Nasal allergies in the Asian–Pacific population: Results from the Allergies in Asia–Pacific Survey

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ABSTRACT

Background: *The Allergies in Asia–Pacific Survey describes the symptoms, impact, and treatment of allergic rhinitis (AR) across Australia, China, Hong Kong, Malaysia, Singapore, Taiwan, Vietnam, and the Philippines. The Allergies in Asia–Pacific Survey was undertaken to further clarify the prevalence of physician-diagnosed nasal allergies (NAs), impact on quality-of-life (QOL), existing treatment paradigms and gaps, and NA medications currently used in treatment.*

Methods: *Thirty-three thousand three hundred seventy-eight households were screened for individuals, ≥4 years old, with a physician diagnosis of AR or NA and either symptoms or treatment in the past 12 months. Standardized questionnaires were used to make comparisons across regions. A total of 1043 adults and 192 children were included in the survey.*

Results: *Nine percent of participants were diagnosed with AR with two of three responding that their NAs were seasonal in nature. Nasal congestion was the most common and bothersome symptom of AR. Most participants reported that AR impacted their QOL with nearly one-half citing impairments in school/work performance/productivity. Sleep disturbances, secondary to AR, were also shown to be appreciable. Two-thirds of patients took medication for their AR. Less than one-quarter of survey respondents reported taking an intranasal corticosteroid and the satisfaction rate was similar to that of over-the-counter medications. The most common reasons cited for dissatisfaction were related to inadequate efficacy and bothersome side effects.*

Conclusion: *AR appears to be extremely common across Asia–Pacific nations. Many individuals with AR suffer from symptoms that reduce QOL and treatment gaps exist with current therapies. Through identification of disease impact and highlighting treatment gaps, clinicians may better understand and treat AR, leading to improvements in overall patient satisfaction and QOL.*

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Allergic rhinitis (AR) is a highly prevalent chronic respiratory illness that has been linked to multiple comorbid conditions, including asthma.[1,2] Poorly controlled AR has been shown to cause significant patient discomfort and impairments in work productivity, school performance, social interactions, and sleep similar to other chronic conditions.[3–9]

Allergic disorders are estimated to affect some 1.4 billion people globally and the prevalence continues to increase and now has become the most common chronic medical condition worldwide requiring active intervention.[10,11] Recent data from Asia–Pacific suggests that there has been a dramatic increase in the prevalence of AR within this region within the past 10 years that exerts a significant economic burden.[12–17] Although it is unknown why the prevalence of AR is increasing, experts have suggested that it is likely a consequence of the changing environment, better hygiene and decreased infections, and genetic susceptibilities.[18]

Consistent with treatment guidelines, treatment is usually based on patient's age and severity of symptoms.[19] Intranasal corticosteroids (INCSs) are well regarded as the most effective treatment options for AR and should be first-line therapy for mild-to-moderate disease.[19,20] Immunotherapy is another option as a disease modifying therapy for AR. Moderate-to-severe disease not responsive to INCSs should be treated with the addition of second-line therapies, including antihistamines, decongestants, cromolyn, leukotriene receptor antagonists, and nonpharmacologic therapies.[19]

Effective AR treatment has been shown to improve quality of life (QOL) and may even lower the risk of new asthma cases developing in adults.[21] Despite these therapeutic benefits, AR often goes unrecognized by physicians, resulting in inadequate control of symptoms. This fact is underscored by a recent survey of Spanish individuals with clinically confirmed symptoms of AR that showed that one-third of survey participants were not aware that they had the condition, and almost one-half had not been diagnosed by their physician.[22]

Several large-scale studies and surveys (*e.g.*, Allergies in America, Allergies in Latin America, and International Study of Asthma and Allergy in Childhood [ISAAC]), have attempted to ascertain the true

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prevalence of diagnosed AR, impact on QOL, and current treatment gaps within the United States, Latin America, and the European Union.[23–26] However, the authors are unaware of any studies that have attempted to ascertain, in the same study population, an assessment of the prevalence of diagnosed AR, its patient-perceived impact on QOL, current prescribing patterns, and treatment gaps within Asia–Pacific. Given this dearth of data, the Allergies in Asia–Pacific Survey was undertaken in an attempt to assess the prevalence of physician-diagnosed AR and its impact on QOL, as well as existing treatment paradigms and patterns and gaps associated with AR in an effort to aid clinicians in optimally treating this highly prevalent disease.

METHODS

Allergies in Asia–Pacific Survey

Persons appropriate for inclusion in this survey were individuals ≥4 years old, residing in Australia, China, Hong Kong, South Korea, Malaysia, Singapore, Taiwan, Vietnam, and the Philippines. These individuals must have reported currently experiencing or being treated for AR and having been diagnosed by a physician as having AR, nasal allergies (NAs), hay fever, or sinus disease within the past 1 year. It is important to note that individuals included in the study were not required to have a skin-prick test to confirm the diagnosis of AR although individuals were asked whether or not they had a skin-prick test performed to confirm the diagnosis. Terms other than AR were included because AR may not have been the common term understood or communicated to patients in the regions where the interview took place. Thus, a range of more or less synonymous terms was provided to ensure that the survey captured everyone with the target condition. However, for the purposes of clarity, the term AR will be used in this article to identify patients included in this survey.

Fieldwork was conducted between December 2009 and January 2010. Telephone and in-person interviewing were used depending on the most appropriate mode of screening and interviewing in a particular region. Translations of the questionnaire were performed in each country where English was not the dominant language. In some countries the questionnaire was translated into multiple languages. Back translation was not performed; however, the advisors in each country reviewed and validated the translation against the English version of the questionnaire. Most of the interviews were conducted in urban areas because of the low telephone penetration and lack of interviewing infrastructure in rural areas of most of the Asian–Pacific regions. It is important to note that in South Korea, traditional telephone survey methods were not possible because of cultural sensitivities in this region and individuals were included in the survey only through physician referral, a methodology used previously in other surveys assessing chronic conditions in South Korea. Given the fact that a different methodological approach was used for South Korea compared with the other eight countries, the South Korean data were excluded from this analysis. This was done to reduce the possibility of imparting bias into the overall results because patients with AR referred to an allergist or otolaryngologist may have had more severe symptoms and hence have been a more severe population compared with the population from the other countries that did not require physician referral as a criterion for inclusion into the survey. The findings from South Korea are intended to be published in a separate article.

Sample weights were developed to correct for sampling bias and differences between eligible patients screened and eligible patients actually interviewed. An age and gender correction ensured that the interviewed population was similar to the screened population of allergy sufferers. Cross-tabulation and frequency weighting were used in all analyses to determine critical survey outcomes.

The maximum expected sampling error for a simple random sample of 1043 cases (*e.g.*, the adult Asia–Pacific sample without South Korea) was ±2.7 percentage points at the 95% confidence level. The maximum expected sampling error for a simple random sample of 192 pediatric cases was ±6.3 percentage points at the 95% confidence level. The maximum expected sampling error for a simple random sample for region-specific samples from Asia–Pacific was ±5.7 percentage points for sample sizes of 300, and ±9.8 percentage points for sample sizes of 100 at the 95% confidence level. It should be noted that household sampling for face-to-face interviews was conducted with a more complex design using cluster sampling so design effects may increase actual sampling variance compared with simple random sampling.

Development of Survey Questionnaires

Validated and standardized questionnaires specific to ascertaining the prevalence, impact, and treatment gaps associated with AR, unfortunately, do not currently exist. Thus, through the use of survey analysts from the research firm Abt SRBI, Inc., along with expert physicians in the AR field from Asia–Pacific, patient and health care professional questionnaires were developed that accurately collected relevant information on AR within the Asian–Pacific regions surveyed. Because formally validated questionnaires do not currently exist to obtain such data, the questions included in this survey have been standardized to survey questions previously used in previous surveys on AR, which include several thousand survey participants across North and South America.[24–26]

The developed questionnaires focused on general health; AR triggers and symptoms; and effects of AR on QOL including sleep, impact on daily life, mood, absenteeism, and presenteeism. Perceived effectiveness, expectations of treatment outcome, and side effects of over-the-counter (OTC; all medications available without a prescription) and prescription AR medications were also assessed.

RESULTS

Study Participation and Demographics

A total of 33,378 households were screened to obtain 1235 completed interviews across the eight regions. There were 1043 adults and 192 caregivers, with pediatric patients who had AR, who completed the survey. An overview of the study design and number of households screened and surveyed, by region, can be found in Table 1. It is important to note that the population surveyed and presented in this table were those individuals actually diagnosed with AR (NA, hay fever, or sinus disease) by a physician.

