

Quality of Life during Pollen Season in Patients with Seasonal Allergic Rhinitis with or without Asthma

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Key Words

Quality of life · Allergic rhinitis · Asthma

Abstract

Objectives: We studied the evolution of generic and rhinoconjunctivitis-specific quality of life (QOL) during pollen season in patients with isolated seasonal allergic rhinitis (SAR) and those with asthma and concomitant SAR (AS+SAR). Generic QOL between groups was also compared at pollen peak. **Methods:** A prospective cohort study was conducted in Southern France in 2002. Outpatients aged 18–60, regularly visiting respiratory physicians for SAR, were recruited before the grass (grass cohort) or ragweed pollination period (ragweed cohort). Before the pollination period (baseline) and at peak pollination, patients completed French versions of the Mini Rhinoconjunctivitis Quality of Life Questionnaire (Mini-RQLQ) and physical and mental Short Form-12 (SF-12) scores (PCS and MCS) to determine rhinoconjunctivitis and generic QOL. **Results:** Totals of 83 and 52 patients were included in the SAR and AS+SAR groups, respectively (mean age = 35.4; 56.4% females). Mini-RQLQ scores indicated slightly worse QOL in the A+SAR group at inclusion, which significantly deteriorated at the time of pollen peak, both in the SAR ($p < 0.0001$) and AS+SAR

groups ($p = 0.003$). In univariate analysis, significantly higher SF-12 PCS (meaning better QOL) were observed at pollen peak in the SAR compared with the AS+SAR group ($p = 0.0008$), while the difference for SF-12 MCS was more limited ($p = 0.05$). Results were confirmed in multivariable analyses adjusting for gender, allergy medication use at pollen peak, cohort of inclusion (grass/ragweed) and comorbid conditions. **Conclusions:** Significant deterioration in rhinoconjunctivitis-specific QOL was observed through the pollination period in patients with SAR and AS+SAR. At pollen peak, AS+SAR patients experienced significantly worse physical functioning than patients with SAR alone.

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Introduction

Asthma and seasonal allergic rhinitis (SAR) share common risk factors and are often associated [1, 2]. Upper and lower airways are probably affected by a common inflammatory process, which may be sustained and amplified by interconnected mechanisms of the two conditions.

As indicated by recent changes in treatment guidelines, health-related QOL has been identified as a major

outcome variable of importance in the management of asthma and SAR. Evidence shows that QOL is impaired in asthma, and it also suggests that SAR impairs the physical, psychological and social domains of QOL [3, 4]. Seasonal effects, which may also influence QOL in these patients, have not been studied extensively. More specifically, the impact of the association between asthma and SAR on QOL at pollen peak and the changes in this outcome throughout the pollen season have, so far, seldom been investigated in observational studies.

Therefore, our study investigated the changes in rhinoconjunctivitis and generic QOL before and during the 2002 pollen season in France in two groups of patients: those suffering from isolated SAR and those with both asthma and concomitant SAR. Further, generic QOL at pollen peak was compared between the two groups. The study was performed to test the hypothesis that QOL would be lower in comorbid patients than in patients suffering from isolated SAR.

Methods

A prospective observational cohort study was conducted in nine towns in the South of France (Lyon, Grenoble, Valence, Vienne, Marseille, Chambéry, Saint-Etienne, Bourgoin, Péage-de-Rousillon) in 2002. Among adult patients who were invited to participate, two groups were identified at baseline, before the occurrence of the pollen season, according to the presence of concomitant respiratory condition: (1) SAR alone (SAR group) and (2) persistent asthma with SAR (AS+SAR group). Patients were recruited by respiratory physicians (investigators). Only patients who were regularly treated by respiratory physicians were eligible for inclusion in the study and prospectively followed during either the spring (grass cohort) or fall (ragweed cohort) allergy season. The diagnosis of SAR was based on a positive skinprick test or radioallergosorbent test to grass or ragweed, depending on the cohort. Patients with SAR included in the ragweed cohort were required to be insensitive (= negative test) to grass in order to prevent any interference of the previous grass pollination period in their baseline QOL. Persistent asthma was defined in terms of specific symptoms assessed by the investigator, the use of inhaled corticosteroids during the 3 months before inclusion and reversibility of FEV₁ of at least 15% under treatment of bronchodilators. Only GINA II or III asthma patients were included in the study. All patients signed an informed consent to participate in the study and an ethical review board approved the protocol prior to study initiation.

