 randomly selected households from the NFO panel, with the request that it be answered by the household member who knew the most about the family's health status and health history in the previous 12 months. A total of 9946 households (66.3%) responded, for a total base population of 22,285 household members. A balanced sample of 1450 persons was then selected to receive a questionnaire containing detailed questions regarding symptoms, triggers, patient attitudes, and medical treatment. A total of 1065 persons (73.4%) responded to this second questionnaire.

Measures

The prevalence of allergic rhinitis was estimated as follows. In the screening questionnaire, subjects were asked about the number of days in the past 12 months during which sneezing, runny nose, stuffy nose or head, itchy eyes, or watery eyes had been experienced. Subjects were also asked whether anyone in the household had been diagnosed by a doctor as having hay fever, rhinitis, persistent stuffy nose or head, or allergies involving the eyes, nose, or throat. The follow-up questionnaire was sent to a balanced sample of subjects who had reported ≥7 days (singly or consecutively) of symptoms within the past year. It was postulated that symptoms present for <7 days could represent upper respiratory infections.

The second questionnaire asked patients to select the one term that best described their symptoms from the following options: (1) a common cold; (2) a seasonal allergy (i.e., hay fever); (3) an allergy I have all the time; (4) an allergy only when exposed to triggers (i.e., dust, pollution); (5) sinus problems; (6) other (please specify). Subjects who answered items (2) or (3) were included in the analysis of self-reported prevalence. Regardless of diagnostic criteria, all prevalence data were calculated, based on the population of responders to the screening questionnaire (22,285 persons).

The geographic classifications of the United States Bureau of the Census were used. These define four census regions in the continental United States (Northeast, Midwest, South, and West), which are subdivided into nine census divisions.[16] Prevalence data were also examined by gender and by five age categories (≤17, 18 to 34, 35 to 49, 50 to 64, and ≥65 years); five household income levels (<$12,500, $12,500 to $24,999, $25,000 to $39,999, $40,000 to $59,999, and ≥$60,000); and four levels of population density (rural, <100,000; urban, 100,000 to 499,999; urban, 500,000 to 1,999,999; and urban, ≥2 million).

TABLE I. Comparison of total households contacted with households reporting symptomatic persons

	No. of households (%)	No. of households with symptomatic persons (%)
Total	15,000 (100.0)	5273 (100.0)
Head of household age (yr)		
<30	1845 (12.3)	542 (10.3)
30–39	2947 (19.6)	1116 (21.2)
40–49	2292 (15.3)	939 (17.8)
50–59	1506 (10.0)	643 (12.2)
≥60	2070 (13.8)	757 (14.4)
Nonfamily households (yr)		
Male <35	735 (4.9)	158 (3.0)
Male ≥35	1123 (7.5)	264 (5.0)
Female <35	514 (3.4)	186 (3.5)
Female ≥35	1968 (13.1)	668 (12.7)
Annual household income ($)		
<12,500	2752 (18.3)	849 (16.1)
12,500–24,999	3132 (20.9)	1038 (19.7)
25,000–39,999	3367 (22.4)	1194 (22.6)
40,000–59,999	3019 (20.1)	1141 (21.6)
≥60,000	2730 (18.2)	1051 (19.9)
Household size (no. persons)		
1	3738 (24.9)	1070 (20.3)
2	4890 (32.6)	1809 (34.3)
3	2578 (17.2)	965 (18.3)
4	2314 (15.4)	872 (16.5)
≥5	1480 (9.9)	557 (10.6)
Region		
Northeast		
New England	810 (5.4)	277 (5.3)
Middle Atlantic	2295 (15.3)	823 (15.6)
Midwest		
East North Central	2550 (17.0)	869 (16.5)
West North Central	1110 (7.4)	361 (6.8)
South		
South Atlantic	2700 (18.0)	899 (17.0)
East South Central	945 (6.3)	330 (6.3)
West South Central	1575 (10.5)	631 (12.0)
West		
Mountain	825 (5.5)	337 (6.4)
Pacific	2190 (14.6)	746 (14.1)

RESULTS

Characteristics of the total households contacted, total base population of responders, and those responders reporting symptoms are summarized in Tables I and II. Slightly more responders were women (52.9%). All regions of the continental United States were represented.

In general, the NFO panel is skewed (approximately 90%) toward white households,[13] and a similar distribution was observed in this study. Of all subjects reporting symptoms, 92.3% were white, 4.2% were black, 0.6% were Asian or Pacific Islander, and 2.9% were of unknown race.

