

Short communication

Rhinitis: do diagnostic criteria affect the prevalence and treatment?

Background: Rhinitis is one of the world's most common health problems. Diagnostic criteria used in community surveys may affect reported prevalence and treatment.

Methods: A proportionately stratified random sample study was performed to investigate the prevalence, comorbidities and management of community-based patients with rhinitis in the tropical urban city of Singapore.

Results: The prevalence of at least one, two, three, or four nasal symptoms on most days during the past year in our study population was 25.5%, 13.1%, 6.5%, and 3.0%, respectively. Based on the definition of 'rhinitis' by the International Consensus Report (ICR), the prevalence was 13.1% in Singapore. There was significantly higher prevalence of self-reported allergy, asthma, and common cold/influenza-like illness among the rhinitis group. In the 53% of rhinitis subjects seeking for medical help, 71% visited a primary care physician and 20% an otolaryngologist. Treatments as reported by patients were decongestants (topical or oral) 27%, antibiotics 12%, antihistamines 6%, nasal steroids 3%, surgery 2%, traditional methods 28%, and 22% did not know what medication they had. Subjects considered the effectiveness of treatment unsatisfactory because the majority of them had only partial or no relief with any treatment.

Conclusions: The standardization of the definition of rhinitis in epidemiological studies is of crucial importance, especially when comparing the prevalence between studies. Appropriate patient education by physicians with a good understanding of the nature of rhinitis and the available treatment options (e.g. evidenced-based efficacy, safety, and a good cost-benefit ratio) will maximize patient compliance and treatment outcomes.

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Rhinitis is a common worldwide disease, which presents with nasal obstruction, rhinorrhea, sneezing and/or itching of the nose. It is a major airway disease, which causes morbidity and significantly impairs a patient's ability to function and their quality of life (1, 2). It is also associated with other conditions such as asthma, sinusitis, anosmia, otitis media, nasal polyps, lower airway infection and even dental malocclusion (1–5).

So far, international guidelines and consensus statements on rhinitis have been developed to enhance the quality of care for rhinitis patients (3, 6–11). However, the impact of these guidelines on the physician practices has not been assessed. Rhinitis can be divided into allergic rhinitis that could be IgE- or non-IgE-mediated, and nonallergic rhinitis (12). Recently, the WHO document 'Allergic rhinitis and its impact on asthma' (ARIA) has recommended replacement of the old terms 'seasonal' and 'perennial' rhinitis with 'intermittent allergic rhinitis' and 'persistent allergic rhinitis', respectively (12). No literature has established a standard criterion for the diagnosis of rhinitis based on nasal symptoms. In 1994, the International Consensus

Report (ICR) (3) defined rhinitis as a patient with one or more of the classical symptoms of nasal obstruction, rhinorrhea, sneezing or itchy nose. Further, its algorithm stated that the definition of rhinitis must include at least any two of the nasal symptoms on most days. Disagreement among a panel of experts on the specific definition would create confusion among physicians regarding diagnosis and treatment of rhinitis.

This Singapore-based study was intended to assess variations in the prevalence of rhinitis using different diagnostic criteria, which would further affect its treatment. Singapore is an equatorial country with daily temperature ranging from 23.9 to 30.8°C and daily humidity ranging from 64.2 to 96.2%; with little variation throughout the year. This country is composed by three major ethnic groups: Chinese (77%), Malay (14%) and Indian (8%).

Material and methods

A total of 4602 subjects aged 6–80 years (mean 33 years) was selected

by means of multistage, clustered, and age-proportionate stratified random sampling. One member of each household was randomly selected for the interview. The study population had a similar age distribution to the general population, but it was disproportionately stratified to have an equal proportion of Chinese, Malays, and Indians. All subjects were investigated using an interviewer-administered questionnaire in their homes. Approval to conduct this study was granted by the National Medical Research Council of Singapore and the institutional review board of the Medical Faculty of National University of Singapore.

Rhinitis definition was based on the ICR recommendation, that is, the occurrence of two or more symptoms (nasal obstruction, rhinorrhea, sneezing and itchy nose) on most days during the past year (3). Common cold/influenza-like illness was defined as the occurrence of a respiratory illness lasting for at least two days with at least one of respiratory tract symptoms (e.g. blocked or runny nose, sore throat, unusual cough or hoarseness of voice), and at least one of systemic symptoms (e.g. fever, chills, muscle ache or headache) (13). Subjects were specifically asked to differentiate rhinitis symptoms from any symptoms associated with common cold/influenza-like illness. For self-reported allergy, subjects had to self-identify any presence of skin, nose, or breathing problems which were associated with inhalation, eating, ingesting or coming into contact with substances, such as house dust, cats, dogs, or foods, either at home or in the workplace. Asthma was confirmed if a subject had ever been diagnosed with it by their physician. The questionnaire also covered questions on sociodemographic characteristics, and past medication along with name and amount of medication prescribed, if possible. The questionnaire was completed by either the subject or their proxy with little assistance of the field-interviewer.

