Assessing the Relationship Between EQ-5D-3L Index Scores and Disease-Specific Patient-Reported Outcome Measures in Eosinophilic Oesophagitis

EOSINOPHILIC OESOPHAGITIS

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Background

- Eosinophilic Oesophagitis (EoE) is a chronic, progressive, type 2 inflammatory disease of the oesophagus, characterised by dysphagia and food impactions, which affects health-related quality of life (HRQoL).[1]
- Because of the increasing prevalence of EoE in recent years, it is necessary to evaluate the impact of EoE-related symptoms on HRQoL using patient reported outcome measures (PROMs).[2]
- The National Institute for Health and Care Excellence (NICE) recommends using the EuroQol-5 Dimensions (EQ-5D) questionnaire, a generic tool for estimating health utility in cost-effectiveness analyses,[3] to assess HRQoL and quality-adjusted life years.[4] However, the sensitivity of the EQ-5D-3L in capturing disease-specific HRQoL has been challenged, as it suffers from known ceiling effects across various disease populations.[5,6]
- Exploring the relationship between EQ-5D and disease-specific PROMs, such as the Dysphagia Symptom Questionnaire (DSQ) and the EoE Impact Questionnaire (EoE-IQ) is essential to determine whether the EQ-5D tool adequately reflects the EoE-specific health impacts.

Objective

- **To evaluate the correlation between the EQ-5D-3L utility values and disease-specific PROMs — DSQ and EoE-IQ, to determine the suitability of EQ-5D-3L in assessing the quality of life (QoL) in patients with EoE, through post-hoc analysis.**

Methods

Study design and study population

- This is a post-hoc analysis of data collected during the 3-part LIBERTY EoE TREET study (R668-EE-1774, NCT03633617), a phase 3, randomised controlled trial to investigate the efficacy and safety of dupilumab in patients aged ≥12 years with EoE. Details of this trial have been previously published.[7]
- In this post-hoc analysis, the EQ-5D-3L questionnaire was administered in the part B of the trial at baseline following a protocol amendment.
- Patients aged ≥12 years with a confirmed diagnosis of EoE, who had an endoscopic biopsy suggesting intraepithelial eosinophilic infiltration, and a history of at least two episodes of dysphagia per week for 1 month before screening were included.

Study assessment

- The following disease-specific PROM scores were assessed.
  - DSQ, range: 0–84; lower scores indicate less severe dysphagia.[8] DSQ score was grouped as follows: <31, ≥31 to <39, ≥39 to <45, and ≥45.
  - EoE-IQ, range: 1 (no impact) to 5 (extremely impacted).[2] EoE-IQ scores were grouped into distinct categories based on values that directly related to the reported interquartile range and median (for EoE-IQ scores), as follows: <1.7, ≥1.7 to <2.2, ≥2.2 to < 2.7, and ≥ 2.7.
- The EQ-5D-3L index score was derived using United Kingdom tariff value set.[9]

Statistical analysis

- Descriptive statistics were reported for patients, including baseline DSQ and EoE-IQ scores, stratified by EQ-5D utility levels (<0.4, 0.4–0.9, and >0.9).
- Spearman's correlation coefficients were computed between the utility levels, EoE-IQ and DSQ scores as well as between EoE-IQ and DSQ scores.
- Two-dimensional and three-dimensional scatterplots were developed to visually explore the relationships between the PROMs.

