

Impact of Allergic Rhinitis Symptoms on Quality of Life in Primary Care

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Key Words

Allergic rhinitis • Classification • ARIA • Intermittent rhinitis • Persistent rhinitis

Abstract

Background: Allergic rhinitis (AR) impairs quality of life (QoL), sleep and work. The Allergic Rhinitis and its Impact on Asthma (ARIA) classification is widely used, but the impact of the different symptoms on QoL is not clear. **Objective:** To describe characteristics of patients consulting in primary care for AR and to study the impact of AR symptoms and the ARIA classes on QoL. **Methods:** A multicenter prospective observational cross-sectional study assessed the visual analogue scale (VAS) in the management of AR in 990 patients consulting general practitioners for AR. Patients were classified according to the four classes of ARIA. VAS, Rhinoconjunctivitis Quality of Life Questionnaire (RQLQ) and total symptom score (TSS) for nasal and non-nasal symptoms were evaluated. VAS and TSS measures were compared with RQLQ. **Results:** Mild intermittent rhinitis was diagnosed in 20% of patients, mild persistent rhinitis in 17%, moderate/severe intermittent rhinitis in 15% and moderate/severe persistent rhinitis in 48%. The presence of treatments did not affect VAS levels. Both severity and duration of rhinitis had

an impact on QoL and VAS levels. Ocular symptoms (OR: 2.78, 95% CI: 1.965–3.939) including eyelid edema (OR: 2.07, 95% CI: 1.274–3.360) and asthenia (OR: 2.73, 95% CI: 1.922–3.877) had more impact on RQLQ than nasal obstruction (OR: 1.61, 95% CI: 1.078–2.405) and nasal pruritus (OR 1.45, 95% CI: 1.028–2.042). Sneezing and rhinorrhea did not impact RQLQ.

Conclusions: This study confirmed that ocular symptoms and, to a lesser degree, nasal obstruction and pruritus have a significant impact on QoL.

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Introduction

The Allergic Rhinitis and its Impact on Asthma (ARIA) recommendations have proposed the classification of allergic rhinitis (AR) into persistent and intermittent categories [1, 2]. Most patients consulting a physician present with moderate/severe symptoms that are usually classified as nasal (sneezing, rhinorrhea, nasal obstruction and nasal pruritus) and non-nasal symptoms. Ocular symptoms occur in up to 70% of AR pa-

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tients depending on the allergen sensitization, severity and duration of symptoms. It is now recognized that AR includes more than the classical symptoms and it is associated with impairments in patient activities related to everyday life. Several studies have found that the ARIA classification is easy to use and correlates with the severity of symptoms and/or quality of life (QoL) in adults [3–9] and children [10]. It has also been proposed to modify ARIA and to classify AR with three grades: mild, moderate and severe [11–13]. The visual analogue scale (VAS), a simple quantitative assessment of impairment incurred by AR, has been found to correlate with the ARIA classification and to be sensitive to changes during treatment [13–18].

QoL impairment in AR has been associated with ocular symptoms [19–21] and nasal congestion [22]. However, there is no study on the global assessment of the impact of all individual nasal and ocular symptoms on QoL.

Most patients consulting in primary [5] or specialist care [23] are treated. In one study, symptom severity was found to be independent from presence of treatment [14], whereas in another there was a correlation between severity and treatment [24]. In asthma, more than half of treated patients have an uncontrolled disease [25]. More data are therefore needed.

Not all patients consulting in primary care have a diagnosis of allergy using skin tests and/or serum-specific IgE. Allergic and non-allergic rhinitis [26] may therefore be observed [27, 28]. It was found that patient clinical characteristics are similar in those with or without a diagnosis of allergy [5]. However, these data should be confirmed. Moreover, it is not known how nasal and non-nasal symptoms and to what extent each of the symptoms independently impact QoL scores. Smoking was not found to impair AR symptoms [29].

A French observational prospective multicenter study (Echelle Visuelle analogique dans la rhinite allergique – EVEIL) was carried out on 990 patients consulting general practitioners for AR. The main objective was to evaluate the utility of the VAS in assessing the severity of AR graded according to ARIA guidelines. The outcomes such as VAS, QoL and symptom severity were assessed on the consultation day and 2 weeks later.

