



Epidemiology of Rhinitis in Thais: Characteristics and Risk Factors

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During the same period as in our previous survey of allergic diseases in university students,¹ another set of questionnaires was developed to study the prevalence and characteristics of subjects with chronic rhinitis (CR) in the general Thai population. Usually allergic rhinitis (AR) is diagnosed when a positive skin test to common aero-allergens is evident, but an allergy skin test is not feasible in a large population survey. Therefore, we applied the criteria used by Ng and Tan² from Singapore to further classify the CR subjects who have concomitant conjunctivitis symptoms or who notice that their rhinitis symptoms occur when exposed to common allergens, into an "allergic" CR group and the rest in a "non-allergic" CR group. This study was performed to elucidate the prevalence of CR and the characteristics of subjects with CR in Thailand. The different characteristics between "allergic" and "non-allergic" CR subjects were investigated together with the identification of possible risk factors in developing CR.

SUMMARY A questionnaire survey was performed on 3,124 subjects living in Bangkok and its vicinity. The cumulative prevalence of chronic rhinitis (CR) was 13.15% (95% CI = 13.13-13.17). The characteristics of CR subjects, i.e. age group, current occupation, associated allergy, family history of atopy, cigarette smoking and drinking habits were totally different from the non CR group, except for sex preponderance. The possible risk factors for developing CR in this group were high income occupation, presence of associated allergy, family history of atopy, smoking and drinking habits. When CR subjects were further classified into "allergic" and "non-allergic" CR groups by using the presence of associated eye symptoms and known provoking factors as the differential criteria, there was no significant difference in all parameters compared between the two groups, i.e. age, sex, current occupation, associated allergy, family history of atopy, smoking and drinking habits, frequency of occurrence of each nasal symptom, seasonal variation of the symptoms, effect of moving to live in the big city, presence of pets in the house and effect of changing occupation, except for the number of nasal symptoms which was significantly higher in the "allergic" CR group.

MATERIALS AND METHODS

According to the recommendation by the International Rhinitis Management Working Group in 1994, rhinitis is defined as inflammation of the lining of the nose, characterized by one or more of the following symptoms, i.e. itching, sneezing, rhinorrhea and nasal obstruction.³ CR is diagnosed when one frequently has rhinitis symptoms without fever for a period of more than one year. Sub-

jects who did not comply with the above criteria were classified in a non CR group.

The questionnaires consisted of two parts: Part I included demographic data and current occupation and also history of allergic diseases, i.e. AR, asthma, conjunc-

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tivitis, eczema, urticaria, family history of allergic diseases, cigarette smoking and alcohol consumption. Part II was only for CR subjects. They were questioned in more detail about their rhinitis and conjunctivitis symptoms, seasonal variation of the symptoms, effect of changing residence and/or occupation, household pets and other known provoking factors. They were also asked whether they had ever had a skin test done, had any kind of treatment for their rhinitis and the result of such treatment in the past. The designed questionnaires were tested for validity and responsiveness in a group of CR patients who attended our ENT allergy clinic before being used in the study.

The survey using the standardized questionnaires was performed in the Thai population in Bangkok metropolitan area in 1995. Altogether 3,124 subjects were interviewed by nurses and student nurses who were trained to administer the questionnaires properly. The data were analyzed using the statistical packages for the social sciences (SPSS) program.

Demographic characteristics and medical histories were compared in subjects with and without rhinitis from questionnaires Part I, and in subjects with allergic and non-allergic rhinitis from questionnaires Part II. The significance of differences between variables was assessed by the χ^2 test.

The odds ratio was calculated as the prevalence of the risk factors in those with rhinitis divided by its prevalence in those without rhinitis. The 95% confidence interval (CI) was given for each ratio.

RESULTS

A total of 2,912 questionnaires was completed for analysis. The demographic data of the population studied was proved to be comparable to the general population in Bangkok metropolis and its vicinity according to the national survey in 1995 census⁴ (see Table 1). Therefore, our group of subjects is an acceptable representation of the Thai urban population.

From Part I questionnaires,

383 subjects answered that they had symptoms compatible with CR, therefore 2,529 subjects were classified in a non-CR group. This indicated that the prevalence of CR in the Thai population studied was 13.15% (95% CI = 13.13-13.17). The characteristics of the CR subjects were demonstrated and compared with the non-CR subjects (Table 2). Significant differences were found in all parameters compared, i.e. age group, current occupation, associated allergy, family history of atopy, cigarette smoking and drinking habits. Only sex preponderance was not significantly different.

