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Application of allergic rhinitis and its impact on asthma guidelines in terms of classification, risk factors, quality of life and co-morbidities in allergic rhinitis patients in Northern India

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ABSTRACT

Background: Despite the high prevalence of allergic rhinitis, there are only few studies on application of ARIA (allergic rhinitis and its impact on asthma) guidelines.
Methods: It was a prospective study of 164 patients. Based on ARIA guidelines; patients were graded for severity, risk factors studied, co morbidities documented and quality of life assessed using rhinoconjunctivitis quality of life questionnaire (RQLQ).
Results: A total of 164 cases were studied between the age group 10-72 years of which 56.1% were males. Most common trigger observed was dust (56.1%). Allergic conjunctivitis was most common co-morbidity associated. Using RQLQ it was observed that ARIA.
Conclusions: ARIA guidelines appropriately classify allergic rhinitis, determines risk factors and associated co-morbidities. RQLQ can be used to determine quality of life in allergic rhinitis.

Keywords: ARIA, RQLQ, Comorbidities, Classification, Quality of life, Risk factors

INTRODUCTION

Allergic rhinitis (AR) is clinically defined as a symptomatic disorder of the nose induced after allergen exposure by an IgE-mediated inflammation. Symptoms of AR include rhinorrhea, nasal obstruction, nasal itching and sneezing which are reversible spontaneously or with treatment.

It is a global health problem that causes major illness and disability worldwide. Patients from all countries, all ethnic groups and all ages suffer from AR. AR affects social life, sleep, school and work. The economic impact of AR is often underestimated because the disease does not induce elevated direct costs. However, the indirect costs are substantial.[1] Both AR and asthma are systemic inflammatory conditions and often are co-morbidities.

Impact is correlated with the severity of symptoms. AR is frequently associated with several co morbidities, including asthma, and physicians are encouraged to ask AR patients about symptoms of asthma.[2,3]

AR was conventionally classified into seasonal allergic rhinitis (SAR) and perennial allergic rhinitis (PAR) based on time of exposure. The conventional classification has some limitations from a therapeutic standpoint due to its poor association with clinical symptoms.[4]

The allergic rhinitis and its impact on asthma (ARIA) workshop was held at the World Health Organization in 1999 and certain guidelines for AR were laid.

Despite the high prevalence of AR and its co morbidities, there are only few studies on application of ARIA guidelines. Hence this study was undertaken to elucidate the ARIA guidelines in terms of classification, risk factors, severity, quality of life and co morbidities in AR patients in Northern India.

METHODS

The study was a prospective study in which total 164 cases were taken. It was conducted in the Department of ENT and Head and Neck Surgery at SRMS IMS in patients presenting in ENT OPD and clinically diagnosed as AR, after the approval by the Research or Ethics Committee during November 2016 to July 2019. The patients included in this study were those who presented with signs and symptoms of AR which were watery rhinorrhea, nasal obstruction, nasal pruritis, sneezing especially paroxysmal and impaired quality of life, sleep, school and work.

Those excluded from the study had symptoms that are usually not associated with AR which are unilateral symptoms, mucopurulent rhinorrhea, post nasal drip, pain, recurrent epistaxis, anosmia. Also, the conditions which mimic AR e.g. infectious rhinitis (rhino sinusitis), work related rhinitis, drug induced rhinitis, atrophic rhinitis, food induced rhinitis were excluded from the study. Moreover, Endoscopic findings suggestive of polyps and/or mucopurulent discharge from middle meatus and CT changes suggestive of mucosal changes within ostiomeatal complex and/or sinuses were also excluded from the study.

A detailed history of AR and other symptoms like eye congestion, recurrent or episodic headache, and symptoms associated with social life, work and school was taken. Besides this, a complete ENT examination and haematological investigations were also carried out. The comorbidities assessed were documented on the basis of clinical presentation and were conjunctivitis, rhinosinusitis, nasal polyposis, adenoid hypertrophy, tubal dysfunction, otitis media with effusion (OME), chronic cough, laryngitis and gastro esophageal reflux disorder (GERD).

Quality of life and health status for the patients of AR was determined by rhino conjunctivitis quality of life questionnaire (RQLQ) self-administered Hindi version developed by Elizabeth Jupiner, MCSP, MSc and translated by MAPI Research Institute with Local Co-ordination of Dr. Abha Saxena and printed by QOL Technologies Ltd in 2002.

