

Impact of Nasal Congestion on Quality of Life and Work Productivity in Allergic Rhinitis

Findings from a Large Online Survey

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Abstract

Background: Allergic rhinitis is the most common allergic disease in the US. The predominant symptom of this condition is nasal congestion, which has a significant impact on quality of life and work productivity. This large survey was conducted to determine the impact of nasal congestion on the above parameters in individuals with allergic rhinitis, and treatment patterns for this symptom.

Methods: Participants were recruited voluntarily via telephone surveys and internet advertisements. Respondents with nasal congestion as a symptom of their allergic rhinitis (or who were primary caregivers to a child with nasal congestion associated with allergic rhinitis) were eligible for participation and completed a 52-question internet survey. Data were normalized to the US adult population using a weighting algorithm.

Results: Of the 2355 individuals with allergic rhinitis screened for participation in the survey, 2002 (85%) had nasal congestion. This was considered severe by 40% of respondents, compared with fewer than 30% who considered any other individual allergy symptom to be severe. Nasal congestion was the symptom that most adults and children wished to prevent, and it affected most respondents at work or school, had a notable emotional impact, and interfered with their ability to perform daily activities. Only 13% of participants receiving allergic rhinitis medication of any type, including over-the-counter medications, claimed to be very satisfied with treatment, and only 20% adhered completely to prescribing instructions. Although intranasal corticosteroids are recommended as first-line therapy for nasal congestion, only 30% of respondents with severe nasal congestion received treatment with intranasal corticosteroids.

Conclusions: Nasal congestion affects most individuals with allergic rhinitis, and has a notable impact on quality of life, emotional function, productivity, and the ability to perform daily activities. Patients need to be better educated on the appropriate use of medications, particularly intranasal corticosteroids, to manage their nasal congestion.

Allergic rhinitis is highly prevalent in the US, affecting between 20 and 40 million people annually.^[1] It is characterized by inflammation of the upper airway mucosa, caused by an immunoglobulin-E-mediated allergic cascade, which is triggered in response to either seasonal allergens (such as grass, tree- and weed-pollens, and fungal spores) or allergens with little seasonal variation (such as dust mites, animal dander, cockroaches, and mold).^[2]

The typical symptoms of allergic rhinitis include nasal congestion, watery rhinorrhea, pruritus of the nose, eyes, ears, and throat, repetitive sneezing, and watery eyes.^[2] Nasal congestion is the predominant symptom in allergic rhinitis, and is estimated to occur

in up to 90% of patients with seasonal symptoms.^[3,4] The term 'nasal congestion' is used to describe mucosal swelling caused by dilation of the capacitance vessels, and consequent edema within the cavernous tissues of the nasal turbinates.^[5,6] This swelling and edema are likely to be the result of a T-helper cell type 2 polarized allergic response,^[7-9] and lead to a reduced internal nasal diameter and increased resistance to nasal airflow, which may be further impaired by intraluminal secretions.^[10]

Chronic nasal congestion is associated with a number of secondary complaints, including: a dry, irritated or sore throat; pain around the eyes; mouth breathing; frontal headaches; eustachian tube dysfunction; and altered hearing, smell, and/or taste.^[2] Fur-

thermore, nasal congestion may be related to other clinical problems, such as worsening asthma, rhinosinusitis, and otitis media.^[2] A recent study by Ciprandi and colleagues^[9] has demonstrated that the severity of nasal obstruction is correlated with lower nasal airflow and impaired lung function in adults with seasonal allergic rhinitis.

Another consequence of nasal congestion is anatomical narrowing of the airway, which may produce sleep-disordered breathing, habitual snoring, sleep disturbance, and the occurrence of daytime somnolence.^[11-13] Furthermore, several studies have suggested that nasal obstruction may be an indicator of lower airway disease.^[9,14]

Anecdotal reports suggest that nasal congestion disproportionately affects sufferers of allergic rhinitis, although this has not been accurately measured. This paper reports the findings of a large internet survey that was conducted between May and June 2004, to determine the impact of nasal congestion on quality of life and work productivity in individuals with allergic rhinitis, and investigate treatment patterns for this symptom.

