

Quality of Life of Food-Allergic Patients Before, During, and After Oral Immunotherapy



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What is already known about this topic? Small series demonstrated improved quality of life (QOL) of children after oral immunotherapy (OIT).

What does this article add to our knowledge? The QOL of food-allergic patients undergoing OIT might temporarily deteriorate, but subsequently improves at maintenance. Further improvement occurs at follow-up. Patients with a worse baseline QOL, single food allergy, and a younger age benefit the most.

How does this study impact current management guidelines? The improvement in QOL experienced by food-allergic patients after OIT should be considered when balancing the pros and cons of this treatment.

BACKGROUND: Oral immunotherapy (OIT) for food allergy is demanding but data on patients' quality of life (QOL) throughout the process are limited.

OBJECTIVE: To characterize changes in QOL of food-allergic patients during and after OIT.

METHODS: In a prospective cohort study, the Food Allergy Quality of Life Questionnaire—Parental Form (FAQLQ-PF) was administered to parents of 191 consecutive children aged 4 to 12 years undergoing OIT for food allergy. Questionnaires were administered at OIT initiation, mid up-dosing, upon reaching maintenance, and after 6 months of follow-up. Age- and sex-matched food-allergic children ($n = 48$) not undergoing OIT served as controls.

RESULTS: FAQLQ-PF scores had significantly improved (decreased) from OIT initiation to reaching full maintenance (emotional impact [EI], 3.66-3.32, $P = .001$; food anxiety [FA], 3.90-3.32, $P < .001$; social and dietary limitation [SDL], 3.50-2.94, $P < .001$; and total score, 3.69-3.19, $P < .001$) and partial maintenance, whereas no change was noted in control patients. Worse baseline QOL, single food allergy, and a younger age predicted greater QOL improvement. Of the 85 (88.5%) patients who completed the FAQLQ-PF at mid up-dosing and for whom

QOL deteriorated, a significant improvement was noted upon reaching maintenance. Additional significant improvement in QOL was observed in the 95 (88.8%) patients who completed the FAQLQ-PF 6 months after reaching maintenance (EI, 3.414-2.993, $P = 0.049$; FA, 3.37-2.593, $P = .001$; SDL, 2.989-2.264, $P = .001$; and total score, 3.266-2.614, $P = .001$).

CONCLUSION: The QOL of food-allergic children improves significantly upon reaching OIT maintenance, with additional improvement 6 months later. The detrimental effect of OIT on some patients' QOL during up-dosing is reversed upon reaching maintenance. © 2018 American Academy of Allergy, Asthma & Immunology (J Allergy Clin Immunol Pract 2019;7:429-36)

Key words: Oral immunotherapy; Quality of life; Desensitization; Up-dosing phase; Maintenance; Follow-up

INTRODUCTION

Food allergy is a major public health problem worldwide.¹⁻⁵ The prevalence of food allergy is increasing, taking a personal, social, and economic toll on individuals and society.^{6,7} The traditional treatment approach in food-allergic patients, consisting of an elimination diet, is hampered by adverse reactions due to accidental exposures and is associated with significantly impaired quality of life (QOL).⁶⁻¹⁰

Oral immunotherapy (OIT) has been extensively studied as an alternative treatment for patients with food allergy¹¹⁻¹⁵ and was recently recommended as a treatment option by the European Academy for Allergy and Clinical Immunology.¹⁶ Many studies have demonstrated the effectiveness of OIT in treating patients having milk, egg, and peanut allergy.^{12,15,17,18} However, the process itself imposes many difficulties. It requires daily consumption of food the patients were taught to avoid and fear, and to which many have developed a food aversion. Moreover, anaphylactic reactions, some requiring injectable epinephrine, as well as nonanaphylactic reactions are experienced during treatment.^{13,19}

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Abbreviations used*EI*- emotional impact*FA*- food anxiety*FAQLQ-PF*- Food Allergy Quality of Life Questionnaire—Parent Form*OIT*- oral immunotherapy*QOL*- quality of life*SDL*- social and dietary limitation*SHTD*- the single highest tolerated dose

Only a few studies have assessed changes in QOL in patients who completed OIT.²⁰⁻²⁴ Most examined the QOL of children at 2 time points only, at the start of OIT and upon reaching maintenance, but lacked a control group.²⁰⁻²² Other studies examined QOL at several time points after OIT but included relatively small groups.^{23,24} Data on changes occurring during the process itself or after a follow-up period in a large group of patients are lacking. Such data on QOL of food-allergic patients undergoing OIT are needed, especially given the controversy regarding its clinical applicability.^{16,25} We previously demonstrated that the QOL of children aged 4 to 12 years undergoing OIT is significantly affected by the treatment as early as in the first dose-escalation week,²⁶ subsequently demonstrating that a subgroup of patients experienced a deterioration in QOL during these first months of treatment.²⁷ Our aim in this study was to examine the changes in QOL throughout the whole process of OIT—from the initiation of treatment, through the mid up-dosing period, upon reaching maintenance, and after 6 months of follow-up. Each phase encompasses different challenges, and we attribute importance to evaluating these difficulties so as to perfect the process, support our patients, and help improve their QOL.

