TITLE:

THE PISA EOE ADAPTATION QUESTIONNAIRE FOR ADAPTIVE BEHAVIORS ACCURATELY MONITORS HISTOLOGICAL DISEASE ACTIVITY TRENDS FOLLOWING TREATMENT IN PATIENTS WITH EOSINOPHILIC ESOPHAGITIS : A PROSPECTIVE, LONGITUDINAL STUDY

AUTHORS

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Background:

The Pisa EoE Adaptation Questionnaire (PiEAQ) on adaptive behaviors at mealtime significantly improves the correlation between dysphagia scores and histological disease activity (HDA) in eosinophilic esophagitis (EoE). Whether longitudinal variations of PiEAQ scores (ΔPiEAQ) can capture HDA trends following pharmacological treatment of EoE has not been investigated.

Methods:

Consecutive adults (>18 years) with histologically active EoE (i.e., ≥15 eos/high-power field) were prospectively enrolled. Clinical characteristics, HDA, a recall-modified dysphagia symptom questionnaire (mDSQ), esophageal hypervigilance and anxiety scale (EHAS), and PiEAQ (drinking water to push the bolus, lubricating food, chewing for long, and blending food) were recorded longitudinally at baseline (T0) and 12 weeks post-treatment using a 30-day recall period (T1). ROC curve analysis with DeLong test was used to calculate the diagnostic accuracy (AUC) of clinical scores for predicting HDA following treatment. Significance threshold was $p<0.05$.

Results:

Thirty-seven histologically active EoE patients were included (**Table 1**). The mDSQ, PiEAQ, and EHAS score at baseline were 2.97 (IQR, 2-5), 2.00 (IQR, 1-3), and 21 (IQR, 14– 25), respectively. Following treatment with budesonide orodispersible tablets (72.2%), PPIs (19.6%), dupilumab (5.5%), or milk-free diet (2.7%), histological remission was achieved in 78.4% of patients, while 21.6% remained histologically active. Post-treatment (T1), mDSQ, PiEAQ, and EHAS scores decreased significantly only in patients who achieved histological remission (**Table 2 and Figure1**). ROC curve analysis showed that a post-treatment reduction of at least 2 adaptive behaviors compared to baseline (ΔPiEAQ=-2) had AUC of 85.0%, with 100% specificity and 64% sensitivity for the identification of patients achieving histological remission following treatment. Similarly, a post-treatment reduction of at least 3 points in mDSQ scores compared to baseline (ΔmDSQ=-3) had AUC of 81.1% with 100% specificity and 57.7% sensitivity. The non-inferiority analysis showed that the ΔPiEAQ had similar performance to ΔDSQ (DeLong p-value= 0.46). A combined score integrating both ΔPiEAQ and ΔDSQ scores increased the AUC of clinical scores for capturing variations of HDA post-treatment to 90%, with 100% specificity and 73.1% sensitivity for detecting patients achieving histological remission post-treatment (**Figure 2**).

Conclusions:

The PiEAQ is the first questionnaire investigating adaptive behaviors as a standalone domain in EoE. We demonstrated that longitudinal variations in PiEAQ scores are sensitive to HDA variations over time and can monitor histological disease activity trends after treatment. This study confirms that, similar to dysphagia, adaptive behaviors contribute to disease burden in EoE and improve with treatment.

Table 1. Baseline Characteristics

Variable	Descriptive statistics (n=37)
Sex	M(86%)/F(14%)
Age (median, IQR)	39 (29 - 50)
DSQ at baseline	2.97 (2.00 - 5.00)
PiEAQ at baseline	2.00 (1.00 - 3.00)
EHAS score at baseline	21.00 (14.00 – 25.00)

Table 2. Variations of PiEAQ and DSQ scores

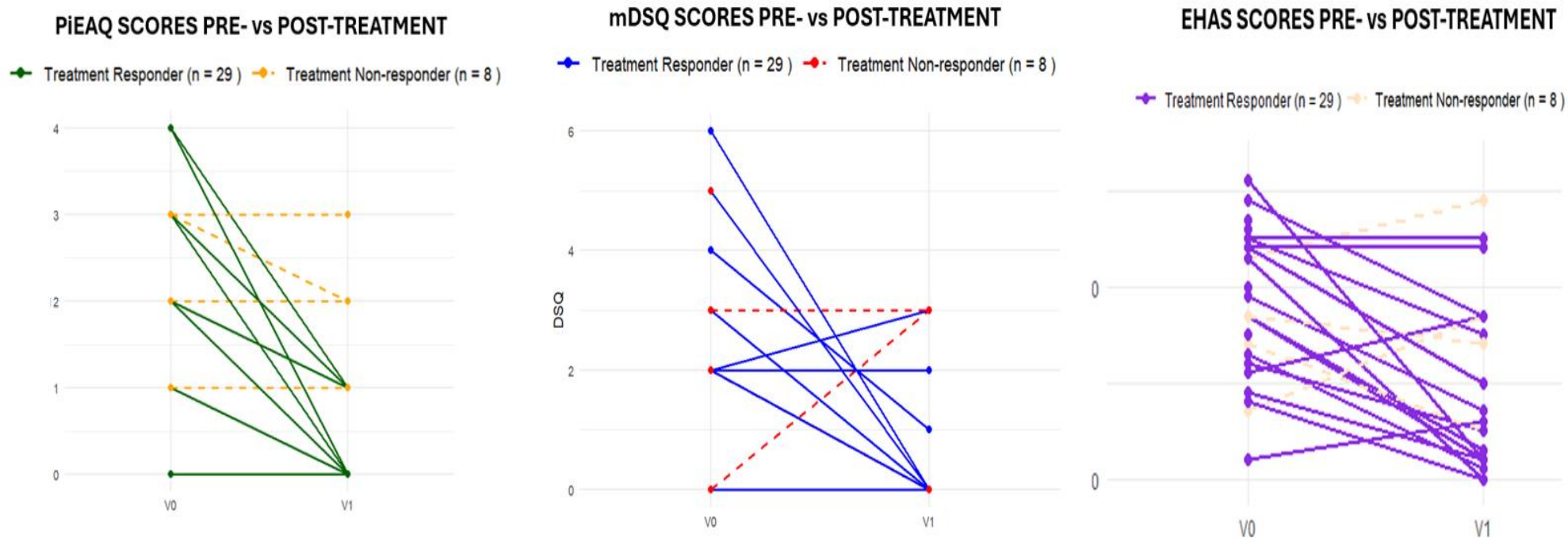| Group	PiEAQ baseline (median)	PiEAQ post-treatment (median)	ΔPiEAQ (T1-T0)	p-value
Non-responder (n=8)	2	1.86	-0.14	0.3
Responder (n=29)	1.96	0.138	-1.83	**<0.0001**
Group	mDSQ baseline (median)	mDSQ post-treatment (median)	ΔmDSQ (T1-T0)	p-value
Non-responder (n=8)	2.29	2	+0.16	0.8
Responder (n=29)	3.27	0.33	-2.92	**<0.0001**
Group	EHAS baseline (median)	EHAS post-treatment (median)	ΔEHAS (T1-T0)	p-value
Non-responder (n=8)	17.7	15.8	-1.91	0.9
Responder (n=29)	21.4	10.2	-11.2	**<0.0001**

Figure 2. PiEAQ and DSQ scores at baseline and post-treatment (by patient), and ROC curves.