Methods

The internet survey was conducted by an independent market research company (Roper Public Affairs Group of NOP World, New York, New York, USA) on behalf of Schering-Plough Corporation, Kenilworth, New Jersey, USA, during the period May to June 2004. Roper Public Affairs prepared the survey questions after consultation with Schering-Plough Corporation.

Participants were part of the NOP World panel of consumers, recruited voluntarily via telephone surveys and internet advertisements. Panelists who agreed to participate in the survey were screened via a questionnaire to identify those individuals with symptoms of allergic rhinitis, and individuals who were primary caregivers to children (aged ≤ 18 years) with allergic rhinitis. Further screening ensured that only individuals with nasal congestion, as a symptom of allergic rhinitis, were included in the survey. Allergic rhinitis and the presence of associated symptoms were self-reported.

Eligible individuals were asked to complete the internet survey, which contained nine questions designed to collect demographic information and 43 questions relating to symptoms and implications of allergic rhinitis and its treatment. It was estimated that the survey would take 25 minutes to complete.

Participants were asked to score the severity of their allergic rhinitis symptoms (i.e. runny nose, itchy eyes, sneezing, itchy ears, itchy nose, watery eyes, nasal congestion, and itchy palate) on a scale from 1 (not severe at all) to 10 (extremely severe). Caregivers were responsible for rating their child's symptoms. A

weighting algorithm was used to normalize data on age within gender, education, and region, to the US adult population (using US census data from the Current Population Survey, March 2003 supplement). Statistical analyses were performed using z-tests for equality between two proportions with a level of 0.05 or less indicating statistical significance. The margin of sampling error was ± 2 percentage points for the total sample, and higher for subgroups.

Results

Respondent Characteristics

A total of 2355 individuals with self-reported allergic rhinitis were screened for participation in the survey. 2002/2355 participants (85%) reported nasal congestion as a symptom of their condition. Those with no nasal congestion were excluded from further participation in the survey.

Demographic data of the eligible respondents ($n = 2002$) are presented in table I. Seventy-seven percent of the participants were adults and 23% were the primary caregivers of children suffering from allergic rhinitis with nasal congestion. Caregivers answered the questionnaire on behalf of their children. The severity of nasal congestion varied, with 40%, 36% and 25% of eligible respondents experiencing severe, moderate, or mild nasal congestion, respectively.

Impact of Nasal Congestion on Work Productivity and Quality of Life

Forty percent of the respondents with allergic rhinitis considered their nasal congestion to be severe (score of 9 or 10 on a

Table I. Demographic characteristics of survey participants with nasal congestion as a symptom of allergic rhinitis ($n = 2002$)

Characteristics	Distribution
Sex (male : female, %)	50 : 50
Age (%)	
<12 years	14
12–17 years	9
18–34 years	24
35–54 years	26
≥ 55 years	27
Race/ethnicity (%)	
White	82
African American	5
Hispanic	8
Other	5

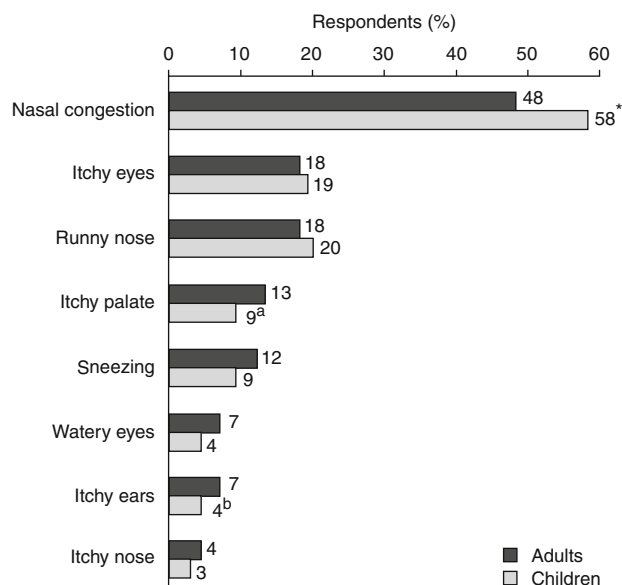


Fig. 1. The symptom of allergic rhinitis rated as the most bothersome. Results are expressed as the proportion of respondents experiencing that symptom. Data were collected in response to the question: "Of those symptoms you/your child experiences, which one do you find to be/is the most bothersome?" ^a small base population ($n = 69$); ^b small base population ($n = 68$). * $p < 0.05$ vs adults.