METHODS

Patients

Children aged 4 to 12 years who began OIT for IgE-mediated food allergy to milk, peanut, egg, sesame, or tree nuts after May 2014 and who reached maintenance by June 2017 were enrolled. Epidemiological data, medical history, and the nature and severity of previous food-related reactions were obtained from the parents of each participant. The QOL of food-allergic patients aged 4 to 12 years who did not undergo OIT (control group) was measured at 2 time points several months apart. This group was randomly selected from patients who were followed regularly in our food allergy clinic and were comparable with the OIT group in their age range and allergenic foods. Control patients were all eligible for OIT and none had criteria that would exclude them from getting treatment. The study was approved by the Institutional Ethics Committee of Assaf Harofeh Medical Center and was registered as a clinical trial (NCT02375360). Informed oral consent was obtained from the study participants.

Oral immunotherapy

Patients were included on the basis of the diagnosis of food allergy by a positive skin prick test result and/or specific serum IgE, together with a positive oral food challenge, or a clinical history of an anaphylactic reaction after accidental ingestion in the past year. Exclusion criteria were uncontrolled asthma, inability to adhere to the protocol, or any contraindication to receive intramuscular epinephrine. Skin prick tests to food and histamine control (ALK-Abello, Port Washington, NY) were performed in all patients on the

volar surface of the forearm and read after 20 minutes. As previously described, the OIT program consisted of alternate cycles of up-dosing and home treatment rounds.¹⁸ The initial up-dosing round consisted of 4 days, during which the dose eliciting a reaction in each patient was established, and the single highest tolerated dose (SHTD, previously defined as the maximal individualized tolerated dose), which would be the patients' starting dose for the treatment, was determined. The SHTD was then consumed once daily during the home treatment round until the next up-dosing cycle 24 days later. The second up-dosing week consisted of another 4 days during which the SHTD was increased as tolerated up to 4-fold, followed by a second home treatment phase. The third up-dosing week consisted of 3 days during which the SHTD was increased as tolerated up to 3-fold, and the fourth and fifth up-dosing rounds consisted of 2 days each with an increase of up to 2-fold. Patients reported on doses taken at home and adverse reaction via a Web-based reporting system.²⁸ When patients reached their maintenance goal (milk, 7,200 mg protein; egg, 12,000 mg protein; peanut, 3,000 mg protein; sesame, 5,000 mg protein; and tree nuts, 4,000 mg protein), they were instructed to continue consuming their daily dose at home. Doses were reduced to a maintenance dose of 1200 mg protein for peanut, sesame, and tree nuts; 3600 mg protein for milk; and 6000 mg protein for egg after a month of consuming the maintenance dose. Starting from April 2016, patients were invited to the clinic for evaluation 6 months after reaching maintenance. During this follow-up visit, patients were challenged for the full maintenance dose to validate that they were fully desensitized.

Food Allergy Quality of Life Questionnaire—Parent Form

The Food Allergy Quality of Life Questionnaire—Parent Form (FAQLQ-PF) was developed to examine QOL in children aged 0 to 12 years, as assessed by their parents.^{29,30} The questionnaire is divided into 3 domains: emotional impact (EI), food anxiety (FA), and social and dietary limitation (SDL). It has the same 15 questions for all 3 age groups, but additional questions are included for 4- to 6-year-olds (26 questions in total) and for 7- to 12-year-olds (30 questions in total). The questionnaire has been previously translated into Hebrew and validated.²⁶ Parents were administered the FAQLQ-PF at 4 time points during the treatment program: initially, at the start of therapy; after 4 months of treatment, which is the median time point for achieving maintenance at our center (data not shown); upon reaching the maintenance dose and completing the process at our center; and starting April 2016, when patients arrived for a 6-month follow-up visit. Patients who did not answer 80% or more of the questions in the FAQLQ-PF were excluded.

Statistics

Statistical analyses were performed using SPSS software version 20 (SPSS, Inc, Chicago, Ill). QOL scores in different time points were normally distributed and a paired *t* test was used to compare these scores between the different time points of treatment. Changes in QOL were abnormally distributed. Therefore, the effect of categorical factors on the changes in FAQLQ-PF between treatment initiation and maintenance was examined using the Mann-Whitney test, whereas the correlation between continuous variables and changes in QOL was assessed by the Spearman correlation coefficient. A linear regression analysis was performed, after all assumptions were met, to analyze the effect of multiple risk factors on changes in QOL during treatment, from start to maintenance.