Statistical testing was conducted with the statistical package for the social science system version SPSS 17.0. Continuous variables are presented as mean±SD, and categorical variables are presented as absolute numbers and percentage. Nominal categorical data between the groups were compared using Chi-squared test or Fisher's exact test as appropriate. $P<0.05$ was considered statistically significant while $p<0.001$ was considered statistically highly significant.

RESULTS

A total of 164 cases were studied between the age group of 10 years to 72 years and the mean age was 30.24 years. Maximum patients were of age group 21-30 years contributing 40.2% followed by 31-40 years contributing 22.6% as depicted in Table 1.

Table 1: Age distribution and classification in patients of AR.

Variables	Frequency	%
Age groups (in years)		
10-20	36	22.0
21-30	66	40.2
31-40	37	22.6
41-50	14	8.5
>50	11	6.7
Total	164	100
Mean±SD	30.24±11.92	
Median	27.5	
Min-Max	10-72	
Classification of AR		
Mild intermittent	92	56.1
Mild persistent	49	29.9
Moderate to severe intermittent	5	3.0
Moderate to severe persistent	18	11.0
Total	164	100

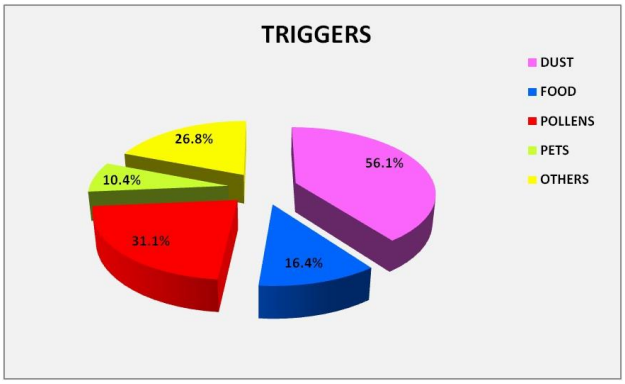

Figure 1: Triggers of AR.

In the past AR was classified as 'seasonal' and 'perennial'. Based on ARIA guidelines it is now classified as intermittent or persistent and mild or moderate to severe. In our study it is illustrated that most

of the patients had mild intermittent AR (56.1%) and the least number of patients had moderate to severe intermittent AR (3%) (Table 1).

It was found that out of 164 cases, 72 (43.9%) were females and 92 (56.1%) were males and most of the patients were of mild intermittent AR in both males and females.

AR is attributed to many risk factors and triggers which are implicated in its aetiopathogenesis and can be outdoor and indoor allergens. In the present study dust, food, pollens, pets, others (other than the allergens mentioned in this study) were studied upon and it was observed that in 56.1% cases dust was the triggering factor followed by pollens (31.1%) (Figure 1). More or less all the studied triggers were most commonly seen in patients of mild intermittent type and least in moderate to severe intermittent type as illustrated in Figure 2.

AR is usually associated with co-morbidities as a result of 'unified airway disease' affecting the entire respiratory pathway. Co-morbidities can be classified as due to a common causal pathway (e.g. allergy) or as a complicating co-morbidity (complication of infections due to mucosa swelling, stasis of mucous). In the present study allergic conjunctivitis was the most common co-morbidity associated (48.8%) while nasal polyposis and Rhinosinusitis was not observed in any patient as illustrated in Table 2.

It has been observed that in the present study except tubal dysfunction, OME and laryngitis rest of the co-morbidities were most commonly seen in mild intermittent AR and it was statistically significant as illustrated in Table 2.

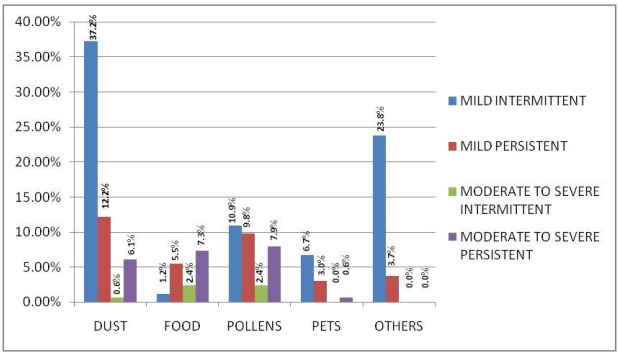

Figure 2: Association of triggers with classification of AR.