As can be seen in Table 2, there were more female subjects included in the survey compared with men. The mean age of children included in the survey was 12.3 ± 2.77 years and the mean age for adults included in this survey was 36.9 ± 13.3 years. The majority of respondents reported that they were educated to a secondary or university level. Most survey participants had either private or public insurance. Less than 20% of respondents reported that they were not insured. This demographic pattern was generally representative of the overall population in Asia–Pacific.

Prevalence and Patterns of Diagnosed AR in Asia–Pacific

The Allergies in Asia–Pacific Survey found that 8.7% of respondents across eight Asia–Pacific regions surveyed had a physician diagnosis of AR, NA, sinus disease, or hay fever (Fig. 1). The prevalence of diagnosed AR ranged from 2.5% in the Philippines to 13.2% in Australia. The vast majority of participants reported being diagnosed with either NA or AR (84% of adults and 87% of children). The average age of doctor diagnosis of AR in adults was 26 years and 9 years for the children included in the survey.

The majority of adult survey respondents reported having been diagnosed with AR by an otolaryngologist (41%) or general practice

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Table 1 **Adult and children survey population and study sampling frame**

Population	Sampling Frame	Interview Length
Adults, adolescents, and children diagnosed with nasal allergies or allergic rhinitis, symptomatic or being treated for nasal allergies in the past 12 mo	**Telephone* and in-person# screening of national or major city sample of households**	**Range, 10–90 min; mean, 34.9 min**
Region	**No. of Households Screened**	**Completed Sample Adults (Children)**
Australia	3534*	262 (41)
China	19,580*	301 (24)
Hong Kong	2118*	71 (29)
Malaysia	491#	73 (27)
Philippines	1285#	80 (20)
Singapore	2002#	88 (12)
Taiwan	1780*	79 (21)
Vietnam	2588#	89 (18)
Total	33,378	1043 (192)

**Participants screened* via *telephone.*
#*Participants screened* via *in-person interview.*

Table 2 **Survey participants demographics**

Parameter	Percent
Sex	
Male	45.9
Female	54.1
Age	
Children (4–17 yr of age)	12.3 yr
Adults (≥18 yr)	36.9 yr
Education level of adult respondents and caregivers of children	
No school	2.0
Primary education	15.5
Secondary education	44.0
University	34.9
Postgraduate	0.1
Do not know	0.3
Refused	0.7
Other	2.6
Health insurance types	
Private	27.0
Public	26.2
Both	27.1
None	18.2
Do not know	1.1
Refused to answer	0.5

physician (41%). Children were most commonly diagnosed with AR by a general practitioner. Not surprisingly, in the majority of instances, these were the same types of physicians that continued to treat these individuals for their AR after initial diagnosis. The majority of individuals who were surveyed reported never having a diagnostic test to confirm the presence of AR. Forty-one percent of adults and 43% of children surveyed reported having had a diagnostic test (either skin or blood test) performed to confirm the diagnosis AR. On average, there was roughly an equal percentage of the survey population that reported having had a skin-prick test (~10%), blood test (~14%), or both (~16%).

Nearly two of three adults and over one-half of children with AR in Asia–Pacific reported having seasonal allergies (Fig. 2, *A* and *B*). There was considerable variation among regions. Participants from China reported having the highest incidence of seasonal allergies whereas those from Singapore had the highest reported incidence of perennial AR (Fig. 2 *A*). It is worth mentioning that despite the majority of survey participants citing that their AR was seasonal in nature, the major allergy trigger reported by the entire survey population was dust, a typical perennial allergen (49% of adults and 56% of caregivers of children with AR; data not shown) potentially indicating that individuals are reporting a seasonal exacerbation secondary to a perennial allergy or nonspecific hyperresponsiveness.

The other most commonly cited AR trigger was climate/humidity. When participants were asked during what particular months of the year is AR the worst, the results were concordant between adults and children surveyed, with both groups having reported that October through December were the months in which their AR was most severe.

When survey participants were asked to assess their general overall health, over one-half of adults (56%) and nearly two of three caregivers of children (68%) rated general overall health as good to excellent. Only 6% of adults and 4% of caregivers of children with AR rated their health as poor or very poor (data not shown).

When asked about concomitant medical conditions, one in five adults and one in four children were reported having been diagnosed with asthma in addition to AR (Fig. 3). The region with the lowest proportion of adults with asthma and AR was Vietnam whereas Taiwan and Hong Kong were the regions with the lowest reported incidence of concomitant asthma in children. The region with the highest proportion of adults with concomitant asthma was Australia and the region with the highest reported incidence of concomitant asthma in children was the Philippines. It is worth mentioning that among those individuals who reported concomitant asthma, nearly 50% of children and 60% of adults with asthma reported having asthma symptoms or an asthma exacerbation within the past year.

Symptoms Associated with AR in Asian–Pacific Patients

Individuals included in the Allergies in Asia–Pacific Survey were asked whether they still suffer from AR or if their AR symptoms have abated over time. The overwhelming majority of adults (96%) and children (96%) reported that they are still troubled by their AR. When asked about the frequency with which they experienced specific symptoms, adults reported most commonly experiencing nasal congestion (45%) and repeated sneezing (43%) every day or most days when their AR was most severe (data not

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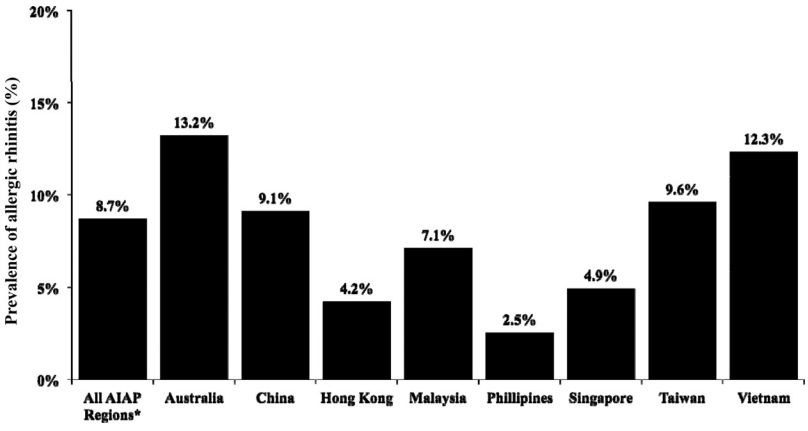

Figure 1. Prevalence of allergic rhinitis overall and by specific Asian–Pacific regions.

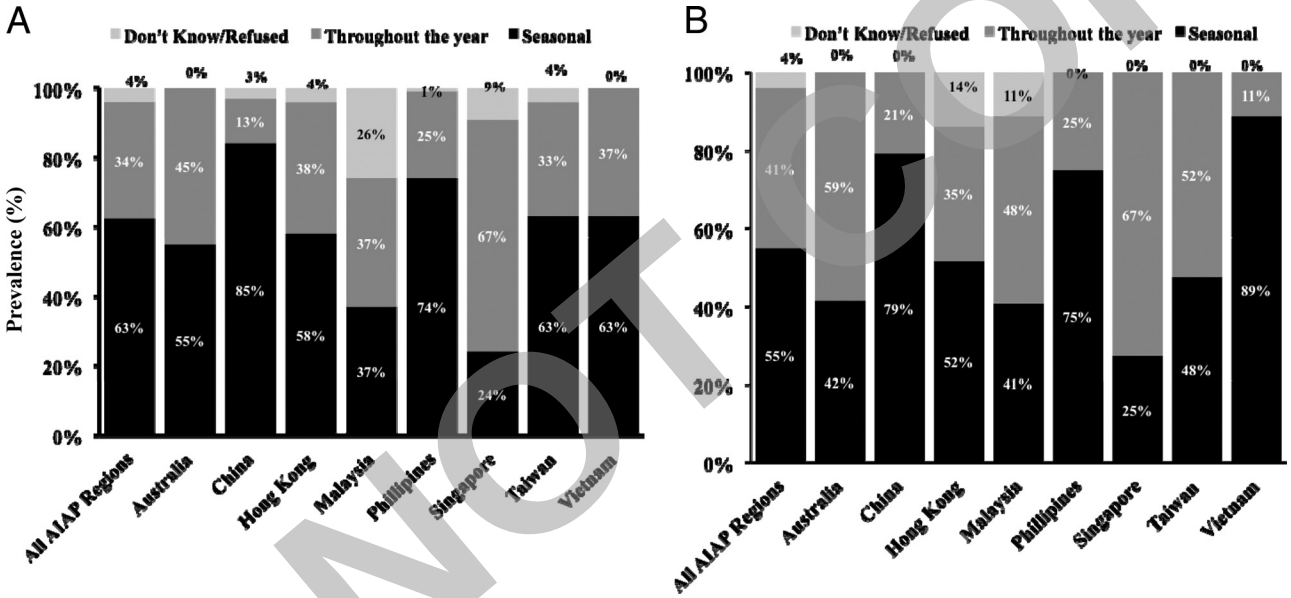

Figure 2. Breakdown of seasonal versus perennial nasal allergies in (A) Asian–Pacific adults and (B) Asian–Pacific children and adolescents.