The current paper presents a part of the data provided from EVEIL on the consultation day. Our purpose is to describe the profile of patients consulting for AR in primary care. This paper analyses: (i) the impact of individual symptoms on patient QoL and (ii) the burden of AR evaluated in treated/untreated patients and in patients with or without diagnostic tests.

Methods

Study Design

The data are obtained from a multicenter prospective observational study carried out throughout France (EVEIL). The aim of the present cross-sectional study is to describe the patient characteristics on the first consultation day, and the classification and severity of rhinitis using the ARIA criteria in patients with AR. The patients were enrolled during 1 year (February 2010 to January 2011) and were selected from all regions of France in order to rule out any geographic or seasonal parameter. A total of 191 general practitioners throughout France participated in the study and 161 enrolled at least 1 patient. General practitioners were randomly selected by means of geographic stratification. Physicians completed a questionnaire on the consultation day including sociodemographic data, diagnostic history, rhinitis symptoms, concomitant diagnosed pathologies (such as asthma, COPD, sinusitis, nasal polyps, eczema, urticaria) and AR treatments. Nasal and non-nasal symptoms of AR, QoL and the discomfort caused by the AR were recorded by patients on the consultation day.

Patients

A total of 990 consecutive patients consulting for rhinitis were included. All patients fulfilled the following inclusion criteria: (1) over 18 years of age and (2) with a diagnosis of AR following recommendations of the International Consensus on Rhinitis and ARIA [1] and presenting clinical symptoms of AR on the consultation day. Since physicians reported the duration and the severity of AR, patients were categorized as having intermittent, persistent, mild, or moderate-to-severe rhinitis according to the ARIA classification [11–13].

Outcome Measures

Total Symptom Score

Patients recorded symptom severity ratings in a form for six individual AR signs/symptoms (nasal symptoms: sneezing, rhinorrhea, nasal pruritus, nasal congestion, and non-nasal symptoms: ocular symptoms and itchy ears and/or palate). A score ranging from 0 to 3 was used for each symptom: 0 – no symptoms; 1 – mild symptoms (symptoms clearly present but minimal awareness, easily tolerated); 2 – moderate symptoms (awareness of bothersome but tolerable symptoms), and 3 – severe symptoms (symptoms hard to tolerate and/or causing interference with activities of daily living, sleeping or both). The total symptom score (TSS)6 was the sum of all symptom ratings, nasal and non-nasal, ranging from 0 (absence of symptoms) to 18 (very severe). The TSS4, which represented a subscore of TSS6, was the sum of nasal symptom ratings ranging from 0 to 12.

QoL was assessed using the disease-specific Rhinoconjunctivitis Quality of Life Questionnaire (RQLQ) score. In this 28-item questionnaire, patients evaluated their QoL impairment during the previous week. Items were rated from 0 (no impairment) to 6 (maximal impairment). The questionnaire provided an overall score and scores in seven domains: limitation of activities, sleep, non-hay fever symptoms, practical problems, nasal symptoms, ocular symptoms and emotions. The total RQLQ score ranged from 0 to 6 [30].

Visual Analogue Scale

The patients expressed the global discomfort caused by their AR during the previous week using a VAS. Scores ranged from 'not at all bothersome' (0 mm) to 'intolerable bothersome' (100 mm).

Statistical Methods

Qualitative data such as demographic data and symptoms were expressed as percentages and frequencies. Quantitative data such as TSS6, TSS4, RQLQ score and VAS were expressed as means and standard deviations. Comparisons between the four ARIA classes were carried out using χ^2 and Kruskal-Wallis tests.

A 3-class multivariate logistic regression analysis was performed to build a model representing the most significant symptoms with an independent predictive value for QoL impairment. The RQLQ global score varied from 0 to 6, thus 3 classes were used in the logistic regression. These classes were scores ranging between 0 and 2, between 2 and 4 and between 4 and 6. For the purpose of this article, an analysis of VAS levels was completed to compare groups with diagnostic test of allergy or not, and with treatment for AR or not.

Results

Patient Characteristics

A total of 990 patients were recruited by 161 general practitioners in France. Of these patients, 432 (44%) were men and aged between 18 and 94 years. The mean age was 42 ± 16 years. A total number of 981 physician questionnaires were analyzed. Half of the patients ($n = 477$, 49%) had a proven diagnosis of allergy using skin-prick tests (80% of patients with a documented diagnosis) and/or serum allergen-specific IgE (73.5% of patients with a documented diagnosis). Rhinitis diagnosis was established after 9 years, as mean duration.