10-point scale), compared with fewer than 30% who considered any other symptom of allergic rhinitis (e.g. itchy eyes, runny nose, itchy palate, or sneezing) to be severe. Participants with severe nasal congestion were also likely to report that other symptoms of allergic rhinitis were also severe. Furthermore, almost 50% of the respondents reported congestion as the most bothersome symptom. This was true for both adults and children (figure 1).

Relative to other symptoms, nasal congestion was the symptom that most adults (50%) and children (63%) wanted to prevent (figure 2), and was the most likely cause to trigger a visit to a physician in 54 and 69% of adults and children, respectively (figure 3). Sixty-four, 46 and 29% of patients with severe, moderate, and mild congestion, respectively, rated nasal congestion as the most difficult symptom to manage.

More than 40% of patients with allergic rhinitis experienced nasal congestion throughout the allergy season, with a further 21% reporting the symptom for at least 2 days each week. In particular, those with severe congestion, compared with those with moderate or mild congestion, were more likely to report having this symptom throughout the allergy season. Nasal congestion was not restricted to the allergy season, as 42% of eligible respondents experienced this symptom throughout the year.

Twenty-six percent of eligible respondents reported that nasal congestion was most bothersome during the day, 31% found it most bothersome upon waking in the morning, and 17% consid-

ered it most troublesome at night. Indeed, this symptom affected $\geq 80\%$ of respondents in some way at night mainly because it caused them to wake up or made it difficult to fall asleep (figure 4). Twenty percent of adult respondents also reported that their partner/spouse's sleep was affected. When analyzed according to the severity of congestion, sleep was affected in more respondents with severe nasal congestion (90%) than those with moderate (83%) or mild (71%) congestion.

Among adults with nasal congestion, who were employed ($n = 1043$), 59% reported that nasal congestion had affected them at work, mainly through not being able to concentrate (42%) or poor productivity (36%). Similarly, of the caregivers ($n = 446$), 61% reported that nasal congestion had affected their child at school, mainly through not being able to concentrate (43%) or poor productivity (42%).

The survey also demonstrated that nasal congestion had an emotional impact upon many individuals with allergic rhinitis, regardless of the severity of this symptom (table II). The main effects reported by respondents included being uncomfortable, having to slow down in the morning, and being frustrated. Furthermore, nasal congestion interfered with the ability of respondents to perform their daily activities (table III), particularly those conducted outdoors.

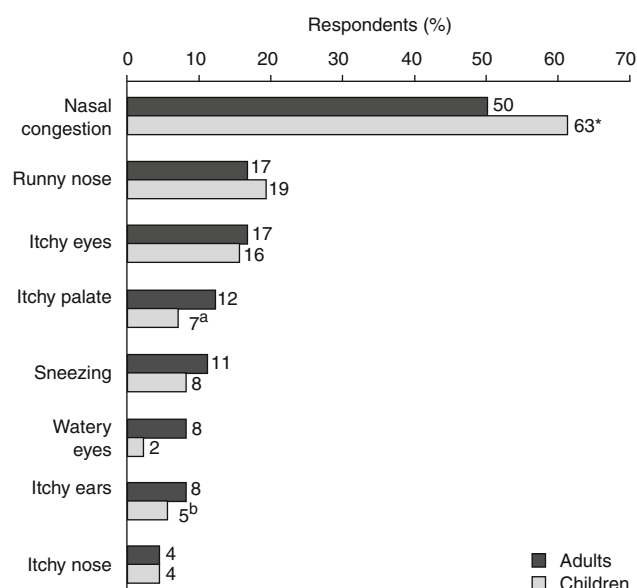


Fig. 2. The symptom of allergic rhinitis that survey respondents most wanted to prevent from occurring. Results are expressed as the proportion of respondents experiencing that symptom. Data were collected in response to the question: "Of those symptoms you/your child experiences, which one would you want most to prevent from occurring?" ^a small base population ($n = 69$); ^b small base population ($n = 68$). * $p < 0.05$ vs adults.