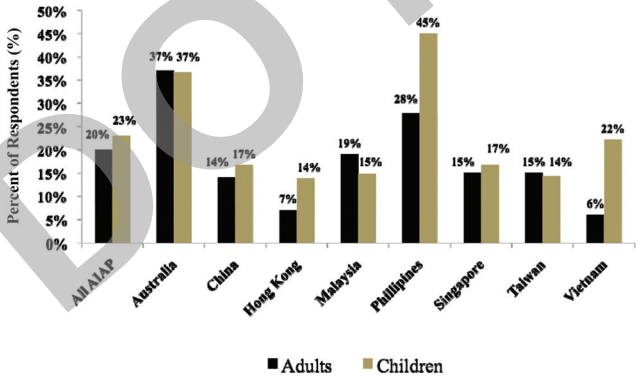

Figure 3. Prevalence of asthma overall and by specific Asian–Pacific regions in adults and children and adolescents with allergic rhinitis.

shown). Caregivers of children with AR reported that their children most commonly experienced runny nose (47%) and nasal congestion (43%) most frequently during the days in which their AR was the most severe (data not shown). The AR symptom assessed as most bothersome was nasal congestion, followed closely by repeated sneezing in the adult and pediatric survey population. A full list of the most bothersome symptoms reported

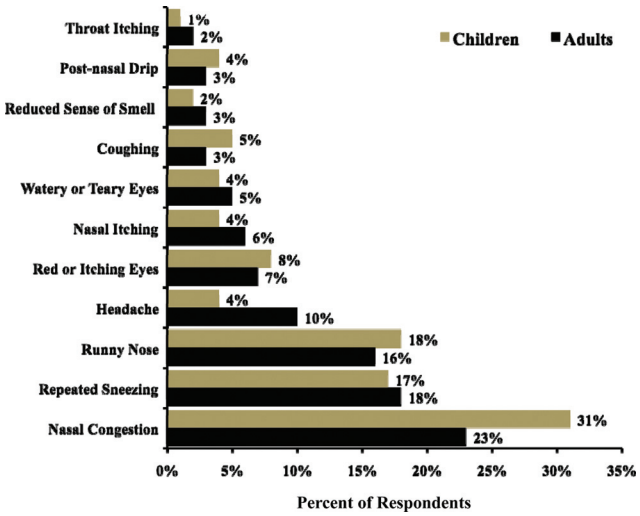

Figure 4. Most bothersome nasal allergy symptoms experienced by Asian–Pacific adults and children and adolescents when nasal allergies are at their worst.

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Table 3 **Impact of allergic rhinitis on various quality of life measures (percent surveyed adults [children])**

	All Regions	Australia	China	Hong Kong	Malaysia	Philippines	Singapore	Taiwan	Vietnam
Moderate-to-severe impact on daily life	38 (38)	43 (56)	48 (50)	16 (21)	12 (19)	67 (74)	12 (17)	28 (14)	34 (39)
Frequently experienced emotions/feelings during allergy season									
Depressed	16 (12)	13 (20)	31 (25)	4 (7)	4 (0)	14 (20)	5 (0)	9 (5)	10 (11)
Tired	27 (24)	41 (44)	27 (17)	17 (21)	11 (7)	36 (30)	9 (17)	15 (10)	24 (33)
Miserable	13 (11)	16 (29)	19 (13)	6 (3)	0 (0)	15 (15)	5 (0)	9 (5)	8 (6)
At least some impact/limitations on lifestyle caused by allergic rhinitis									
Doing well in work/school	46 (45)	41 (42)	66 (75)	37 (41)	22 (22)	48 (70)	20 (33)	38 (14)	51 (72)
Having/playing with pets	31 (32)	25 (27)	45 (67)	13 (24)	41 (30)	28 (35)	21 (17)	25 (19)	27 (28)
Outdoor activities	36 (33)	40 (34)	48 (42)	18 (24)	26 (19)	38 (50)	21 (42)	22 (10)	39 (50)
Indoor activities	27 (22)	24 (17)	34 (29)	28 (21)	12 (19)	28 (55)	13 (17)	28 (10)	36 (17)
Percent reduction in work productivity (school) when allergy symptoms were at their worst compared with when allergy symptoms were absent	25 (23)	31 (36)	31 (23)	20 (19)	16 (10)	31 (30)	22 (18)	10 (19)	12 (11)
Allergy interference with work (school)–yes response	50 (44)	47 (61)	71 (54)	24 (35)	33 (30)	53 (58)	47 (33)	39 (29)	38 (39)
Missed and interfered	21 (23)	16 (36)	35 (21)	3 (14)	10 (9)	28 (42)	23 (25)	11 (10)	15 (22)
Interfered only	25 (13)	24 (15)	32 (29)	18 (14)	19 (4)	24 (5)	18 (0)	28 (19)	21 (11)
Missed work/school only	4 (8)	7 (10)	4 (4)	3 (7)	4 (17)	1 (11)	6 (8)	0 (0)	2 (6)
Moderately-to-extremely troubled with sleep because of allergic rhinitis symptoms									
Falling asleep	41 (37)	28 (27)	53 (54)	17 (28)	53 (30)	48 (70)	26 (17)	23 (19)	75 (72)
Waking up during the night	38 (34)	29 (24)	50 (46)	11 (21)	40 (22)	45 (70)	27 (25)	13 (19)	71 (67)
Lack of good night's sleep	42 (37)	29 (27)	55 (58)	21 (21)	49 (26)	48 (55)	31 (17)	19 (24)	71 (83)

by children and adults diagnosed with AR from the Asian–Pacific region are displayed in Fig. 4.

Patients with AR reported a significant amount of discomfort during NA attacks. Almost all AR sufferers (and caregivers of children with AR) said that the discomfort during an allergy attack is not something they can ignore. Close to one-half (46%) of adults and slightly fewer caregivers of children with AR (39%) said that the discomfort, secondary to AR, is something that they can not tolerate without relief. The region where adults perceived the greatest discomfort secondary to AR was China and the lowest was Singapore. A similar finding was observed for children (data not shown).

QOL Impact of AR in Asian–Pacific Patients

The Allergies in Asia–Pacific Survey also assessed the impact of NA symptoms on QOL. Almost all adults and children with AR reported that the condition had an impact on their daily life when symptoms were at their worst (89% of adults and 82% of children; data not shown). Over one-third of adult and caregivers with children reported that AR affected their lives to at least a moderate degree when symptoms were most severe (Table 3). The region where the impact of AR was the greatest for adults and children was the Philippines. Singapore and Malaysia reported the least daily impact of AR on daily life in adults and Taiwan reported the least daily impact in children (Table 3).

When adults and caregivers of children with AR were asked to identify specifically how symptomatic AR impacted their daily activities, nearly one-half of the entire survey population reported that their AR hindered them from performing well at work/school. Additional limitations cited were the inability to have or play with pets, limitations in participating in outdoor activities, and limitations in participation in indoor activities. A complete by-region breakdown of these data can be found in Table 3.

Nearly 50% of survey participants cited that their AR interfered at some level with their work/school-related efforts with over one in five survey participants having reported that their AR interfered with their daily work/school activities *and* caused them to miss work/school (Table 3). When survey participants were asked to actually rate their work/school productivity/output on a percentage basis in the presence and absence of severe AR symptoms, these data showed >20% reduction in work/school output/performance when AR symptoms were most severe. Interestingly, the results were fairly consistent across all individual regions for both adults and children. A complete by-region breakdown of these data can be found in Table 3.