Adjusted odds ratio of possible risk factors for developing CR are shown in Table 3. A high income occupation, presence of associated allergy, family history of atopy, smoking and drinking habits were significantly associated with increasing risk of CR.

From questionnaire Part II, where 383 CR subjects had filled in the answers, 152 subjects were further classified according to the afore-mentioned criteria into "aller-

Table 1 Demographic data of studied subjects compared with Thai population in Bangkok and the vicinity by age and sex: 1995 census.

Characteristics	Study (%) N = 2,912	Thai population in Bangkok (%) N = 6,830,539	p value
Age group (years)			
11-30	2,112 (72.53)	3,009,950 (44.07)	> 0.05
31-50	617 (21.19)	2,653,890 (38.85)	
> 51	183 (6.28)	1,166,699 (17.08)	
Sex			
Male	1,053 (36.2)	3,305,656 (48.4)	> 0.05
Female	1,859 (63.8)	3,524,883 (51.6)	

Source: Department of Local Administration, Ministry of Interior.
Compiled by: Statistical Data Bank and Information Dissemination Division, National Statistical Office

Table 2 Characteristics of subjects with chronic rhinitis and non-chronic rhinitis

Characteristics	CR (%) N = 383	Non-CR (%) N = 2,529	p value
Age group (years)			
11-30	255 (66.58)	1,857 (73.43)	< 0.05
31-50	95 (24.80)	522 (20.64)	
> 51	33 (8.62)	150 (5.93)	
Sex			
Male	150 (39.2)	903 (35.7)	> 0.05
Female	233 (60.8)	1,626 (64.3)	
Current occupation			
Low income	56 (14.6)	293 (11.6)	< 0.05
Medium income	179 (46.7)	1,198 (47.4)	
High income	28 (7.3)	95 (3.8)	
No answer	120 (31.3)	943 (37.3)	
Associated allergy			
Present	309 (80.7)	1,676 (66.3)	< 0.05
Absent	62 (16.2)	712 (28.2)	
No answer	12 (3.1)	141 (5.6)	
Family history of atopy			
Present	176 (46)	767 (30.3)	< 0.05
Absent	193 (50.4)	1,648 (65.2)	
No answer	14 (3.7)	114 (4.5)	
Smoking			
Yes	82 (21.4)	414 (16.4)	< 0.05
No	290 (75.7)	2,031 (80.3)	
No answer	11 (2.9)	84 (3.32)	
Drinking			
Yes	127 (33.2)	659 (26.1)	< 0.05
No	230 (60.1)	1,745 (69)	
No answer	26 (6.8)	125 (4.9)	

Low income = < 10,000 Baht/month

Medium income = 10,000-30,000 Baht/month

High income = > 30,000 Baht/month

Note: certain subjects did not respond to all items of the questionnaires

gic" CR group and 231 subjects into a "non-allergic" CR group. Demographic data of the two groups were compared and are shown in Table 4. These revealed no significant differences in all parameters, i.e. age, sex, current occupation, associated allergy, family history of atopy, smoking and drinking habits, frequency of occurrence of each nasal symptom, seasonal variation of the symptoms, effect of moving to live in the big

city, presence of pets in the house and effect of changing occupation.

Among the four nasal symptoms typical for AR, rhinorrhea was slightly more common than the others and most subjects had early morning onset of their symptoms. The number of rhinitis symptoms occurring in the allergic group was significantly higher than in the "non-allergic" subjects and the occurrence of 3 nasal symptoms

or more was proved to be associated with an increased risk of having allergic rhinitis (Table 5).

All CR subjects experienced perennial symptoms or perennial symptoms with seasonal exacerbations. Dogs were more common than cats, but both animals were kept by many subjects. The most common provoking factors recognized by "allergic" CR subjects were grass pollen, house dust

Table 3 Odds ratio of chronic rhinitis associated with selected risk

Risk factors	Adjusted odds ratio (95% CI)
Sex: males vs females	1.16 (0.92-1.45)
Current occupation	
Low income (Cler)	1.28 (0.91-1.79)
Medium income (Serv)	1
High income (Prof)	1.97 (1.23-3.16)*
Associated allergy: present vs absent	2.12 (1.58-2.85)*
Family history of atopy: present vs absent	1.96 (1.56-2.46)*
Smoking: yes vs no	1.39 (1.05-1.83)*
Drinking: yes vs no	1.46 (1.15-1.86)*

**p* < 0.05

and furred pets. Associated allergies reported by CR subjects were allergic conjunctivitis = 18.6%, atopic eczema = 14.7% and asthma = 11.3%. A history of urticaria was also recorded in 24.5%, drug allergy 21.6% and food allergy 9.3%. Another interesting item of data was that only 10.6% of CR subjects who lived in Bangkok, the capital city of Thailand, previously had an allergy skin test done. The access to allergy investigations is certainly less in rural areas. Antihistamines were the most effective and commonly used medication reported by 91.3% of CR subjects, while 8.3% preferred the use of nasal sprays. Unfortunately the questionnaire did not verify the type of nasal sprays used.