Conclusions

- **The EQ-5D-3L utility measures showed a weak correlation with disease-specific PROMs in patients with EoE, suggesting that it may not the best option for assessing HRQoL in this population.**
- **Additionally, in patients with EoE, the EQ-5D-3L derived utilities may underestimate the true QoL impact experienced by patients. Disease-specific QoL instruments like Adult Eosinophilic Oesophagitis Quality of Life questionnaire[10] [EoO-QoL-A] and EoE-IQ should be considered.**

RESULTS

Key baseline characteristics

- Of the 240 patients who were included in the part B of the trial, 71 completed the EQ-5D-3L questionnaire at baseline (mean [range] age: 27.7 [12.0–68.0] years; male: 69.0%, **Table 1**).
- The mean EQ-5D-3L utility at baseline was 0.809 (standard deviation: 0.247).
  - Proportion of patients in each utility subgroup were: <0.4 (*N* = 8, 11.3%); 0.4 to 0.9 (*N* = 30, 42.3%); and >0.9 (*N* = 33, 46.5%) (**Table 1**).
- When stratified by the EQ-5D-3L utility scores (<0.4, 0.4–0.9 and >0.9), differences were observed in the mean age (18.9, 25.1 and 32.2 years, respectively), the mean EoE duration (3.8, 5.6 and 6.6 years, respectively), and the mean peak eosinophil count (76.1, 104.1 and 101.4 per high-power field, respectively) (**Table 1**).
- Patients in the lower utility subgroups reported numerically more severe mean DSQ and EoE-IQ scores (**Table 1**).

Table 1. Key baseline characteristics of patients who completed the EQ-5D-3L questionnaire

Variable	EQ-5D-3L utility at baseline			
	Overall (*N* = 71)	<0.4 (*N* = 8)	0.4 to 0.9 (*N* = 30)	>0.9 (*N* = 33)
Age, mean (SD) (years)	27.7 (13.1)	18.9 (7.4)	25.1 (11.6)	32.2 (14.0)
Range	12.0–68.0	12.0–34.0	13.0–57.0	14.0–68.0
Male, %	69.0	50.0	66.7	75.8
Duration of EoE, mean (SD) (years)	5.8 (4.4)	3.8 (3.1)	5.6 (4.7)	6.6 (4.4)
Patients with EoE for ≥5 years, %	50.7	25.0	50.0	57.6
Peak EOS count of three regions[a], mean (SD) (eos/hpf)	99.7 (53.0)	76.1 (52.4)	104.1 (58.8)	101.4 (47.3)
Range	26–258	26–184	27–258	27–223
DSQ score[b], mean (SD)	37.5 (11.4)	41.2 (13.6)	40.8 (10.6)	33.6 (10.5)
Range	14–70	18–56	14–70	15–52
EoE-IQ score[c], mean (SD)	2.3 (0.8)	2.7 (0.6)	2.4 (0.8)	2.1 (0.8)
Range	1–5	2–4	1–4	1–5

[a]A total of nine mucosal pinch biopsies were collected at each time point from three oesophageal regions (3 proximal, 3 mid, and 3 distal).
[b]The DSQ is a validated PRO that has been used in clinical studies to measure the frequency and intensity of dysphagia. DSQ scores ranges from 0–84; lower scores indicated less severe dysphagia).[6]
[c]The EoE-IQ measures disease impact on emotional, social, work and school, and sleep aspect of a patient by responding to 11 questions based on experience living with EoE during the past 7 days. Response to each item is on a 5-point scale (1 = Not at all, 2 = A little, 3 = Somewhat, 4 = Quite a bit, and 5 = Extremely).[2]
DSQ, Dysphagia Symptom Questionnaire; EoE, eosinophilic oesophagitis; EoE-IQ, EoE Impact Questionnaire; EOS, eosinophil; hpf, high-power field; HRQoL, health-related quality of life; SD, standard deviation.