The Allergies in Asia–Pacific Survey attempted to quantify the impact of AR on sleep-related measures. Over 70% of the adult study population reported being at least somewhat troubled by at least one sleep indictor (*e.g.*, falling asleep, awakening during the night, and perception of lack of restful night sleep) secondary to their NA symptoms whereas ~60% of caregivers of children with AR reported being troubled by at least one sleep indicator (data not shown). When the impact of AR on these specific sleep indicators was assessed, the impact was surprisingly similar across these three sleep measures and between adults and children. A full overview of the impact that AR had on sleep outcomes is presented overall and by country in Table 3.

Current Disease and Treatment Patterns: Perceptions and Paradigms

When NA sufferers were asked how well their AR symptoms have been controlled over the past 4 weeks, nearly one-half, to slightly over one-half, of adult respondents and caregivers of children with AR assessed their symptoms of completely or well controlled. Moreover, 13% of adults and 10% of caregivers of children with AR assessed their NA symptoms as poorly or not controlled (Table 4).

With regard to physician visits for AR, nearly two-thirds of adults and nearly three of four children reported seeing a physician for their AR within the past with a smaller percentage reporting having seen an AR specialist (Table 4). Interestingly, only 58% of adults reported they saw a physician for AR despite reporting that their AR was not controlled at all (data not shown).

When survey participants were asked whether there were truly effective treatments currently available to control their disease, over one-half of the survey population somewhat to strongly agreed with

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Table 4 **Current disease and treatment patterns: Perceptions and paradigms (percent of surveyed adults [children])**

All Regions	Australia	China	Hong Kong	Malaysia	Philippines	Singapore	Taiwan	Vietnam
Completely or well-controlled allergic rhinitis symptoms within the past 4 wk								
42 (52)	52 (59)	25 (21)	34 (48)	44 (52)	43 (50)	63 (42)	49 (81)	48 (67)
Poorly or uncontrolled allergic rhinitis symptoms within the past week								
13 (10)	11 (10)	15 (13)	25 (14)	3 (11)	13 (15)	7 (0)	14 (0)	7 (6)
Seen physician within the past year for allergic rhinitis								
66 (70)	50 (68)	75 (63)	42 (41)	73 (85)	73 (90)	61 (83)	82 (76)	80 (72)
Visited an ear, nose, and throat; otolaryngologist; or other specialist for allergic rhinitis within the past year								
49 (30)	12 (12)	62 (54)	24 (10)	8 (19)	46 (50)	9 (17)	68 (38)	73 (56)
Visited a pharmacist for advice on the treatment of allergic rhinitis								
40 (29)	62 (63)	47 (46)	15 (7)	30 (30)	18 (0)	11 (8)	24 (10)	36 (17)
Attitudes about treatment for allergic rhinitis (somewhat to strongly agree)								
No truly effective treatments for allergic rhinitis								
59 (55)	49 (42)	76 (83)	61 (69)	40 (37)	28 (20)	56 (58)	66 (72)	64 (50)
The frequency of allergic rhinitis symptoms can be prevented in most cases								
62 (68)	53 (76)	69 (50)	49 (66)	60 (63)	77 (85)	63 (58)	51 (67)	72 (67)
Current allergic rhinitis medication use for allergic rhinitis symptoms								
No medication								
31 (37)	32 (39)	28 (33)	44 (52)	56 (52)	7 (10)	49 (33)	35 (29)	9 (22)
Any medication								
69 (63)	68 (61)	72 (67)	56 (48)	44 (48)	93 (90)	51 (67)	65 (71)	89 (78)
Any prescription medication								
52 (48)	39 (29)	58 (63)	34 (35)	38 (44)	73 (65)	44 (67)	51 (48)	81 (67)
Over-the-counter medication								
36 (27)	46 (44)	37 (13)	27 (17)	11 (4)	52 (55)	14 (8)	22 (19)	21 (6)
Type of allergic rhinitis medication used for allergic rhinitis symptoms								
Corticosteroid nasal spray								
25 (18)	32 (12)	33 (29)	11 (14)	6 (19)	21 (20)	13 (25)	18 (5)	28 (33)
Other Rx								
37 (37)	15 (17)	44 (46)	25 (28)	36 (30)	63 (60)	36 (42)	43 (43)	64 (56)
Subcutaneous immunotherapy								
22 (23)	6 (15)	37 (33)	0 (0)	15 (19)	11 (40)	66 (83)	12 (5)	7 (11)
Sublingual immunotherapy								
38 (37)	20 (15)	67 (58)	17 (31)	23 (27)	24 (50)	12 (42)	48 (43)	53 (56)
Homeopathic treatments (*e.g.*, herbal supplements)								
16 (14)	10 (0)	19 (4)	3 (7)	22 (41)	16 (25)	8 (8)	30 (14)	29 (0)

this statement (Table 4). Appreciably more survey respondents reported that they somewhat to strongly agree with the statement that the frequency of NA symptoms can be prevented in most cases (Table 4).

The current class of medications used to treat AR taken by survey respondents are displayed in Table 4. These data show that approximately two-thirds of the overall survey population reported taking some type of medication to treat their AR symptoms. The Philippines had the highest proportion of people reporting taking some type of prescription medication for their disease and Hong Kong had the lowest proportion of patients taking some type of medication for their AR. The reported use of prescription medication was approximately one and one-half times greater than that of OTC use among those adults and children surveyed (Table 4). Slightly >10% of the overall survey population reported taking some type of homeopathic remedy (*e.g.*, herbals) to treat their AR symptoms (Table 4). Homeopathic treatment usage was the highest in Taiwan and the lowest in Hong Kong.

When immunotherapy use was assessed, nearly one in four people reported having used subcutaneous immunotherapy to treat their disease. There was almost a two times greater reported sublingual immunotherapy use in both adults and children compared with subcutaneous immunotherapy use. The region that reported the highest overall subcutaneous immunotherapy usage was Singapore and the lowest was Hong Kong. By contrast, the region that reported the overall highest use of sublingual immunotherapy was China and the region with the lowest overall use incidence was Singapore. Slightly >10% (11.6%) of individuals surveyed reported using both sublingual and subcutaneous immunotherapy with Singapore having the greatest overall concomitant use (13%) and Hong Kong having the lowest reported concomitant use (0%). A complete by-region breakdown of the current disease and treatment patterns, perceptions, and paradigms in Asia–Pacific can be found in Table 4.

Treatment Gaps with Prescription Nasal Sprays

Although corticosteroid nasal sprays are regarded as the gold standard for treatment of moderate-to-severe AR, a surprising minority of individuals actually reported taking this class of medication. When respondents were asked the reasons they did not use an INCS product, the major reason identified was that they do not like nasal sprays (Fig. 5). Other reasons included that their symptoms were not serious enough to warrant use of an INCS product, lack of effectiveness, and possible side effects/dependence (Fig. 5). Interestingly, cost of INCS prescriptions was not cited as a major reason for not using an INCS product.

Given the surprising underuse of INCS products in Asia–Pacific, an assessment of possible reasons for this treatment pattern was made. When a comparison was made between the proportions of patients who reported being very satisfied with OTC medications compared