Evaluations of patient characteristics and outcomes were carried out at baseline (before occurrence of allergens either due to grass or ragweed), weekly during the prospective follow-up period and at the peak pollen week. The peak was determined for each center when the allergic risk due to grass/ragweed was considered as 'high' by the pollen regulatory bodies, AFEDA (French Ragweed Association) for ragweed and RNSA (National Aeropollinic Monitoring Network) for grass. At baseline (inclusion visit), investigators assessed patients' SAR and/or asthma status and severity. Patients

recorded sociodemographic data and baseline QOL. They completed the generic Short Form-12 QOL questionnaire [5], which includes a physical component score (SF-12 PCS) and a mental component score (SF-12 MCS), and the Mini Rhinoconjunctivitis Quality of Life Questionnaire (Mini-RQLQ) [6]. Shortly before the week of local pollen peak (time varied with the centers' geographic location), patients were contacted by telephone to request completion of their follow-up QOL questionnaires (same instruments as baseline assessment). The medications used during pollen season (antiallergic and antiasthma medications) were reported by patients in diaries. Antiallergic medication categories included antihistamines, eye drops and nasal steroids.

Baseline patient characteristics in the two cohorts and any univariate analyses of QOL scores used a Wilcoxon test for continuous variables and χ^2 test for categorical variables. Matched t test was used to study changes in QOL scores between inclusion and pollen peak in each group. SF-12 scores were compared between groups at pollen peak. Due to skewed distributions, SF-12 PCS and MCS were appropriately transformed (logarithm) prior to further multivariable analyses, when needed. Multivariable regression analyses studied the relationship between SF-12 scores and the groups (SAR or AS+SAR), with isolated SAR as the reference. Models were adjusted for gender, the use of each antiallergic drug classes (antihistamine, eye drops, nasal corticosteroids) at pollen peak for SAR, the cohort of inclusion (grass/ragweed) and the presence of comorbid conditions other than asthma or SAR. Age was not included, because the relationship between age and QOL has not been established; further, it was not a significant explanatory variable in our model.

Results

Study Population and Environmental Characteristics

The SAR and AS+SAR groups included 83 and 52 patients, respectively. Mean age was 35.4 years (SD = 10.6) and the majority were women (56.4%) (table 1). According to the geographical areas of recruitment, the peak pollen week occurred between the 23rd and the 26th week for grass cohort (spring), and between the 35th and 36th week for ragweed cohort (fall). The average number of weeks elapsed between inclusion and pollen peak was 6.7 (SD = 1.9). Patients included in the two cohorts, grass and ragweed, were similar in terms of baseline characteristics. Therefore, patients with SAR and those with AS+SAR from each seasonal cohort were merged to create two groups for comparison.

Out of 44 patients of the AS+SAR group with available GINA classification, 75% were classified in the grade II category and 25% in grade III. Most patients in the AS+SAR group received a combination of inhaled corticosteroids and long-acting beta agonist as anti-inflammatory treatment for asthma (table 1). Seven asthma patients were prescribed leukotriene receptor antagonists.

Table 1. Baseline patient characteristics

	SAR (n = 83)		Asthma and SAR (n = 52)		p ¹
	n	%	n	%	
Cohort					
Grass	56	67.5	39	75.0	0.35
Ragweed	27	32.5	13	25.0	
Age	34.5 ± 10.3		36.9 ± 10.9		0.17
Female ²	47	58.0	28	53.8	0.63
Smoking status ²					
Nonsmoker	56	69.1	39	75.0	0.13
Ex-smoker	9	11.1	9	17.3	
Current smoker	16	19.7	4	7.7	
Any comorbid condition (other than asthma and SAR) ³	15	18.7	14	26.9	0.27
Gina grade					
II	–	–	33	75.0	–
III	–	–	11	25.0	
Peak flow measure (% of predicted value) ⁴	104.6 ± 18.0		95.2 ± 20.1		0.02
Antiallergic medications ⁵					
Eye drops	19	24.7	11	22.4	0.77
Antihistamines	57	74.0	32	65.3	0.29
Nasal corticosteroids	31	40.3	13	26.5	0.11
Number of anti-allergy medication classes used at pollen peak	1.4 ± 1.0		1.1 ± 0.9		0.17
Anti-asthma medications ⁶					
Short-acting beta agonists	–	–	27	55.1	–
Long-acting beta agonists	–	–	9	18.4	–
Inhaled corticosteroids	–	–	16	32.6	–
Combination of long-acting beta agonist and inhaled corticosteroids	–	–	26	53.1	–
Leukotriene receptor antagonist	–	–	7	14.3	–
Oral corticosteroids			3	6.1	

¹ χ^2 for qualitative variables and Wilcoxon test for quantitative variables.

² Data available for 133 out of 135 patients (gender and smoking status).

³ Data available for 132 out of 135 patients (comorbid condition).

⁴ Data available for 110 out of 135 patients (peak flow meter).

⁵ Data available for 77 patients in SAR group and in 49 patients in asthma and SAR group (antiallergic medication).

⁶ Data available for 49 out of 52 patients (anti-asthma medication).