The adjusted prevalence rate ratio and its 95% confidence interval were calculated by direct adjustment to the age structure of the whole

population. Chi-squared tests and logistic regression were carried out to examine the association between rhinitis and potential risk factors. The SPSS software package for Windows (release 10.0.5 – 27 November, 1999; SPSS, Inc., Chicago, IL, USA) was used for all statistical analyses.

Results

A total of 4602 questionnaires were completed and validated. The participation rate was 68% (3% refused to participate, 29% were noncontactable). This level of nonresponse is unlikely to cause a bias because those who were not in the study were mostly noncontactable.

The prevalence of any individual nasal symptoms (sneezing, rhinorrhea, itchy nose, and nasal blockage) was 15.8%, 11.7%, 10.6%, and 10.2%, respectively. The prevalence of at least one, two, three or four nasal symptoms on most days during the past year was 25.5%, 13.1%, 6.5% and 3%, respectively. Table 1 shows sociodemographic characteristics of the study population as well as the prevalence of rhinitis, based on having at least two of the nasal symptoms. The overall age-adjusted prevalence in the general population was 13.1% (12.8% in males and 13.5% in females). Indians (15.1%) had the highest prevalence, followed by Malays (12.3%) and Chinese (12.1%). It was found that subjects aged between 10 and 19 years had the highest prevalence (Table 1). Rhinitis symptoms were pro-

Table 1. Sociodemographic characteristics and the prevalence of rhinitis (%)

	Number (%)	Prevalence		Adjusted prevalence rate ratio
		Crude	Adjusted (95% CI)	
Total	4602	13.1	13.1 (11.8–14.9)	
Age group (years) *	303 (6.6)	11.9 (10.6–13.2)		1.24 (0.74–2.10)
5–9	778 (16.9)	16.3 (14.8–17.8)		1.71 (1.2–2.67)
10–19	2037 (44.3)	14.3 (12.9–15.7)		1.50 (0.98–2.29)
20–39	1240 (27.0)	10.0 (8.8–11.2)		1.05 (0.67–1.64)
40–59	241 (5.2)	9.5 (8.3–10.7)		1.00
60 & over				
Gender †	2277 (49.5)	13.5	13.5 (12.1–14.9)	1.06 (0.90–1.24)
Female	2321 (50.5)	12.6	12.8 (11.4–14.1)	
Male				
Ethnic group	1697 (36.9)	11.8	12.1 (10.8–13.4)	1.00
Chinese	1471 (32.0)	12.4	12.3 (11.0–13.6)	1.02 (0.84–1.26)
Malay	1434 (31.2)	15.2	15.1 (13.7–16.5)	1.25 (1.05–1.54)
Indian				
Occupation ‡	955 (21.4)	13.2	14.2 (12.8–15.6)	1.11 (0.86–1.43)
Professional/technical/managerial	351 (7.9)	11.7	13.4 (12.0–14.8)	1.05 (0.73–1.51)
Agriculture/craft/machine operator	920 (20.6)	13.4	14.5 (13.1–15.9)	1.13 (0.88–1.44)
Clerical/sales/other	2232 (50.1)	13.1	12.8 (11.5–14.2)	1.00
Student/wife/retired/unemployed				
Housing type §	203 (4.5)	10.4	10.6 (9.3–11.8)	1.00
1–2 room apartment	3415 (75.1)	12.9	12.9 (11.6–14.3)	1.23 (0.79–1.90)
3–4 room apartment	928 (20.4)	14.5	14.9 (13.4–16.3)	1.41 (0.89–2.25)
5 room apartment				
Family size	1000 (21.7)	12.0	11.9 (10.6–13.2)	1.00
1–2 members	2389 (51.9)	13.0	13.1 (11.8–14.5)	1.09 (0.88–1.34)
3–4 members	1213 (26.4)	14.1	14.1 (12.7–15.5)	1.18 (0.91–1.47)
5 members				

* Three missing; † four missing; ‡ 144 not stated; § 56 not stated.