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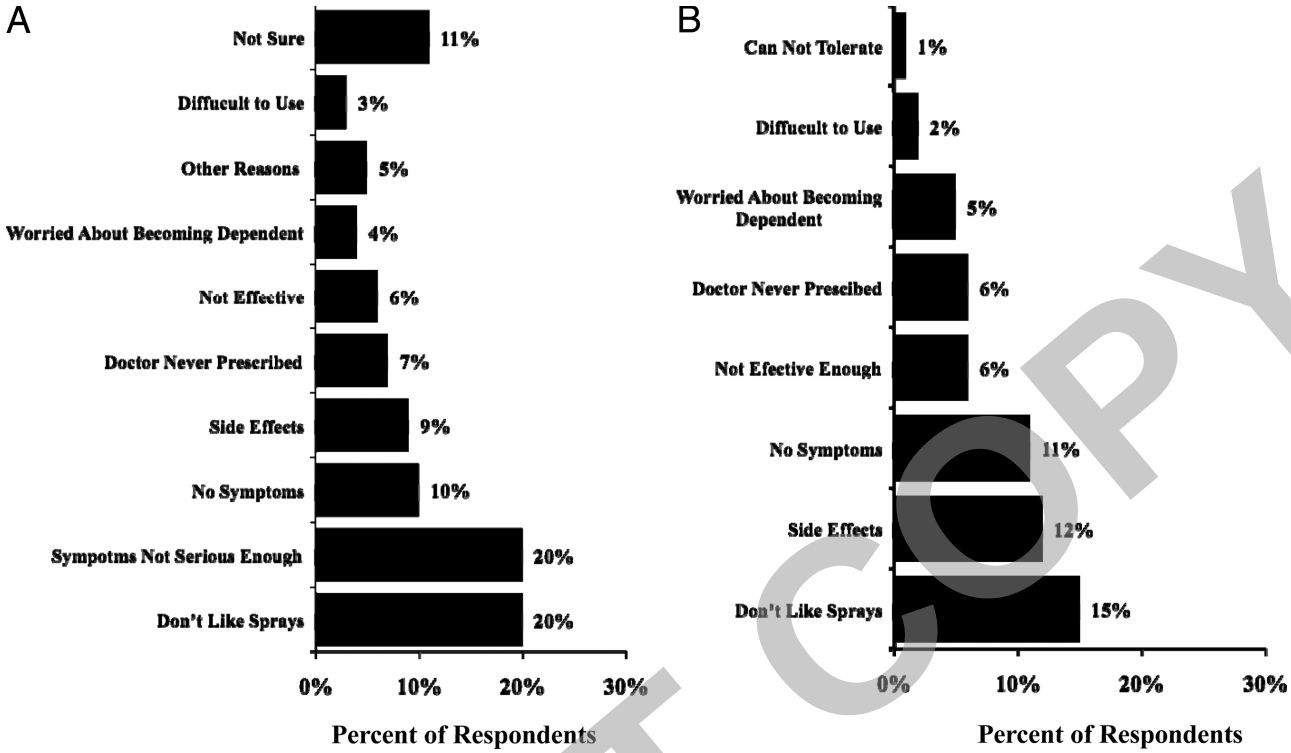

Figure 5. Most common reasons why (A) adults and (B) children and adolescents did not use an intranasal corticosteroid nasal spray.

Table 5 **Treatment patterns, expectations, and gaps with corticosteroid nasal spray use (percent of surveyed adults [children])**

All Regions	Australia	China	Hong Kong	Malaysia	Philippines	Singapore	Taiwan	Vietnam
Proportion of patients who reported being very satisfied with intranasal corticosteroid treatments								
28 (32)	37 (50)	9 (0)	0 (0)	0 (17)	67 (50)	14 (40)	20 (0)	48 (11)
Proportion of patients who reported being very satisfied with over-the-counter treatments								
27 (40×)	39 (46)	18 (0)	7 (25)	0 (0)	24 (36)	25 (100)	0 (0)	50 (100)
INTRANASAL corticosteroid relieves at least most of allergic rhinitis symptoms								
65 (68)	64 (69)	58 (50)	50 (50)	50 (67)	91 (88)	81 (100)	40 (100)	70 (56)
Expected overall percentage of allergic rhinitis symptom relief with intranasal corticosteroid therapy								
83 (86)	85 (83)	81 (92)	87 (89)	77 (93)	87 (90)	87 (91)	77 (67)	84 (80)
Proportion of patients who expect intranasal corticosteroid products to provide symptom relief within 3 hr								
72 (78)	65 (70)	84 (100)	54 (65)	48 (78)	77 (71)	67 (100)	64 (60)	74 (100)
Intranasal corticosteroid products loses effectiveness over the 24-hr treatment interval								
53 (47)	61 (38)	63 (50)	25 (17)	50 (83)	33 (25)	43 (60)	40 (0)	11 (78)
Proportion of patients who reported intranasal corticosteroid effectiveness decreases with chronic use								
30 (19)	41 (21)	32 (29)	0 (24)	10 (0)	41 (43)	9 (0)	8 (20)	30 (13)
Proportion of patients who reported stopping intranasal corticosteroid therapy								
60 (48)	65 (50)	62 (50)	100 (50)	0 (0)	38 (33)	50 (0)	60 (100)	67 (0)
Side effects are less bothersome with other medications used to treat allergic rhinitis compared with intranasal corticosteroid								
36 (27)	26 (19)	38 (40)	35 (25)	57 (17)	63 (50)	44 (33)	41 (0)	50 (50)
Proportion of patients who are not sure if intranasal corticosteroid are safe for long-term use								
25 (28)	19 (15)	25 (50)	34 (35)	30 (26)	29 (47)	40 (50)	22 (10)	27 (17)

with INCS medications, the results were similar between these two classes of AR medications and similar between adults and caregivers of children with AR (Table 5). When survey respondents were asked to assess the symptom relief experienced from an INCS product, approximately two-thirds of adults and caregivers of children with AR reported that their current INCS product relieves at least most of their AR symptoms. As a corollary question, survey participants were asked what defines a successful treatment outcome with INCS products. Adults and caregivers of children with AR reported they expect >80% relief from their AR symptoms after taking an INCS (Table 5). When expectations of speed of symptom relief after INCS administration, an overwhelming majority of respondents stated their expectations were that an INCS product should provide AR symptom relief within 3 hours after administration (Table 5).

In follow-up questions related to efficacy of INCS products, survey respondents were asked if they experienced their INCS medication losing effectiveness over the 24-hour treatment interval as well as losing effectiveness with chronic use. Surprisingly, approximately one-half of the entire surveyed population indicated that their INCS product loses, or has lost, effectiveness over 24 hours despite them having a once-daily dosing indication (Table 5). Additionally, more than one in four survey respondents indicated that their INCS prod-

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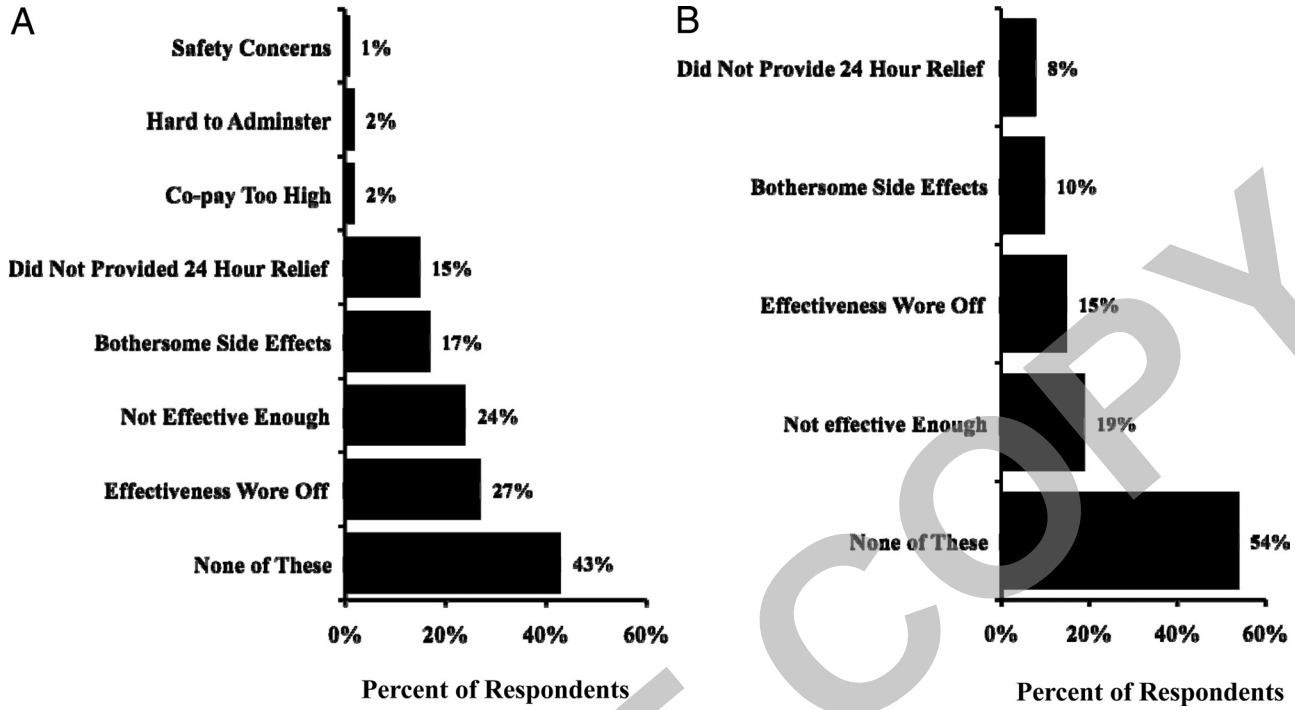

Figure 6. most common reasons why (A) adults and (B) children and adolescents discontinued use of an intranasal corticosteroid nasal spray.

uct loses effectiveness with chronic long-term use (Table 5). It is worth mentioning that Hong Kong had the fewest proportions of respondents that perceived these efficacy shortcomings.

