

## ORIGINAL RESEARCH

# The impact of atopy, sinus opacification, and nasal patency on quality of life in patients with severe nasal polyposis

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**OBJECTIVES:** Nasal polyposis has a great impact on the quality of life. The aim of this study was to evaluate the association between quality of life and atopy, sinus opacification, and nasal patency in severe nasal polyposis.

**METHODS:** One hundred nine patients completed the Medical Outcome Study Short Form-36 (SF-36) survey. Symptoms, polyp size, atopy, nasal patency, and sinus opacification were also scored.

**RESULTS:** Patients showed worse scores in all SF-36 domains, except for physical functioning, compared with Spanish population. Atopic patients had worse scores in role physical, body pain, vitality, and mental health than nonatopic patients. Atopic patients showed lower physical component summary ( $44.7 \pm 1.1$ ) and mental component summary ( $38.4 \pm 1.0$ ) than nonatopic patients ( $48.3 \pm 1.6$ ,  $40.6 \pm 1.3$ ;  $P < 0.05$ ), respectively. There were no correlations between quality of life and symptoms, polyp size, CT scan, nasal patency, and atopy.

**CONCLUSION:** Nasal polyposis has a considerable impact on quality of life and atopy worsens this impact.

**EBM rating: C-4**

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Nasal polyposis (NP) is an inflammatory condition that affects 2% to 4% of the general population. NP is believed to be a multifactorial disease that is frequently associated with asthma and aspirin sensitivity.<sup>1</sup> Settipane and Chafee<sup>2</sup> showed that more NPs were found in nonatopic

than in atopic patients, and subsequent studies have shown that skin test positivity to common airborne allergens was less common in patients with NP than in the general population.

Tissue eosinophilia is a general characteristic of NP and is found in 80% to 90% of all cases.<sup>3</sup> The analysis of blood eosinophil count shows a correlation with the degree of NP, whereas elevated concentrations of total immunoglobulin (Ig) E are described to be present in allergic patients.<sup>4</sup>

In clinical use acoustic rhinometry (AR), a noninvasive, simple, rapid, and relatively inexpensive method,<sup>5</sup> is based on the analysis of reflected acoustic impulses and is the most common method used to assess geometric measurements of the anterior and middle parts of nasal cavities. A global evaluation of NP must include, together with nasal endoscopy, symptoms assessment, and CT scan, the measurement of quality of life (QoL). Several specific instruments for patients with chronic rhinosinusitis have been developed, such as Rhinosinusitis Disability Index, Chronic Sinusitis Survey Score, and SinoNasal Outcome Test-16. Generic questionnaires are applicable to all health conditions, and they allow comparing QoL in different diseases as well as healthy and diseased subjects. The Medical Outcome Study Short Form-36 (SF-36) is the most widely used generic instrument.<sup>6</sup> The Spanish version of the SF-36 has been previously used to measure QoL, showing a good reproducibility and validity.<sup>7</sup> The main aim of this study was to evaluate the

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**Table 1**  
**Characteristics of patients with severe nasal polyposis**

	All patients with nasal polyposis	Nasal polyposis without atopy	Nasal polyposis with atopy
Patients with nasal polyposis	109	76	33
Age (y)	50 ± 1.4	51 ± 1.8	49 ± 2.0
Gender (M/F)	74/35	52/24	22/11
Duration of disease (y)	9.0 ± 0.7	8 ± 1.2	10 ± 0.9

association between QoL and allergy outcomes (atopy, nasal and blood eosinophilia, and serum total IgE), sinus opacification, and nasal patency in patients with severe NP.

## METHODS

### Study Population

One hundred and nine patients with severe NP (mean score of 2.6 in the Lildholdt classification<sup>8</sup>) were included in this prospective study from February 1999 to November 2002. The mean age was 50 ± 1.4 years (ranging from 22 to 84 years), and 35 patients (32%) were female (Table 1). All patients were examined by the same otorhinolaryngologist at the Department of Otolaryngology, Hospital Clinic of Barcelona. Approval for this study was obtained from the ethics committee.

### Inclusion and Exclusion Criteria

The diagnosis of NP was based on the visualization of bilateral polyps and the bilateral opacification of paranasal sinuses on CT scans. Patients with antrochoanal polyps or cystic fibrosis were excluded from the study.

### Study Design

One hundred nine patients with NP completed the SF-36 survey after a 4-week washout period of oral and intranasal steroids. We also scored nasal symptoms, polyp size, allergy study, nasal patency, and CT scan.

**QoL (SF-36) assessment.** The SF-36 questionnaire consists of 36 self-administered questions. Scale scores range from 0 to 100, higher scores indicating better QoL. In addition, the physical component summary and the mental component summary scores were calculated.