The patient demographic characteristics are presented in table 1 and set into four ARIA classes. There was no difference in sex ratio, socioeconomic status or rhinitis treatments between the four ARIA classes. A significant difference was found in the residential area distribution, the duration of AR onset and the documented diagnosis of allergy.

The majority of patients ($n = 711$, 72.5%) were currently being treated for AR symptoms (table 1). On the consultation day, 534 patients (54.4%) were receiving H_1 antihistamines (79.4% of cases were oral administration, 11.8% nasal administration and 8.8% both routes of administration); 350 patients (35.7%) were receiving corticosteroids (89.7% nasal, 6.6% oral and 3.7% both); 173 patients were being treated with decongestants (90.2% nasal, 8.7% oral and 1.2% both), 148 patients were being treated with ocular H_1 antihistamines, 28 patients were being treated with cromoglycate (67.9% ocular, 28.6% na-

sal and 3.5% both), 37 with montelukast (5%), 98 patients with other treatments or over the counter drugs.

Dust mite, tree pollen, grass and weed allergies were significantly different between the four ARIA classes. The presence of at least one allergen was more frequent in persistent rhinitis classes compared with intermittent classes (83 vs. 62%, $p < 0.001$). The presence of allergens was also more frequent in severe classes (72% in mild classes vs. 78% in moderate/severe classes, $p = 0.01$).

Patient Distribution according to ARIA Classification

Two patients could not be classified and therefore were excluded from this analysis. Mild intermittent rhinitis was diagnosed in 197 patients (20%), mild persistent rhinitis in 166 (17%), moderate/severe intermittent rhinitis in 150 (15%) and moderate/severe persistent rhinitis in 466 (48%).

Impact of Treatments and Allergy Diagnosis on VAS

Patient treatments did not affect the VAS levels. The mean VAS level was 61.2 ± 20.0 mm in untreated patients ($n = 270$) versus 60.8 ± 19.8 mm in treated patients ($n = 711$, $p = 0.660$). However, the mean VAS level was statistically higher in patients with allergy diagnosed by skin tests and/or serum-specific IgE ($n = 477$) compared to patients without documented allergy ($n = 500$; 62.5 ± 19.5 vs. 59.6 ± 19.9 ; $p = 0.026$).

Symptoms and VAS Measurements

Symptoms are presented in table 2 according to ARIA classes. Nasal obstruction, ocular symptoms, eyelid edema, loss of smell, breathlessness and asthenia were significantly more common in moderate/severe intermittent or persistent rhinitis than in mild rhinitis. Asthma prevalence was almost similar in mild intermittent rhinitis, mild persistent and moderate/severe intermittent rhinitis (13.7, 13.2 and 16.6%, respectively) and increased in moderate/severe persistent rhinitis (25.1%).

Global symptom score (TSS6) and nasal score (TSS4) were significantly different between the four ARIA classes. TSS6 and TSS4 were significantly impacted by rhinitis severity and also by the persistence of symptoms ($p < 0.001$). VAS levels, assessing the global discomfort caused by AR during the previous week, were significantly increased with the severity of the disease ($p < 0.001$; table 2).

Quality of Life

The disease-specific RQLQ questionnaires completed on the consultation day were analyzed in 758 patients. The response rate to the different domains ranged from 95 to 98%. Mean overall RQLQ score was 2.7 ± 1.1 . Over-

Table 1. Patient demographic characteristics and distribution between the four ARIA classes