Discontinuation of INCS therapy overall, and by region, was also assessed. These results show that nearly three of five adults and one of two caregivers reported that an INCS product was discontinued (Table 5). As illustrated in Fig. 6, major reasons for respondents reporting discontinuing their INCS product was caused by effectiveness wearing off over time, lack of acceptable efficacy, and unpleasant side effects. Interestingly, cost was only cited by a minority of adults surveyed (2%) and was not listed by caregivers of children with AR as a reason for discontinuing their INCS product.

To further assess the perception of side effects, survey respondents were asked whether side effects with INCS products are less bothersome compared with other available AR medication. In response to this question, only slightly over one-third of adults and one-quarter of caregivers of children with AR reported that side effects with INCS products are less bothersome than other medication used to treat AR (Table 5). Moreover, one-quarter of adults and 28% of caregivers of children with AR reported that they are unsure whether INCS products are safe for long-term use (Table 5). When the specific types of side effects experienced by users of INCS products were assessed, the majority of survey participants reported that retrograde drainage into the esophagus was the most frequently occurring side effect associated with their INCS medication. Other side effects reported by adults and caregivers of children with AR included bad taste, drying feeling, uncomfortable spray volume, and burning sensation. A full list of commonly experienced side effects in allergies in Asia–Pacific population can be found in Fig. 7.

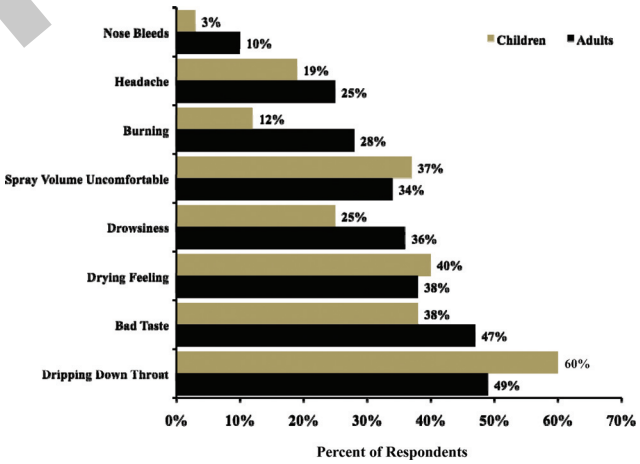

Figure 7. Reported side effects after intranasal corticosteroid use in (A) Asian–Pacific adults and (B) Asian children and adolescents.

DISCUSSION

AR is generally recognized as the most common chronic respiratory disorder worldwide.[27] The ISAAC survey, along with publications from Allergic Rhinitis and Its Impact on Asthma, have recently reported epidemiological and prevalence data for allergic respiratory diseases in Asia–Pacific, South Korea, and Thailand.[12–14] However, prevalence estimates reported from ISAAC are limited to two age cohorts (6–7 years and 13–14 years). Although these data provide directional prevalence and incidence of data on the epidemiological features of AR and asthma, they are limited because individuals were only required to have symptomatology consistent with these diseases and not confirmed by a physician. By contrast, the data from the Allergies in Asia–Pacific Survey were obtained from individuals who actually had a physician diagnosis of AR. Moreover, this is the first study, in which the authors are aware, that ascertained prevalence, patient-assessed symptomatology, impact, and treatment paradigms of AR among patients in Asia–Pacific within the same study.

The data show that nearly 10% of the Asia–Pacific population surveyed had diagnosed AR. Although this is lower than the published estimates of AR for Asia–Pacific, which have been estimated to be as high as 45%, it is important to keep in mind that in this survey

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patients actually needed to have been diagnosed with AR to be eligible to participate in the survey. The author's recognize that is a conservative approach and does not provide information of the true prevalence of AR but rather only provides information on the prevalence of diagnosed AR. By contrast, other estimates only required a survey participant to have symptoms consistent with the disease within the past year.[28] Because the survey was mostly performed in urban areas, one could speculate that factors such as a hygienic environment, higher diagnosis rate due to higher density of specialists, more pollution, *etc.* could potentially overestimate the prevalence of AR—this, however, did not seem to be the case. In fact, the data from the Allergies in Asia–Pacific Survey are consistent with previously published estimates for AR in South Korea as well as Australia.[29,30] Additionally, the data presented here are consistent and in the range of the diagnosed AR population from the United States, Canada, and Latin America when using the same criteria of a physician diagnosis of AR as a clinical validation of the self-reported health condition.[24,26,31] Hence, it is important to recognize that the apparently discordant prevalence estimates between this survey and ISAAC do not necessarily mean that the survey data presented here are flawed, but rather that the rates of physician diagnosis of AR are likely low.

These survey data showed that the worst months for AR exacerbations were October through December. Although the authors do not have a definitive reason as to why these months were perceived by AR patients as ones in which their AR symptoms were most severe, one explanation could be that these months immediately follow the rainy season in most regions surveyed, which may contribute to an increase in native flora resulting in higher pollen counts during the October through December months. Another possible reason for this finding may be related to the fact that changes in temperature and humidity can act as triggers for the nonspecific hyperresponsiveness or hyperreactivity and not because of AR itself.

The types of symptoms experienced by NA suffers as well as the impact on their daily lives were highly concordant with other studies reporting the impact on QOL and treatment gaps that currently exist in the treatment of AR. For example, the most bothersome symptoms reported by this survey population included nasal congestion, sneezing, runny nose, and headaches, which were consistent with those reported in other studies.[4,6,26,31,32]

It is well established that AR has a profound impact on QOL. Not only do people with AR complain of what some consider as "nuisance symptoms," they also have significant limitations in daily activities and limitations in social functioning as well as impaired work performance.[21,33–38] The data presented here are concordant with other published data from the region and also show that almost all patients with diagnosed AR reported that their condition had some impact on their daily lives.[39,40] It is worth mentioning that Singapore survey participants reported that AR symptoms had the least daily impact on daily life. Although the authors have no definitive explanation for this finding, one may speculate that given the fact that this is the richest country of all surveyed that individuals homes and workplaces are perhaps more allergen free and thus individuals are less likely to come into contact with exacerbating allergens. Alternatively, this region had the highest use of disease-modifying subcutaneous immunotherapy, likely ascribed to the healthiness of the country and, by extension, access to comprehensive health care.

Another finding was the fact that the region that reported the highest subcutaneous immunotherapy usage was Singapore whereas China reported the overall highest use of sublingual immunotherapy. Although the author's do not have an exact reason for this finding, one could speculate that Singapore has health care practices similar to western medicine practices in the United States and United Kingdom where subcutaneous immunotherapy is used quite frequently in severe cases of AR. China, by contrast, uses more of the traditional Chinese medicine approach to treating disease. As such, one could speculate that the sublingual approach to immunotherapy treatment in this region could be perceived as more akin to other traditional Chinese medicine treatment modalities, thus providing a rationale for this finding.

Sleep impairment is another significant problem for patients with AR, rhinosinusitis, and nasal polyposis.[33] Although chronic sleep disturbance has been linked to more severe pathologies, the impact of AR on sleep quality remains an underrecognized and undertreated component of AR morbidity.[2,24,34,41–49] Nasal congestion, one of the common and most bothersome AR symptoms identified in this survey, has been associated with sleep-disordered breathing and is thought to be a key cause of sleep impairment.[5,32] The data presented here show that nearly a significant number of adults and children with AR reported either difficulty in falling asleep, awakening during the night, or the lack of a restful night's sleep. These data were, for the most part, highly concordant across all regions surveyed giving the authors confidence that these overall findings were not spurious and simply driven by an overestimated result in one or two regions within Asia–Pacific. Moreover, these data are concordant with other data published on the relationship between impaired sleep quality and uncontrolled AR.[4,34,50,51]

The frequent and burdensome symptoms of AR as well as impaired sleep can significantly affect allergy sufferers' lives and work productivity in the form of absenteeism and presenteeism.[38,52–54] The data presented here show that individuals with AR had a >20% decrease in productivity between days when they have no allergy symptoms and days when their allergy symptoms are at their worst. Interestingly, these data are consistent with the data from the Allergies in America Survey as well as recently published data from Latin America.[24,26,34] Like in the case of the sleep data presented here, these data significantly contribute to the body of evidence showing the far-reaching consequences of AR and for the first time provide and actual quantitative impact of AR on work performance in the Asian–Pacific population.