Evolution in QOL Scores

Mean QOL scores in the two groups, SAR versus AS+SAR, are presented in table 2. Regardless of the measure used or time of assessment (baseline vs. pollen peak), QOL in the AS+SAR group was numerically worse compared with the group with SAR alone. A significant deterioration was observed in rhinoconjunctivitis-related QOL, measured by Mini-RQLQ, between the initial vis-

it and pollen peak in both SAR and AS+SAR groups. A decrease in the physical domain of the generic QOL as measured by SF-12 PCS was also observed in these two groups, though this change was more limited. A significant decrease in the SF-12 PCS was observed only in the AS+SAR group, while no significant variation of the SF-12 MCS was observed in any group. Decrease in generic measures represents deterioration in QOL.

Table 2. Evolution of QOL scores between inclusion visit and pollen peak according to condition

	n ¹	Groups	QOL at inclusion		QOL at pollen peak		Changes between inclusion and pollen peak		
			mean	SD	mean	SD	mean	SD	p value ²
SF-12 PCS ³	78	SAR	85.0	12.6	81.8	14.4	-3.2	15.6	0.08
	48	Asthma + SAR	75.0	15.7	71.3	17.1	-3.7	12.2	0.04
SF-12 MCS ³	78	SAR	65.4	15.8	64.2	16.4	-1.2	14.7	0.47
	48	Asthma + SAR	57.0	18.0	57.5	19.2	+0.5	13.8	0.80
Mini-RQLQ ⁴	77	SAR	1.3	1.2	2.0	1.4	+0.7	1.5	<0.0001
	47	Asthma + SAR	1.9	1.5	2.5	1.7	+0.6	1.3	0.003

¹ Inpatients with QOL measures available both at inclusion and pollen peak.

² Matched t test.

³ Higher score means better QOL.

⁴ Higher score means higher QOL impairment (= worse QOL).

Table 3. Multivariable linear models for SF-12 scores at pollen peak

	β	SD	p
<i>PCS at pollen peak¹ (squared-transformed, n = 124)</i>			
AS+SAR group ²	-1,307.3	382.9	0.0009
Ragweed cohort (vs. grass cohort)	319.9	422.7	0.45
Use of nasal steroids	51.3	426.8	0.90
Use of antihistamines	-275.6	436.6	0.52
Use of eye drops	-97.3	473.0	0.84
Female gender	1,389.1	387.4	0.0005
Presence of co morbid condition ³	-1,518.5	473.9	0.002
<i>MCS at pollen peak¹ (squared-transformed, n = 124)</i>			
AS+SAR group ²	-506.7	356.9	0.16
Ragweed cohort (vs. grass cohort)	650.3	393.9	0.10
Use of nasal steroids	193.5	397.8	0.63
Use of antihistamines	-629.0	406.9	0.12
Use of eye drops	-223.6	440.8	0.61
Female gender	873.9	361.1	0.02
Presence of comorbid condition ³	-1,125.7	441.7	0.01

¹ Higher score means better QOL; therefore, negative coefficient means worse QOL.

² SAR group as reference.

³ Other than asthma or SAR.

Comparison of QOL at Pollen Peak between the Two Groups (SAR vs. AS+SAR)

In univariate analyses (data not shown), a significantly higher SF-12 PCS (better QOL) was observed among patients with SAR compared with those with AS+SAR (p = 0.0008). A nearly significant difference (p = 0.05)

between groups was identified with the SF-12 MCS. These results were confirmed by multivariable analyses (table 3), where groups differed in terms of physical functioning (SF-12 PCS), while results were nonsignificant for mental functioning (SF-12 MCS).

Discussion

This is one of the few observational surveys studying QOL among patients suffering from isolated SAR (SAR group) or SAR associated with asthma (AS+SAR group). QOL deterioration between inclusion and pollen peak was similar in the SAR and AS+SAR groups. Significantly worse physical functioning was observed in the AS+SAR group at pollen peak, while other measures showed numerically worse though not statistically lower QOL in this group compared with patients with SAR alone.

We used both generic and disease-specific QOL questionnaires. Both the SF-12 and Mini-RQLQ have been extensively used in asthma research and were translated and culturally validated for the French-speaking environment. The sensitivity of these measures deserves a note. We identified a highly significant variation of Mini-RQLQ scores between the baseline period and pollen peak in both the SAR and AS+SAR groups. By contrast, variations of the SF-12 generic questionnaire during the same period were more limited. The changes in SF-12 scores reached significance only in the AS+SAR group, and compared with Mini-RQLQ, the level of significance was far lower. MCS changes were limited and insignifi-

cant in both the SAR and AS+SAR groups. In our study, the impact of pollen season was stronger on the SF-12 PCS compared with the SF-12 MCS and strongest on the rhinoconjunctivitis-specific measure. The greater ability of disease-specific questionnaires such as the Mini-RQLQ to detect changes in disease-specific QOL compared with generic instruments such as the SF-12 has been described and could account for these observed differences between the questionnaires [7, 8].