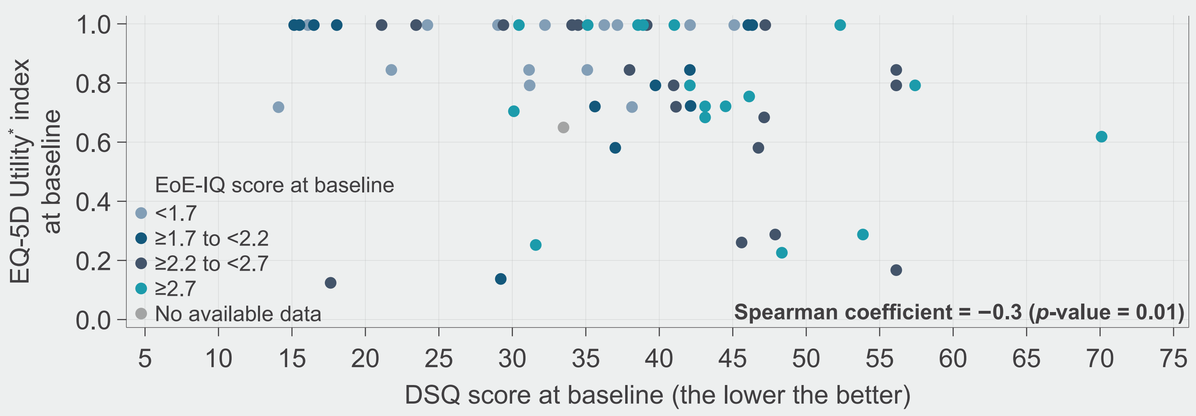
Correlations between EQ-5D-3L utilities and DSQ and EoE-IQ scores

- The correlations between the EQ-5D-3L utilities and DSQ (r = –0.30, *p* = 0.01) and EoE-IQ (r = –0.33, *p* = 0.006) scores were weak (**Figure 1** and **Figure 2**, respectively).
- The correlation between the DSQ and EoE-IQ scores at baseline was moderate (r = 0.43, *p* = 0.0002).

Three-dimensional scatterplots

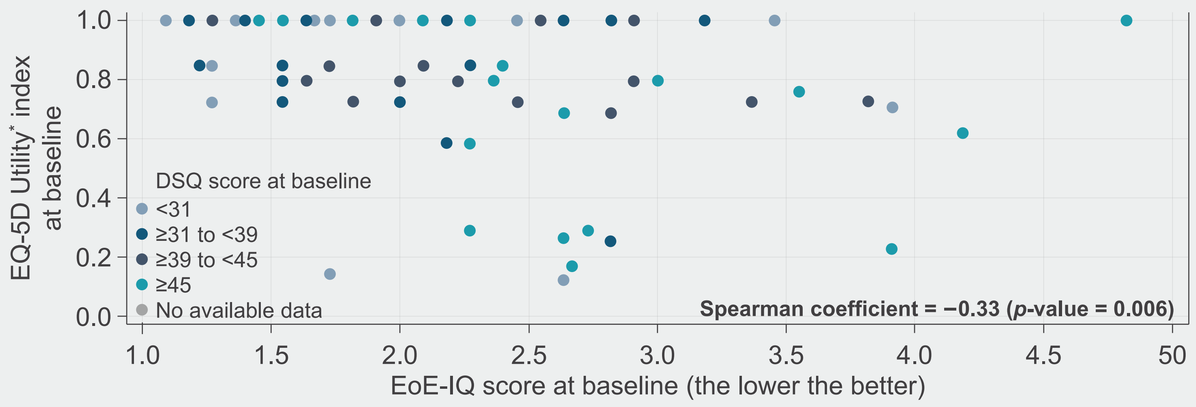
- The three-dimensional scatterplots also revealed no clear visual relationship between EQ-5D-3L utilities and EoE-IQ and DSQ scores (**Figure 3**).
- However, most of the data points were clustered towards higher EQ-5D-3L scores, regardless of DSQ and EoE-IQ scores.