A total of 7009 persons reported having ≥7 days of nasal/ocular symptoms in the previous 12 months. The

TABLE II. Responders: Distribution of total and symptomatic persons

Variable	Total (%)	Reporting symptoms (% of symptomatic)
Total	22,285 (100)	8394 (100)
Gender		
Male	10,507 (47.1)	3487 (41.5)
Female	11,778 (52.9)	4708 (56.1)
No answer	—	199 (2.4)
Age (yr)		
≤17	5106 (22.9)	1269 (15.1)
18–34	4131 (18.5)	1745 (20.8)
35–49	5267 (23.6)	2304 (27.4)
50–64	3807 (17.1)	1419 (16.9)
≥65	3974 (17.8)	1140 (13.6)
No answer	—	517 (6.2)
Region		
Northeast		
New England	1182 (5.3)	408 (4.9)
Middle Atlantic	3617 (16.2)	1288 (15.3)
Midwest		
East North Central	3963 (17.8)	1357 (16.2)
West North Central	1720 (7.7)	560 (6.7)
South		
South Atlantic	3786 (17.0)	1426 (17.0)
East South Central	1291 (5.8)	538 (6.4)
West South Central	2288 (10.3)	1069 (12.7)
West		
Mountain	1315 (5.9)	566 (6.7)
Pacific	3123 (14.0)	1182 (14.1)
Population density		
Rural (<100,000)	5400 (24.2)	1981 (23.6)
Urban		
100,000–499,999	3542 (15.9)	1354 (16.1)
500,000–1,999,999	4614 (20.7)	1779 (21.2)
≥2 million	8729 (39.2)	3280 (39.1)
Household income ($)		
<12,500	3015 (13.5)	1155 (13.8)
12,500–24,999	4287 (19.2)	1566 (18.7)
25,000–39,999	5161 (23.2)	1988 (23.7)
40,000–59,999	5067 (22.7)	1898 (22.6)
≥60,000	4755 (21.3)	1787 (21.3)

overall prevalence when extrapolated to the total base population of 22,285 was 31.5%. Based on 1993 census data,[17] this corresponds to 79.5 million persons. The prevalence by geographic region is summarized in Fig. 1.

The prevalence of physician-diagnosed rhinitis and related conditions is summarized in Table III. The overall prevalence for each category was as follows: hay fever, 8.2%; rhinitis, 4.2%; persistent stuffy nose or head, 5.7%; and allergies involving the eyes/nose/throat, 18.3%.

Of the balanced sample of subjects with ≥7 days of nasal/ocular symptoms and who received the follow-up questionnaire, 481 (45.2%) reported that their symptoms could best be described as a seasonal or continuous allergy. A further 311 (29.2%) reported sinus problems; 227 (21.3%) reported an allergy when exposed to triggers such as dust or pollution; and 36 (3.4%) reported a common cold. These data suggest that of the 7009 persons who reported ≥7 days of nasal/ocular symptoms in the previous 12 months, 3168 had self-diagnosed allergic rhinitis. The prevalence of self-diagnosed allergic rhinitis in the total population of responders therefore may be approximately 14.2%, which corresponds to approximately 35.9 million persons nationwide (Table IV). The prevalence of seasonal and perennial allergic rhinitis was 8.8% and 5.4%, respectively.

Similar trends were observed whether prevalence was estimated by physician diagnosis or self-diagnosis. Prevalence of physician diagnosis increased sharply after 18 years of age, with the highest rates seen in the age groups 18 to 34 years and 35 to 49 years (40.1% and 43.4%, respectively), and decreased after age 50 years (Table IV). As illustrated in Fig. 1, the highest rate by geographic region occurred in the West South Central region (38.2%) and the lowest in the West North Central region (27.9%). A trend toward increasing prevalence from north to south was exhibited in several regions. No trends were evident with regard to urban/rural location or household income.

DISCUSSION

The nationwide prevalence of ≥7 days of nasal/ocular symptoms is estimated to be 31.5%. Based on the 1993 census data,[17] this corresponds to 79.5 million people in the continental United States. If the inclusion criteria are changed to ≥31 days of symptoms, the prevalence is 17.7% (44.7 million people). Although the symptoms used in our questionnaire are suggestive of allergic rhinitis, a prevalence based on symptoms alone may represent an overestimation. In our population, 29.2% and 21.3%, respectively, reported that their symptoms were caused by sinus problems or triggers such as dust or pollution. Allergic rhinitis is a risk factor for sinusitis, and irritants such as dust or airborne pollutants can exacerbate symptoms associated with allergic rhinitis.[2] Therefore, it is possible that some of these patients mistakenly attributed their symptoms to sinus problems or irritants. In our study, the prevalence of self-diagnosed allergic rhinitis was 14.2% (equivalent to 35.9 million persons nationwide); the true prevalence may be higher.