Table 2: Co-morbidities and their association with classification of AR (n=164).

Comorbidities	Total	Class				P value
		Mild intermittent	Mild persistent	Moderate to severe intermittent	Moderate to severe persistent	
	N (%)	N (%)	N (%)	N (%)	N (%)	
Allergic conjunctivitis	80 (48.8)	37 (22.6)	26 (15.9)	3 (1.8)	14 (8.5)	0.025
Rhinosinusitis	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	–
Nasal polyposis	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	–
Adenoid hypertrophy	8 (4.9)	8 (4.9)	0 (0.0)	0 (0.0)	0 (0.0)	0.086
Tubal dysfunction	44 (26.8)	14 (8.5)	22 (13.4)	1 (0.6)	7 (4.3)	0.001
Otitis media with effusion	27 (16.5)	3 (1.8)	19 (11.6)	1 (0.6)	4 (2.4)	<0.001
Chronic cough	14 (8.5)	5 (3.0)	2 (1.2)	2 (1.2)	5 (3.0)	0.001
Laryngitis	14 (8.5)	5 (3.0)	1 (0.6)	1 (0.6)	7 (4.3)	0.001
GERD	32 (19.5)	13 (7.9)	13 (7.9)	0 (0.0)	6 (3.7)	0.084

Table 3: Three most important activities in which patient have been limited by his/her nose/eye symptoms during the last week RQLQ.

Activities	Activity 1	Activity 2	Activity 3
	N (%)	N (%)	N (%)
Bicycling	11 (6.7)	8 (4.9)	2 (1.2)
Reading	6 (3.7)	5 (3.0)	8 (4.9)
Shopping	7 (4.3)	3 (1.8)	4 (2.4)
Doing home maintenance	11 (6.7)	14 (8.5)	6 (3.7)
Doing your housework	7 (4.3)	9 (5.5)	11 (6.7)
Gardening	17 (10.4)	11 (6.7)	8 (4.9)
Watching tv	5 (3.0)	3 (1.8)	4 (2.4)

Continued.

Activities	Activity 1	Activity 2	Activity 3
	N (%)	N (%)	N (%)
Exercising or working out	0 (0.0)	3 (1.8)	2 (1.2)
Hot/cold eatables	9 (5.5)	6 (3.7)	7 (4.3)
Using a computer	3 (1.8)	5 (3.0)	8 (4.9)
Cleaning the lawn	6 (3.7)	7 (4.3)	11 (6.7)
Playing with pets	10 (6.1)	7 (4.3)	7 (4.3)
Eating spicy foods	2 (1.2)	5 (3.0)	7 (4.3)
Playing sports	3 (1.8)	6 (3.7)	4 (2.4)
Driving	7 (4.3)	8 (4.9)	3 (1.8)
Making chapatis	5 (3.0)	9 (5.5)	8 (4.9)
Doing regular social activities	1 (0.6)	0 (0.0)	3 (1.8)
Having sexual relations	0 (0.0)	0 (0.0)	0 (0.0)
Visiting temple	2 (1.2)	3 (1.8)	4 (2.4)
Talking	3 (1.8)	1 (0.6)	1 (0.6)
Eating	2 (1.2)	5 (3.0)	7 (4.3)
Vacuuming	5 (3.0)	3 (1.8)	8 (4.9)
Visiting friends or relatives	0 (0.0)	2 (1.2)	5 (3.0)
Going for a walk	4 (2.4)	3 (1.8)	6 (3.7)
Worshipping god	1 (0.6)	0 (0.0)	2 (1.2)
Stuck in traffic	3 (1.8)	2 (1.2)	4 (2.4)
Carrying out your activities at work	5 (3.0)	2 (1.2)	6 (3.7)
Sitting outdoors	3 (1.8)	4 (2.4)	2 (1.2)
Taking children to the park	0 (0.0)	3 (1.8)	2 (1.2)
Bathing	0 (0.0)	2 (1.2)	1 (0.6)
Cooking food over stove	5 (3.0)	11 (6.7)	4 (2.4)
Using public transport	3 (1.8)	5 (3.0)	1 (0.6)
Setting bedsheet	0 (0.0)	0 (0.0)	0 (0.0)
Cooking vegetables	11 (6.7)	5 (3.0)	6 (3.7)
Handling wheat	7 (4.3)	4 (2.4)	2 (1.2)

Table 4: RQLQ association of activity 1 with classification of AR.