	Mild intermittent (n = 197)	Mild persistent (n = 166)	Moderate/severe intermittent (n = 150)	Moderate/severe persistent (n = 466)	All patients (n = 979)	p value ¹ (n = NA)
Age, years	41.3 ± 15.4	42.1 ± 17.9	43.1 ± 17.2	41.4 ± 15.4	41.8 ± 16.1	0.848
Male gender	79 (40)	81 (49)	72 (48)	199 (43)	431 (44)	0.256
Socioeconomic status						NA
Employee	52 (26)	43 (26)	37 (25)	128 (28)	260 (27)	
Middle/senior executive	35 (18)	31 (19)	24 (16)	79 (17)	169 (17)	
Retired worker	25 (13)	29 (18)	29 (19)	54 (12)	137 (14)	
Student	30 (15)	16 (10)	21 (14)	54 (12)	121 (12)	
Unemployed	13 (7)	9 (5)	8 (5)	33 (7)	63 (6)	
Other	41 (21)	37 (22)	30 (20)	112 (24)	220 (22)	
Residential area						0.008
Rural	45 (24)	37 (24)	36 (25)	112 (25)	230 (24)	
<3,000 residents	24 (13)	23 (15)	19 (13)	35 (8)	101 (11)	
3,000 to 20,000	54 (29)	49 (31)	42 (29)	98 (21)	243 (26)	
20,000 to 100,000	30 (16)	17 (11)	19 (13)	92 (20)	158 (17)	
>100,000 residents	35 (19)	30 (19)	28 (19)	118 (26)	211 (22)	
Current treatments ²						
Oral antihistamines	81 (41)	92 (55)	57 (38)	241 (52)	471 (48)	0.001
Nasal antihistamines	26 (13)	23 (14)	15 (10)	46 (10)	110 (11)	0.391
Nasal corticosteroid	59 (30)	68 (41)	31 (21)	168 (36)	326 (33)	<0.001
Decongestant	43 (22)	27 (16)	24 (16)	79 (17)	173 (18)	0.388
Ocular antihistamines	22 (11)	25 (15)	19 (13)	82 (18)	148 (15)	0.149
Cromone	3 (1)	11 (7)	2 (1)	12 (3)	28 (3)	0.011
Allergy diagnosis ³	67 (34)	92 (55)	47 (31)	271 (58)	477 (49)	<0.001
Duration of the disease, years	6.70 ± 7.33	8.62 ± 8.93	7.00 ± 6.99	11.1 ± 10.3	9.15 ± 9.29	<0.001
Allergens						
At least one allergen	121 (61)	139 (84)	95 (63)	387 (83)	742 (76)	<0.001
House dust mite	48 (24)	54 (32)	31 (21)	184 (39)	317 (32)	0.030
Molds	18 (9)	20 (12)	14 (9)	72 (15)	124 (13)	0.553
Animals	24 (12)	27 (16)	15 (10)	75 (16)	141 (14)	0.863
Drugs	8 (4)	4 (2)	8 (5)	18 (4)	38 (4)	0.223
Tree pollens	63 (32)	92 (55)	59 (39)	269 (58)	483 (49)	0.005
Latex	3 (1)	2 (1)	2 (1)	8 (2)	15 (1)	0.938
Grasses	57 (29)	82 (49)	39 (26)	254 (54)	432 (44)	<0.001
Weeds	14 (7)	25 (15)	15 (10)	90 (19)	144 (15)	0.025

Results are given in numbers (percentages) or means ± SD. NA = Not applicable.

¹ χ^2 and Kruskal-Wallis tests used for qualitative and quantitative variables.

² Patients may have more than one treatment.

³ Allergy diagnosis made by skin-prick tests and/or serum-specific IgE. Patients may be sensitized to more than one allergen.

all and individual domain scores in the RQLQ were significantly different in the four ARIA classes (table 3). Patients with moderate/severe persistent rhinitis had a significantly higher score than those with moderate/severe intermittent rhinitis.

Impact of Symptoms on QoL

Several symptoms impacted RQLQ classes (table 4). These three classes include 207 patients with scores ranging between 0 and 2, 448 patients with scores ranging be-

tween 2 and 4 and 84 patients with scores ranging between 4 and 6. The most bothersome symptoms were ocular symptoms and eyelid edema. Patients with ocular symptoms were three times more likely to have poor QoL than those without ocular symptoms (OR = 2.782); whereas patients with eyelid edema were twice as likely to have poor QoL than those without eyelid edema (OR = 2.069). Asthenia was also found to impact on RQLQ. On the other hand, nasal obstruction and pruritus had less impact and rhinorrhea and sneezing did not impact RQLQ.