The results of early studies, which estimated prevalence from questionnaires and interviews, varied widely. Freeman and Johnson studied a group of 2235 Denver schoolchildren from the 8th and 12th grades.[6] They found the prevalence of the seasonal and perennial varieties of allergic rhinitis to be 19.1% and 6.4%, respectively. In two separate studies, Smith and Knowler reported on 1760 households in rural Iowa[7] and 1440 households in Iowa City.[8] They found a prevalence of seasonal allergic rhinitis of 3.3% and 4.2% in the rural and urban populations, respectively. McKee studied 1000 adults in Palo Alto, California.[9] The observed prevalence of seasonal allergic rhinitis was 16.3%; an additional 3.2% of subjects had coexisting asthma and

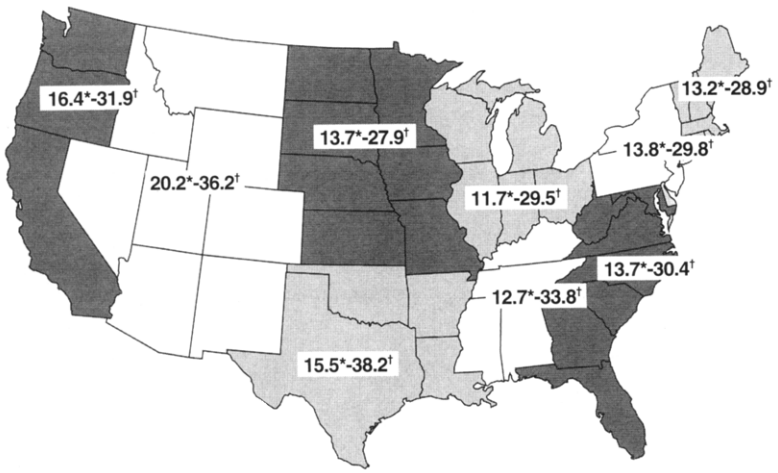

FIG. 1. Prevalence (%), by geographic area, of patients with allergic rhinitis (*) or ≥7 days of nasal/ocular symptoms in the previous 12 months (†).

allergic rhinitis. Broder et al. surveyed 9226 residents of Tecumseh, Michigan, and found an 8.2% prevalence for seasonal and perennial allergic rhinitis combined.[10] Hagy and Settipane surveyed 1836 college freshman in Providence, Rhode Island, and found a prevalence of 21.1% for seasonal allergic rhinitis and 5.2% for the perennial form.[11] A more recent questionnaire-based study by Wright et al. in 747 6-year-old children in Tucson, Arizona, found a prevalence of 42%.[13] Another recent questionnaire-based study by Arrighi et al., which included 1602 children aged 5 to 8 years, found a prevalence of 9% of physician-diagnosed hay fever and a further 24% prevalence of subjects with hay fever symptoms but without a physician diagnosis of hay fever.[14]

These varying results may have reflected different types and concentrations of allergens found in the different regions. It is also possible, however, that they merely reflect variation in the questionnaires used. The age range of each population studied is another important factor. It is generally accepted that most people become symptomatic before 20 years of age.[18] In addition, skin-test reactivity, particularly in people who demonstrate more than one reaction,[11, 19-21] can be correlated with the occurrence of allergic rhinitis. Barbee et al. observed that the highest rate of skin-test reactions occurred in the first half of the third decade of life.[19] In our study, we observed a similar pattern, with prevalence rising sharply from 17 to 34 years of age and remaining relatively consistent thereafter until age 65.

In our population, men and women appeared to be at equal risk for development of the symptoms of allergic rhinitis (13.7% and 14.3% prevalence, respectively). In addition, although there was a slight trend toward increasing prevalence from north to south, the range was not large (Fig. 1). The generally high prevalence observed in all regions of the country shows that allergies can develop in susceptible people regardless of where they live.