DISCUSSION

It is well known that AR in tropical countries, like Thailand, is mainly of the perennial type, or perennial with seasonal exacerbation. The concomitant eye symptoms are not common in this type

of rhinitis, thus one of the criteria used to differentiate between "allergic" and "non-allergic" CR subjects in this study, i.e. the associated conjunctivitis symptoms may not be appropriate. The other criterion, i.e. known provoking factors, is perhaps more meaningful. However, after using these criteria to divide the CR subjects into two groups (i.e. "allergic" and "non-allergic" CR groups), the characteristics of the two groups were similar in all aspects analyzed. Therefore, it is doubtful whether we should have subdivided the CR subjects into the "allergic" and non-allergic" groups by the above criteria. Furthermore, from our practice, it was found that 90% of CR subjects who attended the ENT allergy clinic tested positive when they had a routine allergy skin test.⁵ So it is justifiable to assume that the prevalence of CR in this survey is equivalent to the prevalence of AR. According to Okuda's collective study about the epidemiology of AR in the world, the prevalence of AR in Thailand was classified in the moderate

group.⁶

The data from our first allergy survey reported in 1995 included 649 subjects from rural areas and used history-taking, physical examination and a skin prick test to six common aeroallergens to identify subjects with allergic rhinitis. The prevalence rate of allergic rhinitis in children was found to be 20.6% and 22.8% in adults.⁷ This is surprisingly similar to the estimated minimum prevalence perennial rhinitis, and perennial rhinitis with seasonal exacerbation, which occurred in 21% of the population in London.⁸

Our subsequent survey of 1,147 university students using only questionnaires, revealed the prevalence of allergic rhinitis to be 21.9%¹ while the result from the present study in the general population of Bangkok showed only 13.15% of the Thais had CR. The same difference is also reported from western countries and is believed to reflect the influence of the level of education and increased awareness of the subjects on the result of the study done by using a questionnaire or an interview.⁹

From the current largest epidemiological study on allergic diseases in Thai children using the questionnaire of the International Study of Asthma and Allergy in childhood (ISAAC) conducted by Vichyanond *et al.*,¹⁰ the cumulative and 12 month period prevalence of rhinitis for children aged 6-7 and 13-14 years, living in Bangkok, were 44.2% and 38.7%, respectively. They also noticed that when using a more specific question, i.e. the common term for "hay fever" in the Thai language, the percentage of positive response decreased to 30.3%.

Table 4 Characteristics of subjects prone to have allergic rhinitis and non-allergic rhinitis

Characteristics	AR (%) N = 152	non-AR (%) N = 231	CR (%) N = 383	p value
Age group (years)				> 0.05
11-30	101 (66.5)	154 (66.7)	255 (66.6)	
31-50	42 (27.6)	53 (22.9)	95 (24.8)	
> 51	9 (5.9)	24 (10.4)	33 (8.6)	
Sex				> 0.05
Male	62 (40.8)	88 (38.1)	150 (39.2)	
Female	90 (59.2)	143 (61.9)	233 (60.8)	
*Current occupation				> 0.05
Low income	19 (18.4)	37 (23.3)	56 (21.4)	
Middle income	70 (68.0)	109 (68.6)	179 (68.3)	
High income	14 (13.6)	13 (8.2)	27 (10.3)	
Associated allergy				> 0.05
Present	81 (88.0)	123 (85.4)	204 (86.4)	
Absent	11 (12.0)	21 (14.6)	32 (13.6)	
Family history of atopy				> 0.05
Present	55 (43.0)	121 (52.4)	204 (49.0)	
Absent	73 (57.0)	110 (47.6)	183 (51.0)	
Smoking				> 0.05
Yes	36 (24.3)	46 (20.7)	82 (22.2)	
No	112 (75.7)	176 (79.3)	288 (77.8)	
Drinking				> 0.05
Yes	45 (31.9)	82 (35.5)	127 (34.1)	
No	96 (68.1)	149 (64.5)	245 (65.9)	
Symptom				> 0.05
Itching	122 (80.3)	134 (58.0)	256 (66.8)	
Sneezing	119 (78.3)	131 (56.7)	250 (65.3)	
Rhinorrhea	132 (86.8)	157 (68.0)	289 (75.5)	
Obstruction	129 (84.9)	136 (58.9)	265 (69.2)	
Seasonal variation of nasal symptoms				> 0.05
All the year round	37 (24.8)	58 (31.7)	95 (28.6)	
Rainy & winter	29 (19.5)	20 (10.9)	49 (14.8)	
Rainy	33 (22.1)	52 (28.4)	85 (25.6)	
Winter	44 (29.5)	39 (21.3)	83 (25.0)	
Summer	6 (4.0)	14 (7.7)	20 (6.0)	
Effect of moving				> 0.05
Effect	45 (33.1)	62 (44.6)	107 (39.0)	
No effect	91 (67.0)	77 (55.4)	168 (61.1)	
Pet in the home				> 0.05
No	54 (38.8)	84 (49.7)	138 (44.8)	
Yes	85 (61.2)	85 (50.3)	170 (55.2)	
Change of occupation				> 0.05
Effect	9 (10.8)	13 (19.7)	22 (14.8)	
No effect	74 (89.2)	53 (80.3)	127 (85.2)	