Table 2. Symptoms and concomitant pathologies presented by patients on the consultation day

	Mild intermittent (n = 197)	Mild persistent (n = 166)	Moderate/severe intermittent (n = 150)	Moderate/severe persistent (n = 466)	All patients (n = 979)	p value ¹
Symptoms						
Nasal obstruction	138 (71)	129 (78)	125 (83)	405 (87)	797 (82)	<0.001
Rhinorrhea	171 (87)	151 (91)	135 (90)	417 (90)	874 (89)	0.685
Nasal pruritus	124 (64)	105 (64)	101 (67)	337 (72)	667 (68)	0.066
Sneezing	144 (73)	137 (82)	116 (77)	409 (88)	806 (82)	<0.001
Ocular symptoms	97 (50)	106 (64)	107 (71)	356 (77)	666 (68)	<0.001
Eyelid edema	12 (6)	13 (8)	17 (11)	82 (18)	124 (13)	<0.001
Palate/ear pruritus	47 (24)	50 (30)	52 (35)	210 (45)	359 (37)	<0.001
Loss of smell	62 (32)	59 (35)	68 (46)	250 (54)	439 (45)	<0.001
Breathlessness	37 (19)	47 (28)	61 (41)	234 (50)	379 (39)	<0.001
Asthenia	39 (20)	50 (30)	79 (53)	286 (61)	454 (46)	<0.001
TSS4	6.22 ± 2.49	6.86 ± 2.22	7.49 ± 2.79	8.00 ± 2.60	7.36 ± 2.65	<0.001
TSS6	7.86 ± 3.30	8.94 ± 3.15	10.1 ± 3.77	10.7 ± 3.87	9.74 ± 3.81	<0.001
Concomitant pathologies						
Asthma	27 (14)	22 (13)	25 (17)	117 (25)	191 (19)	<0.001
COPD	4 (2)	7 (4.2)	3 (2)	4 (0.8)	18 (2)	0.051
Sinusitis	6 (3)	6 (4)	8 (5)	46 (10)	66 (7)	0.002
Urticaria	5 (2.5)	7 (4.2)	9 (6)	20 (4)	41 (4)	0.461
Eczema	14 (7)	15 (9)	17 (11)	54 (11)	100 (10)	0.322
VAS level	51.6 ± 20.2	55.3 ± 18.1	63.2 ± 18.2	66.2 ± 18.7	60.9 ± 19.8	<0.001

Results are expressed in numbers (percentages) or mean ± SD.

¹ χ^2 and Kruskal-Wallis tests used for qualitative and quantitative variables.

Table 3. Results of the RQLQ

	Mild intermittent (n = 156)	Mild persistent (n = 109)	Moderate/severe intermittent (n = 113)	Moderate/severe persistent (n = 371)	All patients (n = 749)	p value ¹
Global score	2.06 ± 0.88	2.26 ± 0.88	2.93 ± 1.05	3.04 ± 1.04	2.71 ± 1.08	<0.001
Activities	3.19 ± 1.11	3.32 ± 1.28	3.92 ± 1.25	4.07 ± 1.21	3.76 ± 1.26	<0.001
Sleep	1.61 ± 1.22	1.66 ± 1.25	2.88 ± 1.61	2.90 ± 1.44	2.45 ± 1.52	<0.001
General problems	1.51 ± 1.10	1.57 ± 1.10	2.38 ± 1.33	2.45 ± 1.34	2.12 ± 1.33	<0.001
Practical problems	2.91 ± 1.27	3.40 ± 1.29	3.72 ± 1.34	3.92 ± 1.35	3.60 ± 1.38	<0.001
Nasal problems	2.77 ± 1.11	3.14 ± 1.14	3.50 ± 1.29	3.75 ± 1.17	3.42 ± 1.23	<0.001
Ocular problems	1.38 ± 1.27	1.81 ± 1.48	2.37 ± 1.66	2.32 ± 1.66	2.06 ± 1.61	<0.001
Emotions	1.92 ± 1.25	1.92 ± 1.26	2.70 ± 1.37	2.86 ± 1.33	2.51 ± 1.38	<0.001

Results are expressed in means ± SD. ¹ Kruskal-Wallis test used for quantitative variables.

The most bothersome symptoms, such as ocular symptoms and eyelid edema, were more prevalent in moderate/severe ARIA classes (table 2). These symptoms impacted also the severity of the disease ($p < 0.001$).

Discussion

This study was carried out in general practices on a large number of patients with AR using the ARIA classification, which can easily be used in all patients. Rhinitis severity and also persistence impact on QoL and the

Table 4. Impact of symptoms on RQLQ

Symptom	Versus reference	OR	95% CI	p value
Nasal obstruction	None	1.610	1.078–2.405	0.020
Nasal pruritus	None	1.449	1.449–2.042	0.034
Ocular symptoms	None	2.782	1.965–3.939	<0.001
Palate/ear pruritus	None	1.610	1.147–2.260	0.005
Loss of smell	None	1.650	1.191–2.286	0.002
Eyelid edema	None	2.069	1.274–3.360	0.003
Breathlessness	None	1.517	1.076–2.137	0.017
Asthenia	None	2.720	1.922–3.877	<0.001

The reference is the 'absence of symptom'.

discomfort incurred by AR (VAS). For the first time, the impact of symptoms on RQLQ was studied. It showed that the impact of ocular symptoms on QoL was more significant than the impact of nasal symptoms. However, it is important to note that RQLQ includes domains evaluating ocular and nasal symptoms.