Table 2. Association between rhinitis and comorbid disease

	Comorbidities (%)		
	Rhinitis	Nonrhinitis	Odds ratio (95% CI)
Based on 1 symptom	<i>n</i> = 1175	<i>n</i> = 3427	
Self-reported allergy	41.2	16.3	3.60 (3.11–4.18)
Self-reported asthma*	3.4	0.6	5.73 (3.37–9.77)
Common cold/influenza-like illness			
None	28.5	53.6	1.00
1–3 episodes	44.5	39.1	2.14 (1.84–2.73)
4–6 episodes	15.3	5.3	5.46 (4.31–6.93)
≥ 7 episodes	11.7	2.0	11.2 (8.18–15.4)
Based on 2 symptoms	<i>n</i> = 602	<i>n</i> = 4000	
Self-reported allergy	46.3	19.0	3.68 (3.08–4.40)
Self-reported asthma*	5.1	0.8	7.18 (4.32–12.0)
Common cold/influenza-like illness			
None	25.9	50.5	1.00
1–3 episodes	42.6	40.1	2.07 (1.68–2.56)
4–6 episodes	15.2	6.7	4.40 (3.30–5.88)
≥ 7 episodes	16.4	2.6	12.2 (8.82–16.7)
Based on 3 symptoms	<i>n</i> = 300	<i>n</i> = 4302	
Self-reported allergy	56.3	20.2	5.08 (4.00–6.46)
Self-reported asthma*	5.7	1.0	5.81 (3.28–10.3)
Common cold/influenza-like illness			
None	22.8	49.0	1.00
1–3 episodes	37.9	40.6	2.01 (1.47–2.73)
4–6 episodes	17.8	7.1	5.34 (3.66–7.80)
≥ 7 episodes	21.5	3.2	14.2 (9.73–20.9)
Based on 4 symptoms	<i>n</i> = 137	<i>n</i> = 4465	
Self-reported allergy	59.9	21.5	5.46 (3.85–7.74)
Self-reported asthma*	7.3	1.1	6.81 (3.38–13.7)
Common cold/influenza-like illness			
None	21.2	48.1	1.00
1–3 episodes	35.8	40.6	2.00 (1.26–3.18)
4–6 episodes	19.7	7.5	5.99 (3.50–10.2)
≥ 7 episodes	23.4	3.8	13.8 (8.18–23.4)

* As told by physician.

nounced for one year or less in 21.3% of subjects, for one to four years in 36.7%, five to 10 years in 17.2%, and more than 10 years in 24.8%. The greater the number of symptoms, the longer the duration of those symptoms being suffered. There were no significant differences in the prevalence of rhinitis between occupations, or between family sizes. Significant differences were only observed between people living in different sizes of apartment (Table 1).

Table 3. Type and outcome of treatment as reported by the rhinitis group only

Treatment modalities	No. patients* (<i>n</i> = 282)		Outcome (level of relief) % (<i>n</i> = 246)		
	<i>n</i>	%	None	Complete	Partial
Oral decongestants	34	12	17.0	54.7	28.3
Nasal decongestants (D/S)	43	15	19.7	49.2	31.1
Oral antihistamines	17	6	35.5	32.3	32.3
Nasal steroids	9	3	37.5	50.0	12.5
Antibiotics	35	12	†	†	†
Surgery	5	2	54.5	36.4	9.1
Others	78	28	13.3	47.8	38.9
Don't know	61	22	–	–	–

*A total of 282 subjects with treatments have been identified.

† Data not available.

Self-reported allergy was reported by 22% of subjects, with house dust cited as the most common trigger. The rhinitis group was more likely to have self-reported allergy (46% vs 19%), asthma (5% vs 0.8%), and 'common cold/influenza-like illness' (74% vs 49%) than the nonrhinitis group. Rhinitis patients were also more likely to have multiple episodes (four or more) of 'common cold/influenza-like illness'. It was also found that the prevalence of comorbidity increased proportionally with increasing number of nasal symptoms involved (Table 2).

The proportion of subjects visiting a physician increased with the advancing number of nasal symptoms. Among those who visited a physician in the past year, 71% per cent saw a *primary care* physician and 20% an ENT specialist, and only 35% of them could clearly understand and describe their diagnosis as explained by their physician. Decongestants and antibiotics were the most commonly prescribed medications. Older types of H₁-antihistamines (i.e. chlorpheniramine) were used more commonly than the new second-generation H₁-antihistamines. Half of the subjects received alternative therapies, such as traditional medicines, or other types of therapy that were not well understood by the subject. Subjects were generally unsatisfied with the effectiveness of their medication. The majority of them had only partial or no relief at all from any type of treatment (Table 3).