Activity 1	Score	Class				P value
		Mild intermittent	Mild persistent	Moderate to severe intermittent	Moderate to severe persistent	
		N (%)	N (%)	N (%)	N (%)	
Not troubled	0	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	-
Hardly troubled at all	1	13 (7.9)	3 (1.8)	0 (0.0)	0 (0.0)	0.156
Somewhat troubled	2	59 (36.0)	16 (9.8)	2 (1.2)	0 (0.0)	<0.001
Moderately troubled	3	19 (11.6)	28 (17.1)	2 (1.2)	2 (1.2)	<0.001
Quite a bit troubled	4	1 (0.6)	2 (1.2)	1 (0.6)	11 (6.7)	<0.001
Very troubled	5	0 (0.0)	0 (0.0)	0 (0.0)	5 (3.0)	<0.001
Extremely troubled	6	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	-
Not done	9	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	-

In the present study we have utilised RQLQ to determine quality of life in patients of AR.

Table 3 shows the three most important activities in which patient had been limited by his or her nose or eye symptoms during the last week RQLQ. Out of 35 activities the most common activity 1 was ‘gardening’ which was chosen by 17 (10.4%) patients. Most common activity 2 was ‘doing home maintenance’ which was chosen by 14 (8.5%) patients and most common activity 3 was ‘moving the lawn’ and ‘doing your housework’ which was chosen by 11 (6.7%) patients. After choosing the three activities the patient had to subjectively choose how troubled he/she was by each of the chosen activity from 0-6 (not troubled- not done).

Table 5: RQLQ- how troubled the patient had been by each of these sleep problems during the last week as result of his/her nose/eye symptoms.

Sleep	Not troubled	Hardly troubled at all	Somewhat troubled	Moderately troubled	Quite a bit troubled	Very troubled	Extremely troubled
	0	1	2	3	4	5	6
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Difficulty getting to sleep	72 (43.9)	57 (34.8)	19 (11.6)	11(6.7)	5 (3.0)	0 (0.0)	0 (0.0)
Wake up during night	86 (52.4)	41 (25.0)	24 (14.6)	6 (3.7)	5 (3.0)	2 (1.2)	0 (0.0)
Lack of good night sleep	90 (54.9)	40 (24.4)	20 (12.2)	8 (4.9)	5 (3.0)	1 (0.6)	0 (0.0)

Table 6: RQLQ-association of 'difficulty getting to sleep' with classification of allergic rhinitis.

Difficulty getting to sleep	Score	Class				P value
		Mild intermittent	Mild persistent	Moderate to severe intermittent	Moderate to severe persistent	
		N (%)	N (%)	N (%)	N (%)	
Not troubled	0	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	-
Hardly troubled at all	1	60 (36.6)	12 (7.3)	1 (0.6)	0 (0.0)	<0.001
Somewhat troubled	2	27 (16.5)	29 (17.7)	1 (0.6)	0 (0.0)	<0.001
Moderately troubled	3	5 (3.0)	21 (12.8)	2 (1.2)	4 (2.4)	0.001
Quite a bit troubled	4	0 (0.0)	1 (0.6)	1 (0.6)	9 (5.5)	<0.001
Very troubled	5	0 (0.0)	0 (0.0)	0 (0.0)	5 (4.0)	<0.001
Extremely troubled	6	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	-

Table 7: RQLQ-how troubled the patient had been by these problems during the last week as result of his/her nose/eye symptoms and practical problems.