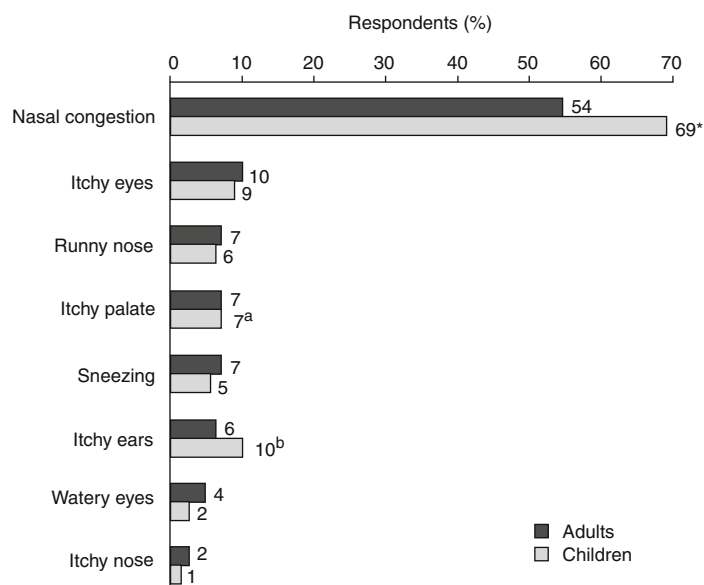


Fig. 3. The symptom of allergic rhinitis which was most likely to trigger a visit to the doctor. Results are expressed as the proportion of respondents experiencing that symptom. Data were collected in response to the question: "Of those symptoms you/your child experiences, which one is the most likely to trigger a visit to the doctor for relief?" **a** small base population ($n = 69$); **b** small base population ($n = 68$). * $p < 0.05$ vs adults.

Pharmacologic Treatment of Nasal Congestion

Of the respondents taking medication to treat their allergy symptoms ($n = 1925$), 25% were taking an intranasal corticosteroid, either alone or in combination with another prescription or over-the-counter (OTC) medication. Adults were more likely to treat congestion with an intranasal corticosteroid than children (25% vs 19%). Furthermore, respondents with more severe or troublesome congestion were more likely to use an intranasal corticosteroid than those with milder congestion; 30, 21 and 17% of individuals with severe, moderate, and mild congestion, respectively, used an intranasal corticosteroid to relieve nasal congestion.

Although 75% of respondents, taking medication for nasal congestion associated with allergic rhinitis, claimed to be satisfied with their treatment, only 13% were very satisfied. Those respondents who were dissatisfied or very dissatisfied tended to experience more severe symptoms and were mostly affected by nasal congestion at work or school, or at night.

Among the respondents who were receiving a prescription medicine for their allergic rhinitis ($n = 1146$), the mean number of medications was 1.6, and the mean number of times they had contacted their physician for a new prescription in the previous year was 2.2. One-third of respondents taking a prescription medication reported that their nasal congestion recurred most of the

time after taking their medication. This recurrence was considered bothersome or very bothersome by most respondents, regardless of the severity of congestion (table IV). Those respondents receiving treatment with a prescription medication, who were dissatisfied with the management of their allergic rhinitis, were more than twice as likely to say that nasal congestion recurred most of the time after taking their medication.

Only 20% of respondents taking a prescription medication completely adhered to the prescribing physician's instructions. Over one-third of eligible respondents reported intentionally stopping their prescribed medication; other reasons for noncompliance included forgetting to take the medication, resolution of symptoms, and feeling that treatment was no longer necessary (figure 5).

Use of Intranasal Corticosteroids for Nasal Congestion

Respondents receiving an intranasal corticosteroid at the time of the survey ($n = 410$) thought that the most important benefits were: preventing the occurrence of nasal congestion (38%); reducing the severity of nasal congestion when it occurred (32%); and providing more nasal congestion-free days (23%). Furthermore, 40% and 21% of individuals receiving intranasal corticosteroids reported taking them daily throughout the year or during their allergy season, respectively. However, 29% reported taking their medication only when their symptoms were bothersome. Forty-five percent of respondents receiving an intranasal corticosteroid started treatment before the onset of the allergy season.