Discussion

Rhinitis is one of the most common diseases today yet little is understood about its prevalence (1). One of the main reasons is that there is no standard definition of rhinitis for an epidemiological study. Our study has demonstrated that the criteria used to diagnose rhinitis could significantly affect the reported prevalence rate. If we had used one nasal symptom instead of two as our criteria for rhinitis, the prevalence of rhinitis in Singapore would have doubled to 25.5% rather than 13.1%, or it would be reduced to 3% if we required that four nasal symptoms be present. In this study, however, we were unable to confirm whether subjects with only one symptom should be considered as not having rhinitis. In temperate climates, prevalence of seasonal allergic rhinitis as previously reported ranged from 10 to 20% and prevalence of perennial allergic rhinitis was between 0.6 and 13% (3, 6, 14). In Singapore, the prevalence of perennial rhinitis in the general population was 10.8% based on the study in 1994 (15). However, a higher prevalence of rhinitis in children (44%) was reported by the international study of asthma and allergies (ISSAC) (16). Variations of rhinitis prevalence in these previous studies may partially be due to the differences in the 'operational--definition' of rhinitis.

All rhinitis patients in our study had persistent symptoms all year long with no seasonal variation. The association with known comorbidities, such as self-reported allergy, asthma, and common cold/influenza-like illness is proportional to the number of nasal symptoms. Our findings would be of importance, as patients must be treated all year round which may finally affect the choice and cost of treatment. We confirmed that house dust mite is the most common aeroallergen in Singapore (17). Avoidance and sufficient reduction of house dust mite must be an integral part of the management strategy. Over the past several years, air pollutants in Singapore, e.g. sulfur dioxide, nitrogen dioxide, suspended particles and ozone, have shown no major changes and levels are within the air quality standards of the WHO (18).

The most alarming findings are patients' poor understanding of their disease and poor efficacy of the treatments prescribed by physicians. The majority of patients were unclear about the diagnosis, and they were not satisfied with the treatment. The treatments showing the best results, as reported by patients, were nonconventional or alternative therapies (Table 3). The most commonly prescribed medications were antibiotics and oral and nasal decongestants. None of these are considered to be first-line drugs for perennial rhinitis. The very low use of nasal steroid sprays and second-generation antihistamines, which are widely recognized as the treatment of choice for both allergic and nonallergic rhinitis, was also unexpected (3, 6, 19). New H₁-antihistamines are far more expensive than the older ones. Nasal steroid sprays are also expensive which is an important concern for patients with persistent rhinitis, who need long-term medication. Many patients admitted that they had tried nasal steroid sprays, but that they stopped using them within a few days if there was no effect or a limited effect. This expectation of immediate relief arose frequently because of the poor explanation given by the physician. Patients must be informed that nasal steroids have a relatively slow onset of action (12 h) and maximum efficacy develops over days to weeks (6).

Why are guidelines are often ignored and less effective drugs prescribed? Why do most patients not

fully understand their condition and how to use their medications properly? Are these problems unique to Singapore or does this phenomenon occur worldwide? In Singapore, physician practice patterns explain some of the problems. Primary care physicians, who see over 70% of cases of rhinitis, are expected by the insurance companies and by the patients to provide both an office visit and drug treatment for one nominal fee. As a consequence physicians must see a large number of patients to meet their overheads and do not therefore have time to inform individual patients about their disease and to give lengthy instructions on how to use medications properly. Also, physicians must use cost-effective drugs such as decongestants and first generation antihistamines. If the physician provides a more expensive treatment such as a nasal steroid spray and/or one of the new H₁-antihistamines, it is possible that the cost of the drug may exceed the sum that will be reimbursed. Patients do not expect to pay separately or to pay a higher fee for more effective drugs. Further, there is fear on the part of physicians and patients about the use of 'steroids' because of the perceived harmful side-effects, and this is despite reassurance that nasal corticosteroids generally do not have any systemic effects.

In conclusion, we have shown that rhinitis is a prevalent problem in Singapore. The most common type of rhinitis in a tropical country is persistent rhinitis, which may be associated with the high prevalence of house dust mites. Patient education and physician compliance with current guidelines are the keys to more effective treatment. Consensus reports and guidelines must provide more consistent criteria for the diagnosis and management of rhinitis.

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