	Not troubled	Hardly troubled at all	Somewhat troubled	Moderately troubled	Quite a bit troubled	Very troubled	Extremely troubled
	0	1	2	3	4	5	6
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Non-nose/eye symptoms							
Fatigue	27 (16.5)	40 (24.4)	60 (36.6)	23 (14.0)	13 (7.9)	1 (0.6)	0 (0.0)
Thirst	29 (17.7)	43 (26.2)	40 (24.4)	38 (23.2)	10 (6.1)	4 (2.4)	0 (0.0)
Reduced productivity	16 (9.8)	42 (25.6)	63 (38.4)	26 (15.9)	14 (8.5)	3 (1.8)	0 (0.0)
Tiredness	13 (7.9)	47 (28.7)	58 (35.4)	30 (18.3)	13 (7.9)	2 (1.2)	1 (0.6)
Poor concentration	11 (6.7)	46 (28.0)	59 (36.0)	34 (20.7)	12 (7.3)	1 (0.6)	1 (0.6)
Headache	84 (51.2)	51 (31.1)	22 (13.4)	6 (3.7)	0 (0.0)	1 (0.6)	0 (0.0)
Worn out	35 (21.3)	25 (15.2)	64 (39.0)	28 (17.1)	12 (7.3)	0 (0.0)	0 (0.0)
Practical problems							
Inconvenience of having to carry tissues or handkerchief	19 (11.6)	25 (15.2)	35 (21.3)	43 (26.2)	28 (17.1)	12 (7.3)	2 (1.2)
Need to rub nose/eyes	17 (10.4)	39 (23.8)	64 (39.0)	24 (14.6)	11 (6.7)	8 (4.9)	1 (0.6)
Need to blow nose repeatedly	15 (9.1)	34 (20.7)	79 (48.2)	25 (15.2)	6 (3.7)	5 (3.0)	0 (0.0)

Table 8: RQLQ-how troubled the patient had been by each of these symptoms during the last week.

	Not troubled	Hardly troubled at all	Somewhat troubled	Moderately troubled	Quite a bit troubled	Very troubled	Extremely troubled
	0	1	2	3	4	5	6
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Nasal symptoms							
Stuffy/blocked	26 (15.9)	37 (22.6)	46 (28.0)	40 (24.4)	13 (7.9)	2 (1.2)	0 (0.0)
Runny	13 (7.9)	21 (12.8)	29 (17.7)	54 (32.9)	25 (15.2)	18 (11.0)	4 (2.4)
Sneezing	0 (0.0)	4 (2.4)	26 (15.9)	57 (34.8)	39 (23.8)	25 (15.2)	13 (7.9)
Post nasal drip	0 (0.0)	63 (38.4)	51 (31.1)	41 (25.0)	7 (4.3)	1 (0.6)	1 (0.6)
Eye symptoms							
Itchy eyes	43 (26.2)	33 (20.1)	57 (34.8)	20 (12.2)	10 (6.1)	1 (0.6)	0 (0.0)
Watery eyes	65 (39.6)	29 (17.7)	27 (16.5)	17 (10.4)	24 (14.6)	2 (1.2)	0 (0.0)
Sore eyes	97 (59.1)	25 (15.2)	32 (19.5)	9 (5.5)	1 (0.6)	0 (0.0)	0 (0.0)
Swollen eyes	106 (64.6)	43 (26.2)	15 (9.1)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Emotional parameters							
Frustrated	39 (23.8)	29 (17.7)	55 (33.5)	22 (13.4)	14 (8.5)	5 (3.0)	0 (0.0)
Impatient or Restless	31 (18.9)	43 (26.2)	47 (28.7)	34 (20.7)	6 (3.7)	3 (1.8)	0 (0.0)
Irritable	12 (7.3)	35 (21.3)	63 (38.4)	32 (19.5)	19 (11.6)	2 (1.2)	1 (0.6)
Embarrassed by your symptoms	56 (34.1)	60 (36.6)	27 (16.5)	14 (8.5)	6 (3.7)	1 (0.6)	0 (0.0)

Then the association of all the three activities with classification of AR was assessed. It was observed that in mild intermittent AR most of the patients were 'Somewhat troubled' followed by 'moderately troubled' and none of the patient was 'extremely troubled' or could not perform activity. However, in patients of moderate to severe persistent AR most of the patients were 'quite a bit troubled' followed by 'very troubled' and 'moderately troubled'. Thus, as the severity of AR increased; the trouble of the patient in performing the activity I also increased and it was statistically significant as illustrated in Table 4 and similarly for activity II and III.