Notes: certain subjects did not respond to all items of the questionnaires and certain subjects responded to more than one item.

Table 5 Odds ratio of allergic rhinitis associated with the number of nasal symptoms

Risk factors	Adjusted odds ratio (95% CI)
Number of nasal symptoms	
One symptom	1
Two symptoms	3.22 (0.87-12.9)
Three symptoms	6.61 (1.97-24.34)*
Four symptoms	7.69 (2.43-27.02)*

*p < 0.05

The high prevalence of allergic rhinitis in the study of Vichyanond *et al.*¹⁰ could be explained by several reasons; the first is the fact that children have colds more frequently than adults and it is difficult to differentiate between a cold and allergic rhinitis. If further criteria were used in an attempt to identify AR more specifically, e.g. only nasal symptoms associated with eye symptoms can be regarded as AR, the prevalence of AR in children in their study reduced to 13.1%.

The second reason is that the prevalence of AR in children is actually higher than in adults. The higher incidence of AR in children is also documented elsewhere e.g. in the United States, where the incidence of AR in adults was 10-30% while the incidence of AR in children was up to 40%.¹¹

The third reason is probably the true increase in the prevalence of allergic diseases, which is already recognized worldwide. The causes of the increase have been postulated by many authors.¹²⁻¹⁵ One exception is the review by Sly,¹⁶ which indicated that the prevalence of allergic rhinitis in the United States over the past 35 years had undergone no major change.

However, it must be kept in mind that differences in the prevalence of AR in different reports may be attributed in part to the different types of questionnaires used in each study.

The possible risk factors for developing AR in the Thai population from this study were the presence of associated allergic diseases, a family history of atopy, smoking and drinking habits which are already known risks and do not differ from studies in other countries. Unfortunately, the amount and duration of smoking and drinking consumption were not analyzed in this study. The pattern of genetic inheritance and gene sequencing in allergic Thais may be different from other ethnics and they have not been studied yet. We plan to start the genetic study of AR patients at our center in an attempt to find if there are any racial differences.

The finding that AR/CR may be more prevalent in the high income social class has been suggested by many earlier reports.^{2,9,17,18} This is again shown in the present study. The causes of the higher prevalence of AR in the upper social class have been postulated by Mygind and Dahl,¹⁹

which included the immunological basis of the influences by helminthic infection and of more frequent bacterial infection, usually occur in the low socio-economic population, on the development of the reactivity. In Thailand, there is a tendency for the baby of the high income family to be fed by commercially available cows' milk while breast feeding is confirmed in several studies to decrease the risk of developing subsequent allergic diseases.²⁰⁻²² Although there has been a continuous nationwide campaign for at least six-months of breast feeding newborn children in our country for a long time, the effect of the campaign on the prevalence of allergic diseases has never been studied.

In conclusion, the cumulative prevalence of CR in the Thai population in Bangkok was 13.15% according to this study. When CR subjects were further classified into "allergic" and "non-allergic" groups, the characteristics of the two groups were exactly the same. Therefore, it was assumed that the prevalence of CR and AR was the same. The prevalence and characteristics of AR subjects in this study showed no differences from those reported in other countries. The possible risk factors for developing AR were high income social class, presence of associated allergy, family history of atopy, cigarette smoking and alcoholic drinking habits. However, the significance of these risks should be further confirmed by longitudinal study which will provide more clues on the epidemiology of AR in the future.

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