The current study also investigated treatment patterns and the role of NA medications in treatment of AR, including patient perspectives on both effectiveness and bothersome side effects associated with these medications. These data showed that nearly three of four survey participants have seen a physician within the past year for their AR with nearly 60% reporting seeing a specialist for their disease. This is not completely surprising given the fact that almost all NA sufferers said that discomfort during an allergy attack could not be ignored, with nearly one-half of participants citing that that the discomfort is something that they can not tolerate. These data were supported by the fact that the majority of individuals in this survey took some type of medication to treat their AR symptoms, with over one-half reporting having taken some type of prescription medication to treat their disease.

What was surprising, however, was that only a minority of individuals reported taking an INCS product. Although on initial review of these data may seem surprising, this was similar to the INCS usage observed in Latin America and only slightly less compared with the United States and Canadian experience.[24,26,31,34] Initially, we speculated that that the likely reason for underuse of INCS products in this region was related to cost, given the fact that in certain areas in the Asia–Pacific, INCS prescriptions can be up to 20 times more expensive than the first- and second-generation antihistamines.[12] Surprisingly, however, it appeared to be caused by dislike of nasal sprays and side effects. The dislike for nasal spray products is not totally surprising given the fact that there is a considerable amount of data regarding patient preference with INCS products as well as intranasal migraine therapies that have shown that patient preference attributes are a key driver to patient acceptance and adherence.[55–58] Moreover, these data are concordant with other studies that looked at sensory attributes that patients found unpleasant.[24,59–61] For example, Mahedevia and colleagues found that lack of aftertaste was the most important attribute of an "ideal INCS product," followed by no aftertaste, throat rundown and nose run-out, and that all of these

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attributes contributed to patient acceptance and, by extension, patient adherence to INCS therapy, suggesting that patient preference may be an important driver in increasing patient acceptance and adherence to intranasal NA medications.[62,63]

In addition to assessing current treatment patterns for AR in Asia–Pacific, treatment gaps with AR medications were also analyzed. The majority of individuals who reported taking an INCS product reported that their INCS product relieved most of their AR symptoms, with less than one-third of participants reporting that that they were very satisfied with their INCS treatment. One reason for this low satisfaction rate for INCS therapy could be the fact that patients with AR expect a high amelioration of their nasal symptoms. When asked the expected overall percentage symptom relief after taking an INCS product, respondents stated that they expected upward of an 85% reduction in AR symptoms in order for them to consider that the therapy was successful. When reasons for discontinuing an INCS product was assessed, the major reasons cited were lack of perceived effectiveness specifically related to lack of 24-hour control of symptoms as well as diminution of effect with chronic use and side effects. Thus, an AR medication that is effective in reducing severity of all nasal symptoms associated with AR (*e.g.*, rhinorrhea, nasal congestion, sneezing, and itching) may more adequately meet a patient's perception of an effective product leading to increased persistence and compliance.

One additional benefit of the Allergies in Asia–Pacific Survey data set was that it enabled an assessment if intracountry differences. Although most data across Asia–Pacific were similar in terms of QOL impact of AR, the region that reported the highest and lowest impact of AR on daily life was the Philippines and China, respectively. It is not totally surprising that the Philippines reported both the highest QOL impact of AR and the highest medication usage for their disease, supporting that patients that have a disease with a considerable impact on daily life are likely to seek out treatments to reduce the burden of their disease.

When individual region treatment patterns for INCS use were assessed, individuals from the Philippines had one of the highest expectations for relief of AR symptoms and had the highest overall satisfaction rates with INCS products. Despite this high overall satisfaction rate, this region also had the highest proportion of patients that reported an INCS effectiveness decreased with chronic use. Additionally, this was the region that reported that medications used to treat AR (*e.g.*, OTC and immunotherapy) actually had a better side effect profile compared with other currently available INCS products.

As a follow-up study, it may be worth assessing treatment gaps associated with other classes of medications (*e.g.*, antihistamines and nasal decongestants) and if the specific types and brands of AR medications currently approved in these particular regions drove the differences in treatment expectations and treatment gaps with INCS products. An additional area of study is why the overall survey population had a relatively low reported usage of subcutaneous immunotherapy, which was not appreciably different from the overall reported usage of INCS.

In conclusion, data from the Allergies in Asia–Pacific Survey have identified the impact of AR on individuals with this chronic disease as well as having identified a number of treatment paradigms and treatment gaps that currently exist in Asia–Pacific. It is the authors' belief that these data will contribute to a better understanding of the true burden of AR and provide a basis for physicians to provide better education to patients about their condition and treatment options, which may ultimately lead to better treatment outcomes for patients with AR.

APPENDIX

1. Including yourself, how many persons, adults and children, live in this household (even if not there right now)?

2. Have any of these persons been diagnosed as having NAs (hay fever), sinus disease, or AR?

3. How many persons in this household have been diagnosed with NAs (hay fever), sinus disease, or AR?

4. (Has this person/Have any of these persons) had symptoms such as sneezing, itching, watery eyes, nasal congestion, or other NA symptoms in the past 12 months?

5. (Does this person/Do any of these persons) take any medication for their NAs (hay fever), sinus disease, or AR?

6. (What is the age/What are the ages) of the person(s) with NAs (hay fever), sinus disease, or AR?

7. What (is/are) the gender of (that person/those persons)?

8. Has a doctor ever diagnosed (you/your child) as having NAs, hay fever, sinus disease, or AR?

9. Do you have nasal congestion; repeated sneezing; cough; runny nose; or red, watery, or itching eyes at least a few days a week?

10. (Do you/ Does your child) still suffer from NAs (hay fever), sinus disease, or AR?

11. When was the most recent time that (you/your child) experienced symptoms of NAs for a month or longer?

12. In the past 12 months, (have you/has your child) taken medication to treat (your/his/her) NAs (hay fever), sinus disease, or AR?

13. Is there any other person in the household who suffers from NAs (hay fever), sinus disease, or AR?

14. In general, would you say (your/your child's) health is excellent, very good, good, fair, poor, or very poor?

15. (Have you /Has your child) ever been diagnosed with asthma?

16. (Have you/Has your child) had asthma symptoms or exacerbations in the past 12 months?

17. At what age (were you/was your child) first diagnosed with NAs (hay fever), sinus disease, or AR?

18. What was the medical specialty of the doctor who FIRST diagnosed (you/him/her) with NAs?

19. (Were you/Was he/she) given a skin test to see what (you were/he/she was) allergic to?

20. (Were you/Was your child) given a blood test to see what (you were/he/she was) allergic to?

21. Would you describe (your/his/her) NAs as seasonal or intermittent or do they occur throughout the year (persistent)?

22. In the past 12 months, have (your/his/her) NA symptoms been more frequent or worse during a particular season or time of year?

23. During what particular months of the year are (your/his/her) NAs the worst?

24. Are (your/his/her) NA symptoms worse when (you are/ he/she is) outdoors or inside, or is it about the same?

25. During the worst 1-month period in the past year, did (you/ he/she) have—every day, most days a week, a few days a week, a few days a month, or less than that?

26. When (you have/he/she has) NA attacks, how bothersome are the following symptoms usually. Was the (symptom) extremely bothersome, moderately bothersome, slightly bothersome, or not bothersome?

27. Which of these symptoms was the MOST bothersome to (you/ him/her)?

28. In general, when (you have/ he/she has) a NA attack would you say that (your/his/her) discomfort is usually?

29. What things usually trigger or make (your/his/her) NA symptoms worse?

30. (Have you/Has your child) missed (work/school) in the past 12 months because of (your/his/her) NAs?

31. How many (work/school) days in the past year (have you/has he/she) missed?

32. Aside from actually missing (work/school) (have your/ has his/ her) NA symptoms in the past 12 months interfered with (your/his/her) performance at (work/school)?

33. Thinking about (your/your child's) ability to do the things (you/he/she) want(s) to on a scale from 0 to 100, where 100 means

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100% able, where would you rank (your/his/her) ability on days when (you don't/ he/she doesn't) have NA symptoms?

34. Where would you rank (your/ his/her) ability to do the things (you/he/she) want(s) to on the same scale of 0 to 100, where 100 means 100% able, when (your/his/her) NAs are at their worst?

35. How much do you feel that (your/your child's) allergies limit what (you/he/she) can do in the following areas? Do you feel (your/his/her) allergies restrict (you/him/her) a lot, some, only a little, or not at all.