Another domain studied in the present study according to RQLQ was sleep parameters as shown in Table 5 and it is depicted in Table 6 that as the severity of AR increased; the trouble of the patient in sleep parameter i.e. 'difficulty getting to sleep' also increased and it was statistically significant.

Other domains studied in the present study according to RQLQ were non nose or eye symptoms, practical problems, nasal symptoms, eye symptoms and emotional parameters as depicted in Tables 7 and 8 and it was observed that as the severity of AR increased; the trouble of the patient in that particular parameter as per RQLQ also increased and it was statistically significant as for 'difficulty getting to sleep' as illustrated in Table 6.

DISCUSSION

AR is one of the most common manifestations of immunoglobulin E (IgE)-mediated inflammation after allergen exposure of the nasal mucosa membrane.

In the present work the age distribution of the patients ranged from 10 years to 72 years and the mean age was 30.24 years. Maximum patients were of age group 21-30 years contributing 40.2% while among age group >50 years only 6.7% patients had AR. Our results were consistent with the previous studies by Cazzoletti et al, Droste et al, Olivieri et al in which the prevalence of AR peaks around the age of 16-24 years and decreases in the subsequent years up to the age of 65-70.[5] The age related decrease in the AR prevalence may be because of the decrease in allergen specific IgE level that occurs with aging in atopic individuals.[5-7]

Previously AR was classified as seasonal and perennial but this classification became obsolete. Based on ARIA Guidelines 2008, AR has been classified into intermittent and persistent type and severity is classified as mild and moderate to severe type and this classification has been applied in the present study. We observed that most of the patients were having mild intermittent AR (56.1%) and very few patients were having moderate to severe intermittent AR (3%). Contrasting results were documented in studies by Demoly et al, Bousquet et al and Shafi et al in which most of the patients had moderate to severe intermittent and persistent AR while very few patients had mild intermittent AR.[8-10]

Demoly et al showed that seasonal and perennial rhinitis are not synonymous to intermittent and persistent rhinitis and they concluded that ARIA classification appears to be more appropriate than the classic form.[11]

In the present study dust, food, pollens, pets, others (other than the allergens mentioned in this study) were studied

upon as triggers and it was observed that in 56.1% cases dust was the triggering factor followed by pollens (31.1%). There is a significant association of dust and pollens with the severity of AR as depicted in our study. Various studies done in past also support our result and show a strong relationship among dust/pollutants and allergic sensitization.[12-16]

AR is an organ-specific manifestation of allergic disease and it coexists with other organ-specific disorders that have a common allergic basis. Therefore, AR is rarely found in isolation but has been frequently associated with other co-morbid disorders.[17] In the present work we have studied co-morbidities associated with AR as mentioned in ARIA guidelines 2008 and we found that most common co-morbidity associated with AR was allergic conjunctivitis (48.8%) followed by tubal dysfunction (26.8%) while least no. of patients had adenoid hypertrophy (4.9%). None of the patient in our study had nasal polyposis and rhinosinusitis which was in contrast to a study by Cazzoletti et al in which sinusitis was present 33.9% subjects with AR (3363 patients) and the 6.6% patients of AR reported nasal polyps.[5] Similarly Passali et al reported sinusitis in 57.69% patients of AR and nasal polyposis in 36.54% patients in their study.[17]

In our study allergic conjunctivitis was observed mostly in patients of mild intermittent or persistent AR as compared to moderate to severe intermittent or persistent AR and it was found to be statistically significant. However, it was in contrast to a study done by Alyasin et al in which Allergic conjunctivitis was present mostly in moderate to severe intermittent or persistent AR patients.[18]

Numerous epidemiologic studies have identified allergy as a risk factor for OME. Our results show that OME is present in 16.5% of AR patients and there is a statistically significant association of OME with severity of AR. Comparable to our results Umapathy et al in their study showed that a significant association between AR and OME exist.[19]

AR is a chronic disease and has a negative impact on the quality of life. Bousquet et al in their study concluded that more than 80% of the patients with more severe forms of AR reported impairment in their activities due to the disease compared with only 40% of those with mild forms.[20]

In our study we used the RQLQ self administered Hindi version) developed by Elizabeth Jupiner, MCSP, MSc and translated by MAPI Research Institute with local co-ordination of Dr. Abha Saxena and printed by QOL Technologies Ltd in 2002 for determining quality of life in patients of AR.