The limitation of many studies in primary care is the relative imbalance between the number of patients with mild and moderate/severe rhinitis. In this study, although most patients had moderate/severe rhinitis, 35% of patients had mild rhinitis. This larger percentage of mild rhinitis patients was not related to the high percentage of patients receiving rhinitis treatments.

As previously reported in large studies, our results showed that patients consulting their physicians for AR have uncontrolled disease, defined as persistence of symptoms, even when treated [5, 23, 31]. In another previous study, treatment was found to affect clinical status [24]. In this study, treatment did not appear to affect symptom severity assessed globally by VAS. Patients in this study were seeking physicians because of AR symptoms, regardless of whether they were treated or not. A more detailed analysis using all symptoms and each individual treatment may have found differences. However, the size of the current study does not allow such analysis.

The rhinitis diagnosis may be assessed using scores but skin or blood testing can be used to diagnose the common allergies with a very high certainty. In the present study, allergy was tested in 49% of patients. This percentage is highly consistent with other studies carried out in France in general practices [14, 28]. Since this study examined outcomes in primary care settings, the lack of diagnostic testing for allergy in almost half of the patients reflects real clinical practice. We separately analyzed pa-

tients with and without diagnostic tests for allergy and we found that the VAS level was significantly higher in patients with a diagnosis test. A more in-depth study should be carried out to assess the impairment incurred by allergic and non-allergic rhinitis.

No generic health status measures were needed in this study since patients were included only if they were consulting for symptomatic AR. Therefore, more specific disease measures were used. The classification of the rhinitis severity can be carried out using TSS, VAS or RQLQ. In the present study, patients were classified according to the ARIA criteria which include symptom scores and the impact of rhinitis on daily activities and sleep. In contrast to other studies [5, 13, 32], VAS and RQLQ scores differed significantly between the four ARIA classes in our results. VAS levels for patients with moderate/severe persistent rhinitis are similar in France [14], Spain [13] and Japan [32], suggesting that this simple measure of rhinitis control could be widely used in primary care. It should, however, be tested against a more complex scoring system [33, 34]. It might be interesting to perform a meta-analysis of these scores in order to have a better insight on patient symptoms and QoL.

It has been recognized for many years that AR impairs QoL. The results of RQLQ were similar to previous studies carried out on patients with AR. For all the outcome measures, rhinitis severity was more bothersome than duration. However, our results cannot be generalized to all patients with AR, since only symptomatic patients consulting physicians were included. Thus, results may be influenced toward greater severity.

Loss of smell was common, as previously reported in particularly persistent rhinitis [35]. In the present study, loss of smell was associated with the severity of the disease as reported in another large study on patients consulting in primary care in France [5]. Smell does not represent a cardinal symptom of AR, however, almost half of the patients (45%) had impaired smell, which is more associated with the severity of the disease than with diagnosis. It seems to be far less important than in nasal polyps. However, precise determination of smell using objective tests may be of interest in further studies.

The present study is the first, to our knowledge, to assess the impact of all nasal and non-nasal symptoms on RQLQ. It has already been found that ocular symptoms [19–21] and nasal congestion [22] are bothersome. However, this study showed that ocular symptoms, particularly eyelid edema, were more bothersome than nasal symptoms. Moreover, few patients (15%) consulting for AR were treated with ocular treatments in our results.

Sneezing and rhinorrhea did not impact RQLQ, probably because they were more difficult to measure, or because they were better tolerated. Furthermore, sneezing and rhinorrhea were not controlled in treated patients (data not shown). Interestingly, asthenia was found to be associated with RQLQ impairment. However, it is known that

treatment is less effective on ocular symptoms than nasal symptoms [36, 37]. This study is therefore important to help better understand the concept of SCUAD (severe chronic upper airway disease) [15]. Ocular symptoms represent a major unmet need and a target for novel treatments.

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