McMenamin, in a study of 1988 ICD9 data, found that allergic rhinitis (ICD9 code 477) represented 9.3% of all diagnoses.[12] However, studies that rely on physician diagnosis may underestimate the true prevalence, because allergic rhinitis is not always reported, and there is a lack of widely accepted, objective criteria. The results of the present study and the study by Arrighi et al. show a comparable prevalence of 8.2% and 9%, respectively, based on physician diagnosis and a much higher prevalence based on symptoms,[14] suggesting that in many patients allergic rhinitis remains undiagnosed. In contrast, the study by Wright et al. in children in Tucson found a much higher prevalence of physician-diagnosed allergic rhinitis (42%).[13] However, this was in a more closely monitored and frequently surveyed population in a region where there is an overall high awareness of allergic conditions.

Some studies have found that prevalence of allergic rhinitis and other allergic disorders is directly related to socioeconomic status as measured by parental income, education, or occupation.[6, 10, 13] People in lower socioeconomic levels appeared to be at lower risk. We did not observe any relation between household income and prevalence of allergic rhinitis.

According to some historians, allergic rhinitis was much less prevalent before the industrial revolution.[22, 23] Whether the prevalence has continued to rise is the subject of debate. The rate of physician consultations for hay fever in the United Kingdom rose from 10.6 per 1000 in 1971 to 19.7 per 1000 in 1981.[24] In addition, a Swedish study found that the prevalence of allergic rhinitis in army recruits approximately doubled (4.4% to 8.4%) during the same period.[25] Some have argued that the data from the United Kingdom could have reflected changes in patient consulting behavior or patterns of physician diagnosis.[26] However, the Swedish data, which showed a greater increase in northern, less urban regions

TABLE III. Prevalence of physician-diagnosed seasonal allergic rhinitis and related conditions*

Variable	Number (%)			
	Hay fever	Rhinitis	Persistent stuffy nose or head	Allergies involving eyes, nose, and throat
Total	1827 (8.2)	927 (4.2)	1278 (5.7)	4078 (18.3)
Gender†				
Male	761 (7.2)	318 (3.0)	506 (4.8)	1554 (14.8)
Female	1029 (8.7)	590 (5.0)	740 (6.3)	2436 (20.7)
Age (yr)†				
≤17	201 (3.9)	136 (2.7)	196 (3.8)	655 (12.8)
18–34	431 (10.4)	172 (4.2)	235 (5.7)	820 (19.8)
35–49	556 (10.6)	294 (5.6)	339 (6.4)	1097 (20.8)
50–64	319 (8.4)	175 (4.6)	222 (5.8)	687 (18.0)
≥65	205 (5.2)	114 (2.9)	184 (4.6)	570 (14.3)
Region				
Northeast				
New England	82 (6.9)	33 (2.8)	47 (4.0)	190 (16.1)
Middle Atlantic	278 (7.7)	129 (3.6)	198 (5.5)	642 (17.7)
Midwest				
East North Central	268 (6.8)	138 (3.5)	214 (5.4)	634 (16.0)
West North Central	130 (7.6)	63 (3.7)	96 (5.6)	258 (15.0)
South				
South Atlantic	292 (7.7)	216 (5.7)	250 (6.6)	695 (18.4)
East South Central	100 (7.7)	74 (5.7)	89 (6.9)	276 (21.4)
West South Central	234 (10.2)	126 (5.5)	164 (7.2)	532 (23.3)
West				
Mountain	136 (10.3)	55 (4.2)	64 (4.9)	273 (20.8)
Pacific	307 (9.8)	93 (3.0)	156 (5.0)	578 (18.5)
Population density				
Rural (<100,000)	401 (7.4)	193 (3.6)	304 (5.6)	928 (17.2)
Urban				
100,000–499,999	281 (7.9)	166 (4.7)	230 (6.5)	649 (18.3)
500,000–1,999,999	396 (8.6)	234 (5.1)	282 (6.1)	879 (19.1)
≥2 million	749 (8.6)	334 (3.8)	462 (5.3)	1622 (18.6)
Household income ($)				
<12,500	245 (8.1)	92 (3.1)	223 (7.4)	595 (19.7)
12,500–24,999	323 (7.5)	163 (3.8)	269 (6.3)	776 (18.1)
25,000–39,999	437 (8.5)	221 (4.3)	292 (5.7)	952 (18.4)
40,000–59,999	410 (8.1)	243 (4.8)	248 (4.9)	893 (17.6)
≥60,000	412 (8.7)	208 (4.4)	246 (5.2)	862 (18.1)

*Extrapolated to the total base population of 22,285 responders (see Table II).
†Information not provided by all respondents.

of the country, cannot be explained by any changes in physician prescribing.