In the present study the association of all the three Activities with classification of AR was assessed and it was found that as the severity of AR increased; the trouble of the patient in performing the activity also increased and it was statistically significant.

In our study one of the parameters assessed for quality of life as per RQLQ was sleep. Our results were confirmed by the observations made by La-Grutta et al in their study on Spanish adolescents (aged 12-18 years) with respiratory allergies including AR who suggested that the adolescents experienced difficulties falling asleep, night waking, and poor sleep as a consequence of their condition.[21] Our results are comparable to the survey done by Blaiss et al in patients of AR which depicted that 68% patients with perennial AR and 48% patients with seasonal AR reported that the disease interfered with their sleep and affected their quality of life.[22] Similar results were observed in a French cohort where the prevalence of sleep disorders (insomnia) was around 14% in mild AR and 40-42% in moderate-severe AR.[23]

Another domain studied in the present study according to RQLQ was non nose or eye symptoms which were fatigue, thirst, reduced productivity, tiredness, poor concentration, headache and worn out and the results were similar to the sleep parameters as mentioned before. Our results were consistent with the observations made by Leger et al who reported that 43.7% of patients with AR suffer from fatigue even when they sleep normally at night. Their headaches, anxiety, depression, and daytime sleepiness are significantly higher compared to those without AR.[23]

Certain practical problems mentioned in RQLQ have been studied in the present study and the results were comparable to a study performed by Dziekanski et al which utilised modified RQLQ (RQLQm) for determining quality of life; among “practical problems,” to wipe the nose repeatedly was the one that most caused discomfort, followed by to rub the nose repeatedly, having to carry handkerchiefs and having to take medication in smaller proportions.[24]

Another domain mentioned in the RQLQ and taken into consideration in the present study is of Nasal Symptoms which are really very annoying to the patient and affects quality of life in patients of AR. The results were similar to the other domains mentioned before and it was observed that as the severity of AR increased; the trouble of the patient in nasal symptoms also increased.

In a study by Dziekanski et al who utilised RQLQm; regarding the “nasal symptom score,” nasal itchiness predominated. None of the interviewed cited nasal itchiness as absent. Runny nose appeared to be uncomfortable a few times and the symptoms headache and itchy eyes generally bothered less the respondents.[24]

Another domain studied was of eye symptoms which showed that in parameter ‘itchy eyes’ the patient was mostly ‘somewhat troubled’. in parameters ‘watery eyes’, ‘sore eyes’ and ‘swollen eyes’ most of the patients were

'not troubled'. The results were similar to the other domains as mentioned before and were comparable to the results depicted in a study by Belgu et al who found that in the group with coexistent allergic conjunctivitis, RQLQ scores of sleep, non-hay fever complaints, nasal complaints, ophthalmic complaints, and restricted activities were significantly higher compared to the group without AC ($p<0.05$).[25]

In the present study the emotional problems (as per RQLQ) that were studied included 'frustrated, 'impatient or restless', 'irritable' and 'embarrassed by your symptoms'. The results were similar to the other domains as mentioned before and it was observed that as the severity of AR increased; the duration for trouble for the patient in emotional problems (as per RQLQ) also increased and it was statistically significant.

In a study by Dziekanski et al in the emotions domain, a small proportion of patients reported being bothered in the previous week by feeling impatient and irritable, followed by anxious, nervous, embarrassed and angry.[24] A large online survey performed by Meltzer et al reported that a considerable proportion of the parents of US adolescents (aged 12-17 years) with AR thought their child's condition made them unhappy, upset, angry, and embarrassed.[26]

Results found in other studies were satisfactory in estimating the impact of AR on the QoL of the interviewed through RQLQm. Among these studies the average subjective severity score of the disease and quality of life scores were high, indicating that the QoL was considered moderate to low thus confirming the results obtained from this study.[27-29]

Thus, on the basis of present study we conclude that ARIA guidelines are appropriate and should be applied to classify patients of AR and should be implicated to determine the associated comorbidities and clinicians should keep in mind the associated comoribidities as mentioned in ARIA guidelines so that appropriated management can be accomplished. The quality of life questionnaire should also be applied to determine the effect on the quality of life as well depicted in the results of the present study.

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