**Allergy study.** Skin prick tests with commercial extracts of the main airborne allergens present in our geographic area (Barcelona), including house dust mites, pollens, molds, and cat and dog dander were performed. Nasal eosinophilia was performed by smear and scored as follows: 0, no (negative);

1, mild (0-5 per field); 2, moderate (5-10); and 3, severe (>10) eosinophil infiltration as observed by optical microscopy. To describe the correlation of routine histopathology with the history of allergy or recurrence, 1 to 3 scores were grouped as positive nasal eosinophilia. Blood eosinophil counts were obtained through routine blood analysis and expressed as a percentage. Serum total IgE levels were measured using a chemiluminescent enzyme-labeled immunoassay.

**Nasal symptom scores.** Nasal obstruction, loss of sense of smell, rhinorrhea, and sneezing were scored. The severity of symptoms was scored as follows: 0, no symptom; 1, mild symptom; 2, moderate symptom; and 3, severe symptom.

**Polyp size score.** Polyp size was scored using endoscopy from 0 to 3 for each nasal cavity: 0, no polyps; 1, mild polyposis; 2, moderate polyposis; and 3, severe polyposis.<sup>8</sup>

**CT scan score.** CT scan of paranasal sinuses was performed in all patients and was blindly staged by the same radiologist using the Lund-Mackay score system.<sup>9</sup> This system scores: 0, no opacity; 1, partial opacity; and 2, total opacity for each of the sinuses. In addition, the ostiomeatal complex scores 0 for no obstruction or 2 when obstructed. The system has a total score of 24 bilaterally.

**Nasal patency.** The total nasal volume and the minimum cross-sectional area (MCA) were measured from each nasal cavity within the distance of 12 cm from the nostrils using AR. Room temperature and humidity were 18° to 22°C and 40% to 70%, respectively. The test was repeated 3 times, and the mean of MCA and volume of the nasal cavity were calculated.

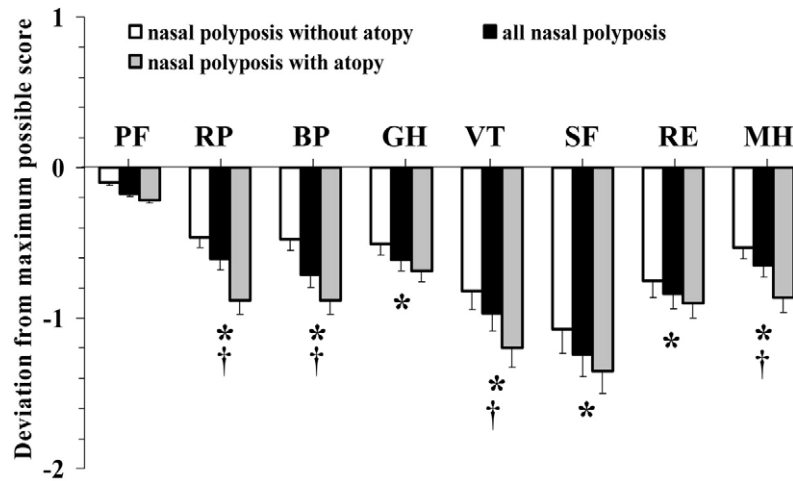
### Statistical Analysis

The data are presented as mean ± SEM. An unpaired Student *t* test was used to compare the SF-36 scores of NP with the Spanish population. There was no significant difference on the mean age between patients of our study and the Spanish population. QoL scores differences between groups were assessed using the Student unpaired *t* test. Pearson correlation coefficients were used to examine the association between QoL scores and gender, age, nasal symptoms, CT scan scores, RA, and allergy study.

## RESULTS

### QoL (SF-36) Assessment

In comparison to the Spanish general population,<sup>7</sup> patients with severe NP had significantly worse QoL scores in all SF-36 domains, except for physical functioning (Fig 1). The mental component summary (39.2 ± 1.0, *P* < 0.05) was significantly lower than the physical component summary (46 ± 1.3), keeping in mind that the Spanish general population has similar values for both mental component summary (79.7) and physical component summary (78.8), sug-



SF-36 domains

**Figure 1** Quality of life impairment in patients with severe nasal polyposis (with and without atopy) compared with the Spanish general population. Physical functioning (PF), role physical functioning (RP), bodily pain (BP), general health (GH), vitality (VT), social functioning (SF), role emotional functioning (RE), and mental health (MH). \**P* < 0.05, nasal polyp patients compared with the Spanish general population; †*P* < 0.05 comparison between atopy and nonatopy patients with nasal polyposis.

gesting that NP impaired mental health more than physical health. Males and females scored similarly in the SF-36 domains with no differences in respect to the Spanish general population. Age, gender, nasal symptoms, and polyp size scores did not statistically correlate to SF-36 scores.

Atopic patients with NP had worse scores of QoL (*P* < 0.05) than nonatopic patients in role physical, body pain, vitality, and mental health (Fig 1). Atopic patients also showed lower physical component summary (difference: 3.6 and 95% confidence interval: 7.4-0.25) and mental component summary (difference: 2.2 and 95% confidence interval: 5.5-1.0) than nonallergic patients.