Results of the present study and that of Wright et al.[13] suggest that prevalence may be increasing in the United States. For example, among earlier studies, that of Broder et al. (conducted from 1962 to 1965) used particularly rigorous criteria and found a prevalence of 8.2%.[10] In addition, a community study of skin-test reactivity in 1333 Tucson residents found a 39.1% baseline prevalence of positive skin tests in 1975 which rose to 50.7% over a mean follow-up period of 8.1 years.[27] However, skin testing does not establish a causal relation between symptoms and allergen.

Observations relating urban pollution to increased IgE production underscore the importance of the continuing search to identify and understand increases in allergic disease. The marked increase in latex sensitivity is perhaps the most troubling allergic phenomenon in recent years. This is most prominently noted among health workers, and the increased use of latex gloves is incriminated.[28] Symptoms range from contact dermatitis to allergic rhinitis, asthma, and anaphylaxis. Ubiquitous latex exposure is now associated with everything from pacifiers to air pollution, and studies suggest that an unusual prevalence of latex allergy is now being identified in populations previously thought not to be at risk. Latex allergens have been eluted from children's rubber products.[29] It has been observed that respirable particles of rubber from tire fragments containing latex proteins are identifiable in large quantities in Denver's air pollution.[5] Japanese investigations have previously demonstrated an apparent adjuvant effect of urban pollution on

TABLE IV. Prevalence of self-diagnosed allergic rhinitis*

Variable	Percentage
Total	14.2
Gender	
Male	13.7
Female	14.3
Age (yr)	
≤17	9.1
18–34	18.4
35–49	17.6
50–64	14.2
≥65	7.8
Region	
Northeast	
New England	13.2
Middle Atlantic	13.8
Midwest	
East North Central	11.7
West North Central	13.7
South	
South Atlantic	13.7
East South Central	12.7
West South Central	15.5
Pacific	
Mountain	20.2
Pacific	16.4
Population density	
Rural (<100,000)	12.4
Urban	
100,000–499,999	12.6
500,000–1,999,999	14.4
≥2 million	15.1
Household income ($)	
<12,500	9.4
12,500–24,999	12.8
25,000–39,999	13.4
40,000–59,999	15.8
≥60,000	15.9

*Extrapolated to the total base population of 22,285 responders (see Table II).

IgE production associated with common antigens such as cedar pollen.[30] These observations suggest that the prevalence of allergic presentations, including rhinitis, may be subject to remarkable increase in the future.

Our study population does not represent a truly balanced sample of the U.S. population. It is representative with respect to age, household income, geographic region, and population. This would be expected to introduce some error into the extrapolation to the general U.S. population.

Other limitations of this study include use of an unvalidated questionnaire, reliance on patient recall, and the lack of adequate verification of diagnosis by interview or review of medical records. In practice, the diagnosis of allergic rhinitis can be complicated, because many patients have coexisting allergic and nonallergic factors that trigger their rhinitis. The hallmark of allergic rhinitis is the temporal association of nasal symptoms with exposure to an allergen. Other studies have required symptoms to be manifested on a regular basis for at least two allergy seasons.[7, 11] Except for patients with seasonal symptoms that occur at the same time each year and patients with symptoms that occur with exposure to animals, it is difficult to arrive at an unequivocal diagnosis of allergic rhinitis. Also, it is difficult to confirm the diagnosis of allergic rhinitis without skin testing, yet patient history is still paramount to the diagnosis of allergic rhinitis. Skin testing alone also is not helpful unless a cause-and-effect relation can be demonstrated between symptoms and exposure to suspected allergens. Until standard diagnostic criteria are adopted, the controversy regarding the exact prevalence is likely to continue.

The nonresponse rate of 33.7% could be seen as another limitation of this survey. Persons experiencing discomfort from nasal symptoms may have been more likely to respond. However, the household demographics were similar for the total population and for those responders who reported symptoms (Table I). In addition, the total base population of responders exhibited a distribution similar to the analysis by household. Finally, the response rate was comparable to that found in similarly conducted surveys.[14]

In conclusion, our study indicates that the prevalence of self-reported allergic rhinitis in this country may be 14.2%. The presence of nasal/ocular symptoms suggestive of rhinitis may be as high as 31.5%. Identification of these patients requires a concerted proactive effort on the part of physicians to obtain, through careful questioning, detailed histories on patients whose symptoms are suggestive of the disease. There is also a need to reach agreement on standardized diagnostic criteria. Finally, cost-effective treatment of such a large population requires an equal effort to educate patients and ensure that appropriate therapeutic strategies are undertaken.

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