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RESEARCH NOTE

# Omalizumab and quality of life in nasal polyps: A post hoc analysis

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health-related quality of life, immunoglobulin E, nasal polyps, patient-reported outcome, 22-item Sino-Nasal Outcome Test

## INTRODUCTION

Chronic rhinosinusitis with nasal polyps (CRSwNP) reduces health-related quality of life (HRQoL), with patients reporting that symptoms of nasal congestion/obstruction, loss of sense of smell, breathing difficulties, and rhinorrhea have the greatest impact.[1–4] Patient-reported outcome tools used to gauge HRQoL, including the 22-item Sino-Nasal Outcome Test (SNOT-22)[5] and Total Nasal Symptom Score (TNSS), should be considered by physicians when evaluating treatment outcomes.

Omalizumab is an anti–immunoglobulin E monoclonal antibody with demonstrated efficacy in patients with CRSwNP in replicate phase 3, double-blind, randomized, placebo-controlled studies (POLYP 1 [NCT03280550] and POLYP 2 [NCT03280537]).[6] To investigate effects of omalizumab therapy vs placebo on patient-reported HRQoL in further depth, we conducted a pooled analysis of patient data from these 2 studies in which changes in SNOT-22 total score, 4 SNOT-22 subdomain scores, and TNSS were evaluated.

## PATIENTS AND METHODS

In POLYP 1 (N = 138) and POLYP 2 (N = 127), patients with persistent bilateral nasal polyps (Nasal Polyp Score ≥2 for each nostril and total ≥5), nasal congestion (Nasal Congestion Score ≥2), impaired HRQoL (SNOT-22 score ≥20), and inadequate response to nasal corticosteroids were randomized 1:1 to subcutaneous omalizumab (n = 134) or placebo (n = 131) for 24 weeks, with dose (75-600 mg) and frequency (every 2 or 4 weeks) determined as previously described.[6] All patients received intranasal mometasone.[6]

SNOT-22 (with an established minimal clinically important difference [MCID] of ≥−8.9 points[7]) evaluates

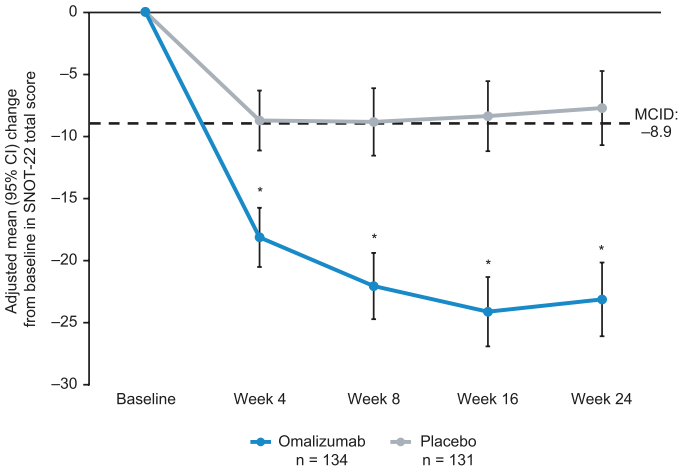


**FIGURE 1** Adjusted mean change from baseline for 22-item Sino-Nasal Outcome Test (SNOT-22) total score in patients receiving omalizumab vs placebo.[7] Data analyzed post hoc. *$p < 0.0001$. CI = confidence interval; MCID = minimal clinically important difference.

symptoms over the previous 2 weeks using a 6-point Likert scale from 0 (not a problem) to 5 (problem is as bad as it can be) for a maximum total score of 110. SNOT-22 subdomain scores were calculated as the sum of all items comprising the domains of nasal symptoms (0-40 points), otologic and facial pain (0-20 points), sleep impact (0-40 points), and emotional and psychological impact (0-10 points).[5] Patients reported nasal symptoms for TNSS using an eDiary. TNSS is the sum of average daily scores over 7 days for sense of smell, nasal congestion, posterior rhinorrhea, and anterior rhinorrhea, graded on a 4-point Likert scale from 0 (no symptoms) to 3 (severe symptoms), for a total score range of 0 to 12 points.

A mixed-effect model with repeated measures and unstructured covariance matrix was used to estimate treatment-specific adjusted mean changes from baseline and 95% confidence intervals (CIs). Treatment group differences and 95% CIs were calculated at each study week. The model was adjusted for study, baseline outcome score, geographic region, and asthma/aspirin sensitivity status. Achievement of SNOT-22 MCID was analyzed using a dichotomized repeated binary regression (using generalized estimating equations to generate odds ratios), which included weeks 4, 8, 16, and 24 as time-points, with an unstructured covariance matrix.

## RESULTS

Baseline SNOT-22 total scores, SNOT-22 subdomain scores, and TNSS were similar for omalizumab and placebo groups (Table S1).

Adjusted mean (95% CI) change from baseline in total SNOT-22 score at week 4 differed for omalizumab vs placebo by −9.4 points (−12.8 to −6.0; Fig. 1). This between-group difference remained at weeks 8 (−13.2 [−17.0 to −9.4]), 16 (−15.7 [−19.7 to −11.7]), and 24 (−15.4 [−19.6 to −11.2]). A significantly greater proportion of omalizumab- than placebo-treated patients achieved MCID of ≥−8.9-point improvement in SNOT-22 total score at all time-points (Fig. S1).

Adjusted mean (95% CI) between-group differences from baseline at week 24 were significantly ($p < 0.0001$) greater for omalizumab than placebo across all SNOT-22 subdomains (Fig. 2): nasal symptoms (−5.8 [−7.31 to −4.21]), sleep impact (−5.6 [−7.45 to −3.65]), otologic and facial pain (−2.6 [−3.42 to −1.79]), and emotional and psychological impact (−1.3 [−1.86 to −0.83]).