**Allergy Study**

SPT was positive in 30% of all patients with no differences between males and females. Twenty percent of patients were positive to house dust mites, 24% to pollens, 10% to molds, and 12% to animal dander. Eosinophilic infiltration of nasal mucosa was observed in 35% of all patients (40% of atopic and 30% of nonatopic patients). Blood eosinophils were 5.7% ± 0.4%, whereas total IgE was 190.6 ± 34.4 KU/L. There were no significant differences between atopic and nonatopic patients on nasal eosinophilia, blood eosinophilia, and serum total IgE.

**Table 2**  
Allergy study, nasal symptoms, polyp size, CT scan, and nasal patency scores for all patients with severe nasal polyposis

	Nasal polyposis (n = 109)	Nasal polyposis without atopy (n = 74)	Nasal polyposis with atopy (n = 35)
Nasal eosinophilia positivity (%)	35	40	30
Blood eosinophilia (%)	5.7 ± 0.4	5.6 ± 0.5	6.0 ± 0.7
Serum total IgE (KU/L)	190.6 ± 34.4	199.8 ± 45.3	170.7 ± 49.6
Nasal obstruction	2.3 ± 0.1	2.4 ± 0.1	2.3 ± 0.1
Loss of sense of smell	2.2 ± 0.1	2.2 ± 0.1	2.3 ± 0.1
Rhinorrhea	1.7 ± 0.1	1.7 ± 0.1	1.7 ± 0.1
Sneezing	1.4 ± 0.1	1.3 ± 0.1	1.5 ± 0.1
Polyp size	2.6 ± 0.1	2.5 ± 0.1	2.6 ± 0.1
CT scan	19.1 ± 0.4	17.8 ± 0.7	20.4 ± 0.8*
Total nasal volume (cm <sup>3</sup> )	26.4 ± 2.0	26.6 ± 2.6	26.1 ± 2.8
MCA (cm <sup>2</sup> )	0.4 ± 0.3	0.4 ± 0.4	0.5 ± 0.05

\**P* < 0.05 comparison between atopy and nonatopy patients with nasal polyposis.

### Nasal Symptom Scores

The mean duration time of nasal symptoms was  $9.0 \pm 0.7$  years. Patients scored nasal obstruction and loss of the sense of smell as the major nasal complaints (Table 2), whereas other nasal symptoms were much less frequent and disconcerting. Atopic and non atopic patients with severe NP had similar nasal symptom scores.

### Polyp Size Score

Atopic and nonatopic patients had similar polyp size score (Table 2).

### CT Scan Score

The CT scan score was  $19.1 \pm 0.4$ , and there was no difference between atopic and nonatopic patients (Table 2).

### Nasal Patency

The total nasal volume was  $26.4 \pm 2.0 \text{ cm}^3$  and the MCA  $0.4 \pm 0.3 \text{ cm}^2$  without significant differences between allergic and nonallergic patients (Table 2). There were no significant correlation between QoL and nasal symptoms, polyp size, paranasal sinuses opacification, nasal patency, nasal eosinophilia, blood eosinophilia, and serum total IgE.

## DISCUSSION

The main findings of our study showed that atopy increased the impact of severe NP on QoL, but no effect was found on nasal symptoms, paranasal sinuses opacification, polyp size, nasal patency, nasal and blood eosinophilia, and serum total IgE.

This study shows that NP impaired all SF-36 domains except for physical functioning. Our group has recently reported that QoL in patients with NP is impaired compared with the Spanish general population, the mental health being more impaired than the physical health.<sup>10,11</sup> Previously, Radenne et al<sup>12</sup> showed that NP impairs QoL in all SF-36 domains. Using the SF-36, other studies have also shown that chronic rhinosinusitis has a considerable impact on all QoL domains except for physical functioning compared with a healthy population.<sup>13-16</sup>

Our study did show an association between the presence of atopy and impairment of QoL. There was a significant correlation between atopy and physical component summary and mental component summary. Using the SF-36 questionnaire, Winstead and Barnett<sup>14</sup> showed that the presence of allergy had an adverse impact on vitality and general health perception compared with rhinosinusitis alone. Derebery and Berliner<sup>17</sup> evaluated the health impact of allergy, showing poorer QoL on all SF-36 domains than the level for the general US population. Krouse<sup>18</sup> found an association between severity of allergy and the degree of symptoms as noted on the Rhinosinusitis Disability Index in relation to physical aspect of rhinosinusitis, such as impairment in physical exertion, exercise tolerance, and sexual function.

The present study provides additional evidence that findings on the CT scan do not correlate with the severity of nasal symptoms as reported by other investigators.<sup>19,20</sup> Also, there was no correlation between CT scan and atopy and polyps size scores. However, Krouse<sup>18</sup> reported that the degree of allergic reactivity is associated with the radiologic appearance of the sinus mucosa on CT scan. Our finding was probably unexpected and calls into question the nature and basis of the symptoms that patients are reporting. Perhaps, we may explain these results due to the severity of NP in our patients. In conclusion, these results suggest that severe NP has a considerable impact on QoL and atopy worsens the impact of NP on QoL.

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