Figure 1. Correlations between DSQ score and EQ-5D-3L utility at baseline, grouped by values of EoE-IQ



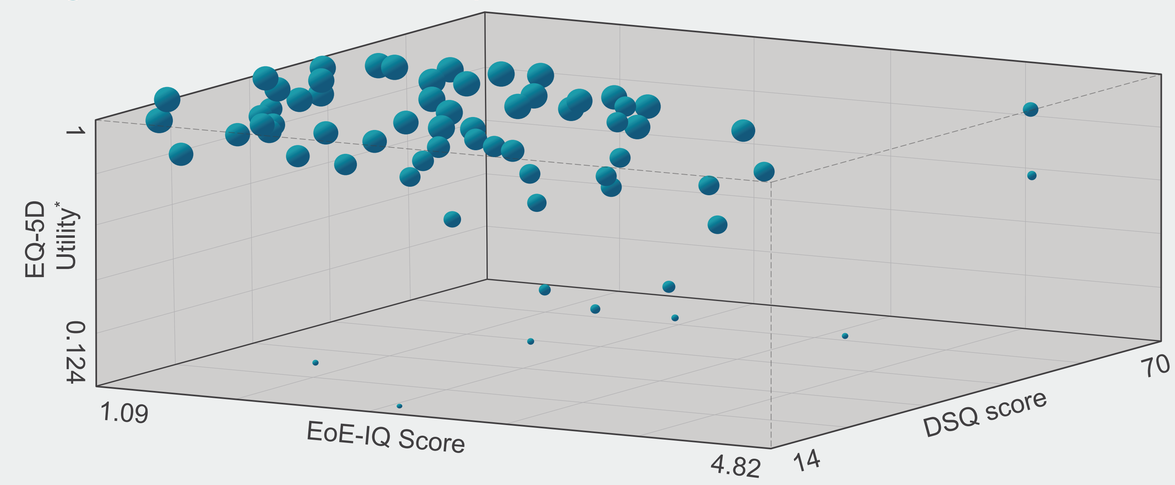
*Calculated based on the UK tariff (Dolan P, 1997).[7] EoE-IQ score points were colour coded and categorised into different ranges (1: no impact to 5: extremely impacted).[2]
DSQ, Dysphagia Symptom Questionnaire; EoE, eosinophilic oesophagitis; EoE-IQ, EoE Impact Questionnaire; HRQoL, health-related quality of life; UK, United Kingdom.

Figure 2. Correlation between EoE-IQ score and EQ-5D-3L utility at baseline, grouped by values of DSQ



*Calculated based on the UK tariff (Dolan P, 1997).[7] The DSQ score points were colour coded and categorised into different ranges (range: 0–84; lower scores indicated less severe dysphagia).[6]
DSQ, Dysphagia Symptom Questionnaire; EoE, eosinophilic oesophagitis; EoE-IQ, EoE Impact Questionnaire; HRQoL, health-related quality of life; UK, United Kingdom.

Figure 3. Correlations between DSQ total score, EoE-IQ score, and EQ-5D-3L utilities using three-dimensional scattered plot



*Calculated based on the UK tariff (Dolan P, 1997).[7] Each point represents the scores for a single patient. Only those patients who reported a value for each of three variables (i.e., no missing values) are shown in the figure. The correlation between EQ-5D utilities, EoE-IQ and DSQ scores were computed using Spearman's correlation coefficient. DSQ scores were plotted on the x-axis (range: 0–84; lower scores indicated less severe dysphagia), the EoE-IQ score on the y-axis (range: 1 [no impact] to 5 [extremely impacted]), and EQ-5D on the z-axis.
DSQ, Dysphagia Symptom Questionnaire; EoE, eosinophilic oesophagitis; EoE-IQ, EoE Impact Questionnaire; UK, United Kingdom.

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CONFLICTS OF INTEREST
JM, **FJ**, and **STT** are employees of Sanofi and may hold stocks and/or stock options in the company.
RBT is an employee of Regeneron Pharmaceuticals, Inc. and may hold stocks and/or stock options in the company.
EH is an employee of RTI Health Solutions, which received research funding from Sanofi to perform this study.
BB was an employee of RTI Health Solutions at the time of study execution and abstract development.

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