Adjusted mean (95% CI) change from baseline in TNSS at week 4 differed for omalizumab vs placebo by −1.0 (−1.46 to -0.60; Fig. S2). The between-group difference remained at weeks 8 (−1.9 [−2.42 to −1.36]), 12 (−2.0 [−2.61 to −1.47]), 16 (−2.2 [−2.77 to −1.56]), 20 (−2.0 [−2.65 to −1.42]), and 24 (−2.0 [−2.63 to −1.33]).

Safety findings from the POLYP 1 and POLYP 2 trials have been reported elsewhere.[6]

## DISCUSSION

Our findings confirm that omalizumab improves the HRQoL of patients with CRSwNP vs placebo, as assessed by SNOT-22 total score, SNOT-22 subdomain scores, and TNSS. Improvements in SNOT-22 and TNSS were seen as early as week 4 and maintained throughout the remainder of the treatment period. Greater improvements from baseline at week 24 for omalizumab vs placebo were observed in all 4 SNOT-22 subdomains, with the nasal symptoms and sleep impact subdomains, major contributors to overall health, demonstrating the largest relative improvements. Patient-reported outcome measures may help manage patient expectations about outcomes and facilitate shared decision-making between patients and their health-care providers, using tools such as the shared decision-making tool created by the American College of Allergy, Asthma and Immunology.[8]

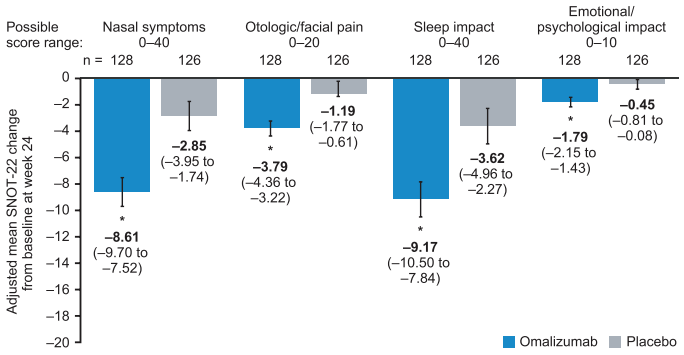


**FIGURE 2** Adjusted mean (95% CI) 22-item Sino-Nasal Outcome Test (SNOT-22) subdomain score improvements from baseline at week 24. $p < 0.0001$ for all comparisons. Error bars represent 95% CI. CI = confidence interval.

Portions of this analysis were post hoc and therefore subject to associated limitations. In addition, results in the current analysis may not align with other SNOT-22 subdomain structures.

The findings of these pooled analyses indicate that omalizumab provides robust, durable, and meaningful improvements vs placebo in overall HRQoL as well as specific aspects of HRQoL important to patients with CRSwNP. Validated patient-reported outcome measures can be helpful to follow patients' progress and make shared decisions about continued treatment.

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## CONFLICT OF INTEREST

J.K.H.: consultant to AstraZeneca, Genentech, Inc., GlaxoSmithKline, Novartis, Regeneron, and Sanofi Genzyme; B.Y., R.S., L.A.M: employees of Genentech, Inc.; J.B.: employee of Roche Products, Ltd.; S.E.L.: consultant to AstraZeneca, Genentech, Inc., GlaxoSmithKline, Novartis, Regeneron, and Sanofi Genzyme.

## DATA AVAILABILITY STATEMENT

Qualified researchers may request access to individual patient-level data through the clinical study data request platform at: https://vivli.org. Further details on Roche's criteria for eligible studies are available at: https://vivli.org/members/ourmembers. For further details on Roche's Global Policy on the Sharing of Clinical Information and how to request access to related clinical study documents, please refer to: https://www.roche.com/research_and_development/who_we_are_how_we_work/clinical_trials/our_commitment_to_data_sharing.htm.

## REFERENCES

1. Fokkens WJ, Lund V, Bachert C, et al. EUFOREA consensus on biologics for CRSwNP with or without asthma. *Allergy*. 2019;74:2312-2319.
2. Khan A, Huynh TMT, Vandeplas G, et al. The GALEN rhinosinusitis cohort: chronic rhinosinusitis with nasal polyps affects health-related quality of life. *Rhinology*. 2019;57:343-351.
3. Vennik J, Eyles C, Thomas M, et al. Chronic rhinosinusitis: a qualitative study of patient views and experiences of current management in primary and secondary care. *BMJ Open*. 2019;9:e022644.
4. Hall R, Trennery C, Chan R, et al. Understanding the patient experience of severe, recurrent, bilateral nasal polyps: a qualitative interview study in the United States and Germany. *Value Health*. 2020;23:632-641.
5. Feng AL, Wesely NC, Hoehle LP, et al. A validated model for the 22-item Sino-Nasal Outcome Test subdomain structure in chronic rhinosinusitis. *Int Forum Allergy Rhinol*. 2017;7:1140-1148.
6. Gevaert P, Omachi TA, Corren J, et al. Efficacy and safety of omalizumab in nasal polyposis: 2 randomized phase 3 trials. *J Allergy Clin Immunol*. 2020;146:595-605.
7. Hopkins C, Gillett S, Slack R, et al. Psychometric validity of the 22-item Sinonasal Outcome Test. *Clin Otolaryngol*. 2009;34:447-454.
8. American College of Allergy, Asthma and Immunology. Treating chronic rhinosinusitis with nasal polyps. 2021. https://www.american-rhinologic.org/assets/images/newsletter/Fall2020/CRSwNP%20SDM%20Paper%20Tool%20-%20FINAL.pdf. Accessed July 30, 2021.

## SUPPORTING INFORMATION

Additional supporting information may be found in the online version of the article at the publisher's website.

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