36. During the worst 1-month period, would you say the condition impacted (your/his/her) daily life …?

37. How troubled (have you/has he/she) been by each of these symptoms during the last week (as a result of your/his/her) nasal symptoms?

38. Overall, how well would you say that (your/your child's) NAs have been controlled in the last 4 weeks?

39. Is the place (you/your child) USUALLY (go/goes) for (your/his/her) overall health care, medical advice, or treatment(a) the place (you go/he/she goes) MOST often.

40. What is the medical specialty of the doctor that (you see/he/she sees) MOST OFTEN for (your/his/her) NAs?

41. (Have you/Has he/she) seen a doctor about (your/his/her) NAs in the past 12 months?

42. How many times (have you/ has he/she) seen a doctor primarily for (your/his/her) NAs in the past 12 months?

43. Has (your/your child's) doctor ever given (you/him/her) desensitization or immunotherapy?

44. When was the most recent time (you/he/she) had desensitization or immunotherapy?

45. Has (your/your child's) doctor ever given (you/him/her) allergy drops or extracts by mouth or under the tongue to treat (your/his/her) NAs?

46. When was the most recent time (you/he/she) had allergy drops or extracts by mouth or under the tongue?

47. Has a doctor ever shown (you/your child) how to use a nasal spray for (your/his/her) NAs?

48. When was the most recent time a doctor showed (you/him/her) how to use a nasal spray for (your/his/her) NAs?

49. (Have you/Has your child) seen an allergist; ear, nose, and throat; or respiratory specialist about (your/his/her) NAs in the past 12 months?

50. How often (do you/does he/she) see a specialist about (your/his/her) NAs?

51. (Have you/Has he/she) been to a pharmacy or drug store to get advice about (your/his/her) NAs in the past 12 months?

52. How many times (have you/ has he/she) been to a pharmacy or drug store primarily for advice about (your/his/her) NAs in the past 12 months?

53. In the past 4 weeks, (have you/has your child) used any steroid nasal spray for (your/his/her) NAs?

54. When was the most recent time that (you/he/she) used a steroid nasal spray for (your/his/her) NAs?

55. What is the name of the most recent steroid nasal spray (you/he/she) take(s)/took for NAs?

56. How often do(did) (you/he/she) take medication?

57. Does your medication give (you/him/her) relief from all of (your/his/her) symptoms, most symptoms, some symptoms, or no symptoms?

58. How long does it take for your medication to begin giving (you/him/her) symptom relief?

59. Does your medication lose effectiveness over the course of the day or night, or does it remain as effective as when (you/he/she) first took it?

60. How long after taking your medication does it begin losing effectiveness?

61. How many weeks (have you/has your child) taken medications for (your/your child's) NAs in the past 12 months?

62. How satisfied are you with your medication for (your/his/her) NAs in the past 4 weeks? Why (haven't you/hasn't your child) used a steroid nasal spray for (your/his/her) NAs in the past 4 weeks?

63. How often (do you/does your child) change steroid nasal sprays—several times each year, once a year, once every few years, only rarely, or never?

64. Why (have you/has your child) changed steroid nasal sprays?

65. Have you ever asked the doctor to change (your/your child's) steroid nasal spray because (you were/he/she was) dissatisfied with it?

66. Why (were you/was he/she) dissatisfied with that medicine?

67. (Have you/Has your child) taken any other prescription medications for (your/his/her) NAs in the past 4 weeks?

68. What is the name of the other prescription medicines (you take/he/she takes) for NAs?

69. How often (do you/ does he /she) take your medication?

70. (Do you/Does he/she) take that medicine as a pill, liquid, or by nasal spray?

71. Does your medication give (you/him/her) relief from all of (your/his/her) symptoms, most symptoms, some symptoms, or no symptoms?

72. How long does it take (MEDICATION FROM Q49b) to begin giving (you/him/her) symptom relief?

73. Does your medication lose effectiveness over the course of the day or night, or does it remain as effective as when (you/he/she) first took it?

74. How long after taking your medication does it begin to wear off?

75. How satisfied are you with your medication for (your/his/her) NAs in the past 4 weeks?

76. In the past 4 weeks, (have you/has your child) used any OTC, nonprescription medicine to give (you/him/her) relief from NA symptoms?

77. When was the most recent time that (you/she/he) used an OTC medicine, nonprescription medicine for relief from NA symptoms?

78. What is the name of the OTC medicine(s) (you take/took/he/she takes/took) for NAs?

79. How often do(did) (you/he/she) take your OTC medication.

80. (Do you/Does he/she) take the OTC medication as a pill, liquid, or by nasal spray?

81. How satisfied are you with the OTC medication (you have/your child has) used for (your/his/her) NAs in the past 4 weeks?

82. How many weeks did (you/your child) take the OTC medication for allergy symptoms in the past 12 months?

83. In the past 4 weeks (have you/has he/she) used any homeopathic, herbal, or alternative treatments for (your/his/her) NAs?

84. What kinds of homeopathic, herbal, or alternative treatments (do you/does he/she) use?

85. How much do you know or have heard about steroid nasal sprays for NAs? Would you say…?

86. Based on your experience or what you have heard. How quickly are steroid nasal spray's supposed to begin providing symptom relief for NAs?

87. How long are steroid nasal spray's supposed to provide symptom relief for NAs?

88. Have you ever found that the effectiveness of a steroid nasal spray that promised 24-hour relief for NAs began wearing off earlier? About how long after (you/he/she) started taking it does a steroid nasal spray's allergy medicine's effectiveness begin wearing off?

89. Have you ever found that a steroid nasal spray's effectiveness in treating (your/your child's) NA symptoms wears off over weeks or months even when (you are/he/she is) taking the medicine as prescribed?

90. About how long, in months, after (you have/he/she has) started taking it does a steroid NA spray's effectiveness begin wearing off even when taking the medicine as prescribed?

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91. (Have you/Has your child) ever stopped taking a steroid nasal spray for (your/his/her) NAs because its effectiveness had worn off?

92. Have any of the steroid nasal sprays that (you have/your child has) taken for NAs ever caused nosebleeds?

93. How bothersome were those nosebleeds?

94. How many of the steroid nasal sprays that (you have/your child has) taken for NAs had the following types of side effects (bad taste, burning, dripping down throat, drying feeling, headaches, drowsiness, and spray volume uncomfortable)—all, some, or none?

95. How bothersome are the following side effects of steroid nasal sprays for NAs (bad taste, burning, dripping down throat, drying feeling, headaches, drowsiness, and spray volume uncomfortable)—extremely, moderately, slightly, or not bothersome?

96. Compared with steroid nasal sprays, would you say that other treatments for (your/his/her) NA symptoms have more bothersome side effects, less bothersome side effects, or about the same?

97. (Have you/Has your child) ever stopped taking a steroid NA spray prescribed by (your/his/her) doctor because, You didn't find it effective; It didn't provide relief through the day and night; It's effectiveness began wearing off over time; It had bothersome side effects; Concerns about safety; Any other reasons?

98. In choosing a steroid nasal spray (for yourself/for your child), which would be most important (fast symptom relief; long lasting symptom relief; complete symptom relief; easy to take; few side effects; low cost; none of these).

99. On a scale of 0–100%, what percent symptom relief would you expect from a steroid nasal spray for it to be considered a successful treatment?

100. How quickly after taking would a steroid nasal spray have to begin relieving symptoms for you to consider it a successful treatment?

101. How long after (you take/your child takes) a dose of steroid nasal spray should symptom relief last for you to consider it a successful treatment?

102. People with allergies sometimes fail to follow their physician's instructions about their medicines for their NAs. (Have you/Has your child) ever failed to take an NA medicine as prescribed because of troublesome side effects, drug cost, lack of symptoms, concern about long-term use, concern over side effects, loss of effectiveness over time, or poor toleration?

103. Now I'm going to read you a series of statements. As I read each statement, please tell me whether you agree strongly, agree somewhat, disagree somewhat or disagree strongly. There are no truly effective treatments for NAs? Frequent NA symptoms can be prevented in most cases. Steroid nasal sprays are safe.

104. Do you have pets living in your house?

105. What kind of pet or pets?

106. Does anyone in your household smoke?

107. How old are you?

108. What is the last year or grade of school you completed?

109. Would you describe the place in which you live as being a large city, the suburb of a large city, a large town (25,000–100,000), a small town, or a rural area?

110. Do you have coverage for your medical care costs through private health insurance or public health plans?

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