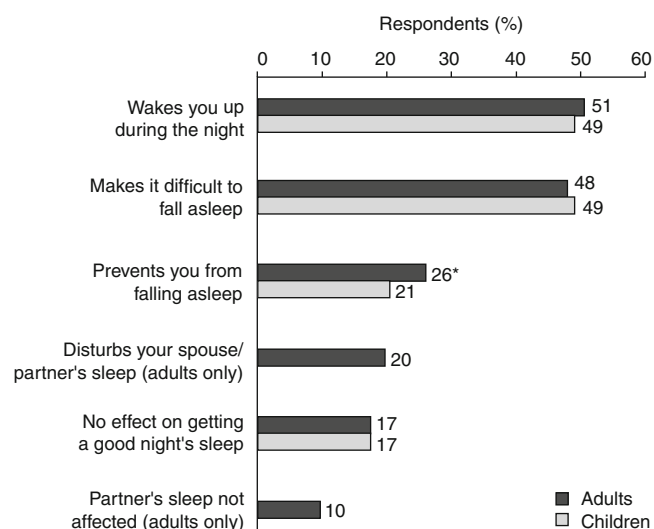


Fig. 4. Effects of nasal congestion on sleep patterns at night. Results are expressed as a proportion of all survey respondents. Data were collected in response to the question: "In what ways, if any, has the nasal congestion affected you/your child during the night?" * $p < 0.05$ vs children.

Table II. Emotional impact of nasal congestion in individuals with allergic rhinitis according to severity of congestion. Data were collected in response to the question: "How often does the nasal congestion from you/your child's allergy affect you/him/her in the following ways when it is present?"

Parameter assessed	Severity of nasal congestion		
	severe (% respondents)	moderate (% respondents)	mild (% respondents)
Frequent emotional impact	76*	58	43
Uncomfortable	56*	34	24
Slows you/your child down in the morning	35*	23	13
Frustration	34*	17	16
Fatigue	33*	20	11
Heavy headed	36*	16	9
Grumpy/irritable	29*	20	12
Overall feeling of being sick	26*	14	8
Loss of desire/motivation	21*	14	5
Stressed	20*	8	5

* $p < 0.05$ vs mild to moderate nasal congestion.

Discussion

This large internet survey provides interesting insight into the specific impact of nasal congestion on quality of life and work productivity in patients with allergic rhinitis, and current treatment of this symptom. It also confirms previous reports of the high prevalence of nasal congestion in individuals with allergic rhinitis.^[3,4] Of the participants with self-reported symptoms of allergic rhinitis initially selected for participation in the survey ($n = 2355$), only 15% were excluded from further participation because nasal congestion was not one of the symptoms reported. This suggests that most patients presenting with allergic rhinitis may require treatment for nasal congestion.

Compared with other clinical symptoms of allergic rhinitis, respondents in this study thought nasal congestion was the most severe and bothersome. It was the symptom they most wanted to prevent from occurring, and was the most likely cause in both adults and children to trigger a visit to the physician. These findings suggest that nasal congestion plays a significant role in allergic rhinitis, and deserves distinct consideration when determining the most appropriate treatment strategy.

Nasal congestion is affected by circadian rhythms, with peak congestion occurring in the early hours of the morning.^[15] Therefore, it is not surprising that almost one-third of the respondents (31%) found this symptom most bothersome upon waking. However, it is interesting that a further quarter of participants (26%) found nasal congestion bothersome throughout the day. Participants also reported that they were affected by nasal congestion at night, possibly because the nasal obstruction resulting from allergic rhinitis causes sleep-disordered breathing, such as snoring and obstructive sleep apnea.^[16] Indeed, sleep was affected more in

respondents with severe nasal congestion than in those with moderate or mild congestion.

Daytime somnolence as a consequence of allergic rhinitis may lead to impairment of learning and productivity.^[17] Participants reported that nasal congestion negatively affected their performance at work or school. When considered in the context of the number of people affected by nasal congestion (59%), this is highlighted as a socioeconomic issue that deserves attention.

Nasal congestion may also be directly associated with decreased quality of life.^[18] Respondents reported that nasal congestion had a negative effect on their emotional function and ability to perform daily activities. Although the impact of nasal congestion on quality of life needs to be investigated using validated questionnaires, these findings provide an interesting preliminary insight into this aspect of nasal congestion.