Regardless of the method employed, uni- or multivariable, patients with asthma and SAR had significantly worse physical functioning at pollen peak than those with SAR alone. These findings are in line with those of a previous study comparing QOL in patients with asthma and allergic rhinitis (AR; seasonal and perennial) [9] which found lower SF-36 PCS (= worse physical functioning) in patients with both conditions compared with those with AR alone. In patients suffering from AR, the authors did not observe any significant effect of associated asthma on mental health, which is consistent with our findings. The likely explanation for the specific influence of asthma on the physical component of QOL may be that patients with asthma tend to face particularly more problems in physical activities [10], which may override mental functioning due to the 'adjustment to situation' syndrome very common among patients with chronic conditions such as asthma. Worsened QOL in concomitant groups may also occur as patients with chronic SAR may be able to manage their symptoms to a better extent than those with concomitant asthma. Several reasons may account for this. Asthma is likely to worsen disproportionately during season due to higher probability of exposure to seasonal allergens leading to deteriorating patient functioning. In addition, currently available treatment options for patients with comorbid asthma and SAR may be inadequate or inconvenient. Regardless of the reasons for these findings, our data suggest that concomitant asthma would have a detrimental effect on the physical component of QOL among patients with SAR at pollen peak; hence, special attention should be paid to management and outcomes in patients with asthma and SAR.

Similarly, although measured through different outcomes, evidence suggests that concomitant AR, of which SAR is a subset, increases asthma-related resource use [11] and that adequate management of AR results in lower asthma-related complications in a comorbid population with asthma and AR. Four studies have demonstrated that among patients with asthma and concomitant AR, those receiving treatment for AR have a significantly lower risk of subsequent asthma-related events (emergency

care visits/hospitalizations) than those not receiving treatment for AR [12–15].

A further step in this direction is outlined in the Allergic Rhinitis and its Impact on Asthma guidelines (ARIA) [16] suggesting that optimal management of rhinitis may improve coexisting asthma, and therefore, a combined treatment strategy should ideally be used to treat these two conditions. Preliminary evidence suggests that among patients with both asthma and AR enrolled in a large clinical trial, adding montelukast to budesonide provided greater benefit in reducing airflow obstruction compared with doubling the dose of budesonide [17]. Further studies will be needed to determine which treatment options offer benefits in patients with both conditions.

Several limitations of our study need to be mentioned. First, patients were recruited in two allergic periods, spring and fall. Groups of those with SAR alone and those with AS+SAR were created by merging patients from each seasonal period as their baseline characteristics allowed us to do so in order to increase statistical power. There may be unobservable characteristics that differ among patients; however, we were unable to evaluate them. This may increase the variability in outcomes, but significant differences between groups suggest consistency of the responses. The second limitation is the ability to time evaluation of outcomes before the arrival of the pollen season and at pollen peak. For each cohort, inclusions were performed when the allergic risk to grass (ragweed pollen) was considered 'limited', based on the aerobiologic monitoring pollen bodies. Likewise, in all centers, patients were asked to complete their 'pollen peak' QOL questionnaires when the monitoring pollen bodies advised us to do so, during a week of 'high' allergic pollen risk. A separate analysis (data not shown) suggests that 'pollen peak evaluations' were matched closely with actual peak pollen weeks. The third limitation is the fact that patients were allowed to take medications during the evaluation period, which may decrease our ability to detect changes in QOL over time and may partially explain the lack of differences in outcomes between the two groups. An evaluation of anti-allergy medication use suggested nonsignificant differences between the SAR versus AS+SAR groups. This means that QOL evaluations are not confounded by this variable. It has to be noted, however, that due to the patient self-reporting methodology used in this study, only the number of medication classes could be evaluated. This poses a limitation of its own, but is a compromise researchers are willing to make in order to perform observational research. Observational studies

supplement clinical trials and provide a sense of 'real world' to empower medical decision making. Despite the use of a proxy measure in our study, comparison groups appear to be similar in terms of concomitant allergy medication use and other observable baseline characteristics, and therefore, comparison of changes in QOL over time and between the two groups remains valid.

Conclusions

Significant changes in rhinoconjunctivitis-specific QOL were observed in patients with isolated SAR as well as in those with asthma and SAR during pollen season, with the latter group experiencing slightly worse disease-

specific QOL at all times regardless of the season. Changes in generic QOL, both in terms of physical and especially mental functioning, were more limited in these two groups. Compared with patients with SAR alone, patients with both SAR and asthma experienced significantly worse physical functioning at pollen peak, suggesting that careful evaluation and management of patients with both conditions as outlined in the ARIA guidelines are essential.

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