The impact of nasal congestion on productivity, the ability to perform daily activities, and quality of life indicates that targeting this symptom should be a key aim in the treatment of allergic rhinitis. This survey showed that a variety of OTC and prescription medications are used for allergic rhinitis. Three-quarters of the respondents (75%) taking medication indicated that they were satisfied with their treatment, although almost one-third (31%) reported that nasal congestion recurred most, or all of the time despite taking their medication. This recurrence may have been influenced by several factors, including taking medications that do not directly target nasal congestion, and noncompliance with treatment.

The range of pharmacologic options for nasal congestion in allergic rhinitis may help explain why many of those individuals who participated in this survey found it difficult to find the most

Table III. Effect of nasal congestion on respondents' ability to perform daily activities. Data were collected in response to the question: "How often, if at all, does the nasal congestion from you/your child's allergy interfere with your/his/her ability to do the following activities when it is present?"

Parameter assessed	Severity of nasal congestion		
	severe (% respondents)	moderate (% respondents)	mild (% respondents)
Frequent effect on daily activities	46*	32	22
Doing outdoor activities	28*	20	13
Spending time outdoors relaxing	27*	17	12
Exercising/participating in sports	19*	12	7
Doing chores around the home	18*	9	8
Overall daily routine	17*	10	6
Normal eating habits	13*	8	4
Participating in social activities	13*	7	4
Spending time indoors relaxing	10*	5	3

* $p < 0.05$ vs mild or moderate nasal congestion.

appropriate treatment for their nasal congestion, and had contacted their physician at least once in the previous year for a different prescription. While antihistamines are considered to be a mainstay of pharmacotherapy for allergic rhinitis, these agents are generally considered to be minimally effective in preventing or treating nasal congestion.^[2] This is presumably because nasal congestion is mediated by multiple inflammatory molecules in addition to histamine.^[10] Oral decongestants are modestly effective in relieving nasal congestion, and are often used in combination with an antihistamine to improve symptom control and to counter the somnolence caused by the sedating antihistamines.^[19] However, oral decongestants are contraindicated in patients with uncontrolled hypertension or ischemic heart disease, and are to be used with caution in the elderly, and in individuals with stable hypertension, ischemic heart disease, diabetes mellitus, prostatic hypertrophy, and glaucoma.^[2] Unlike oral formulations, intranasal decongestants are not associated with systemic adverse effects and are very effective in relieving nasal congestion, although they have a limited effect on other symptoms of allergic rhinitis. However, the risk of rhinitis medicamentosa precludes the use of nasal decon-

gestants for >5 days, restricting their utility in the long-term management of nasal congestion in allergic rhinitis.^[2] Intranasal cromolyn sodium (sodium cromoglycate), a mast-cell stabilizer, is available OTC and is an effective prophylactic option for nasal congestion when used 4–6 times daily, although is not as useful once symptoms have started.^[2] Another relatively new class of allergic rhinitis treatment is the leukotriene-receptor antagonists such as montelukast. These agents are effective in reducing the symptoms of allergic rhinitis; head-to-head comparisons have indicated that leukotriene-receptor antagonists are similar to antihistamines in their effect on nasal congestion.^[20]

Numerous studies have shown the effectiveness of intranasal corticosteroids in alleviating congestion in allergic rhinitis,^[21–26] and have demonstrated that they can improve sleep quality, daytime fatigue, and quality of life.^[27] Indeed, the American Academy of Allergy, Asthma and Immunology recommends intranasal corticosteroids as first-line therapy where nasal obstruction is a major component of allergic rhinitis.^[2] Despite these recommendations, in this survey, only one-quarter of the individuals with nasal

Table IV. Impact of prescription medicine on nasal congestion in respondents taking a prescription medicine, and compliance with the prescribing physician's instructions on administration of medication (n = 1146)

Parameter assessed	Severity of nasal congestion		
	severe (% respondents)	moderate (% respondents)	mild (% respondents)
Prescription medicine provides relief most or all of the time	65	70	78
Nasal congestion recurs most or all of the time	42*	28	20
Recurrence of nasal congestion is very bothersome (n = 2002)	46*	28	13
Compliant with physician's instructions	18	20	26†

* $p < 0.05$ vs mild or moderate nasal congestion; † $p < 0.05$ vs moderate or severe nasal congestion.

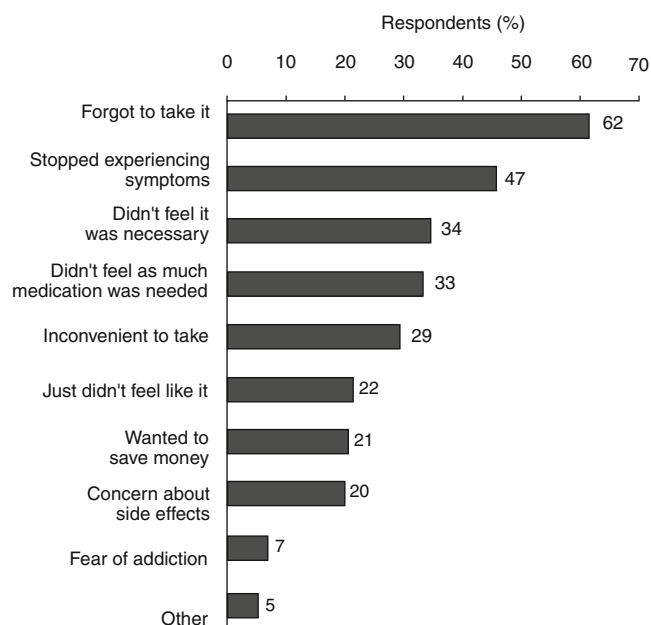


Fig. 5. Reasons for missing or stopping allergic rhinitis medication. Results are expressed as a proportion of all survey respondents receiving treatment with a prescription medication for allergic rhinitis ($n = 1146$). Data were collected in response to the question: "Have you/your child ever missed or stopped taking allergy medication exactly as prescribed by your doctor for any of the following reasons?"

congestion associated with allergic rhinitis were receiving treatment with an intranasal corticosteroid.

Intranasal corticosteroids target the underlying anti-inflammatory pathways of allergic rhinitis. A minimal persistent level of inflammation may be present during the asymptomatic period, supporting prophylactic therapy with corticosteroids for allergic rhinitis, to prevent exacerbations during periods of increased allergen levels.^[28] The findings of this survey suggest that guidelines for intranasal corticosteroid use are generally not being followed. Less than half (40%) of the respondents taking a corticosteroid reported using a prophylactic approach to treat congestion, and almost one-third (29%) took their corticosteroid only when symptoms were bothersome.

While this survey provides interesting insight into the impact of nasal congestion in allergic rhinitis and treatment patterns for this symptom, it does have some inherent limitations. As with any survey of this type, there is a degree of selection bias in terms of the respondents who completed the questionnaire: those with particularly troublesome symptoms may have been more motivated to participate than those with less severe or better controlled symptoms.

In addition, participation was restricted to those with nasal congestion, therefore those without congestion but with other symptoms that were particularly severe may have been excluded.

This bias could have inflated the relative importance of nasal congestion as a symptom of allergic rhinitis. Furthermore, given that this was an internet survey, participation was restricted to individuals with internet access. Whether this affects the generalisability of the results is difficult to gauge, although it may be hypothesized that those with access to the internet have a higher socioeconomic status than those without, and therefore, better healthcare access. This would suggest that, in fact, the actual impact of nasal congestion may be greater in the general population than indicated by this survey. In addition, allergic rhinitis was self-reported in this survey, with no clinical or immunologic confirmation of diagnosis required. Thus, some individuals completing the survey may have had a form of rhinitis that was not mediated by an allergic response; however, this is unlikely to affect the conclusions of the survey with respect to nasal congestion being troublesome and inadequately treated.

Conclusion

In summary, the findings of this large internet survey demonstrate that nasal congestion affects most individuals with allergic rhinitis and has a significant impact on quality of life, emotional function, productivity, and the ability to perform daily activities. Examination of treatment patterns suggests that nasal congestion is not being adequately addressed in clinical practice. In particular, intranasal corticosteroids need to be considered for patients with nasal congestion associated with allergic rhinitis, and patients need to be better educated on proper use of their medication. Further research into the impact of nasal congestion in patients with allergic rhinitis should include rigorous physician-conducted studies using validated questionnaires.

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The internet survey was conducted between May and June 2004 by an independent market research company (Roper Public Affairs Group part of NOP World, New York, New York, USA) on behalf of Schering-Plough Corporation, Kenilworth, New Jersey, USA. Roper Public Affairs prepared the survey questions after discussion with Schering-Plough Corporation.

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