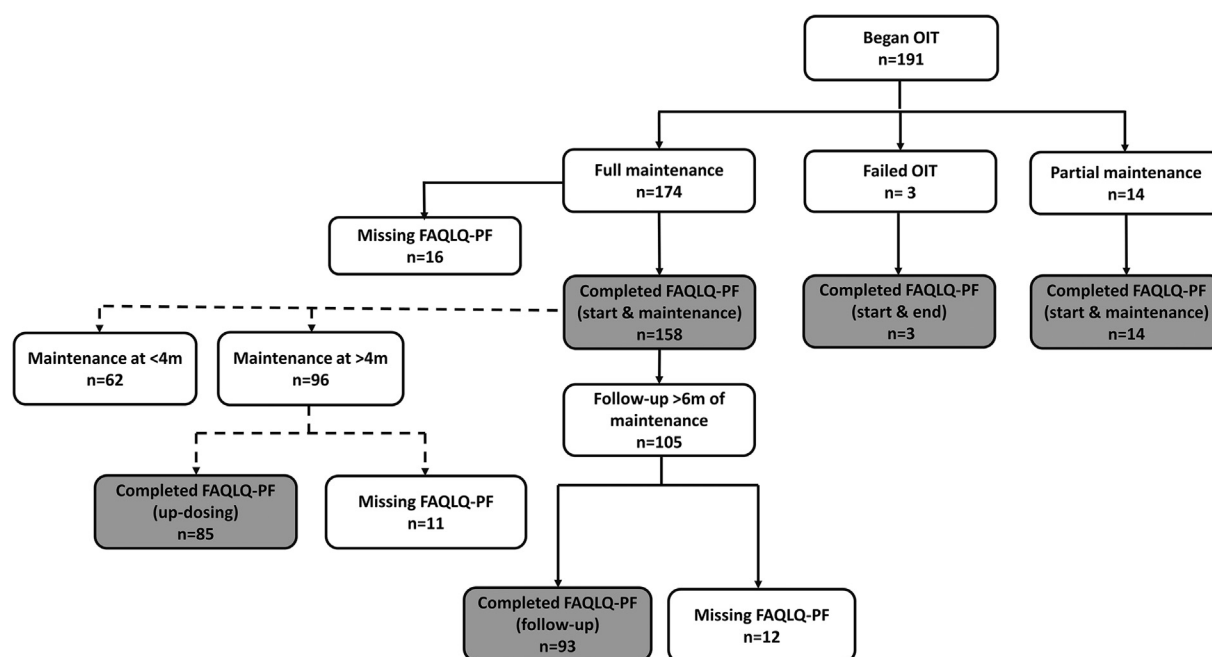


FIGURE 1. A flowchart demonstrating the number of patients who began OIT after May 2014 and completed OIT before June 2017, and who answered the FAQLQ-PF at different phases of the study. Highlighted boxes denote patient groups who completed questionnaires at various points of the study.

TABLE I. Epidemiological and clinical characteristics of the study population at study entry

Category	Variable	Frequency, n (%)		P value
		Study group (N = 175)	Control group (N = 48)	
Demographic characteristics	Age (y), mean $\pm$ SD	6.3 $\pm$ 2.3	6.8 $\pm$ 2.3	.14
	Sex: male	103 (58.9)	32 (66.7)	.41
	Single food allergy	101 (57.7)	24 (50)	.41
	Asthma	90 (57.0)	24 (57.1)*	.56
Reaction severity	Anaphylaxis	87 (49.7)	23 (54.8)*	.61
	Epinephrine	42 (24)	9 (21.4)*	.84
	Emergency department	66 (37.7)	20 (47.6)*	.29
	Hospitalization	16 (9.1)	2 (4.8)*	.54
Baseline FAQLQ-PF, mean $\pm$ SD	EI	3.7 $\pm$ 1.3	3.6 $\pm$ 1.3	.6
	FA	3.9 $\pm$ 1.5	3.9 $\pm$ 1.6	.85
	SDL	3.5 $\pm$ 1.5	3.5 $\pm$ 1.4	.87
	Total score	3.7 $\pm$ 1.3	3.7 $\pm$ 1.3	.97

*Details are available for 42 patients.

A difference of more than 0.5 is considered the minimal important difference on health-related quality-of-life questionnaires with a 7-point scale.³¹ A Fisher exact test was used to compare patients with a more than 0.5-point increase (significantly diminished), unchanged, and more than 0.5-point decrease (significantly improved) FAQLQ-PF scores at each time point. All analyses were 2-tailed, and a *P* value of less than .05 was considered significant.

RESULTS

Of the 191 patients who began OIT after May 2014, 174 reached full maintenance, 14 reached partial maintenance, and 3 failed by June 2017 (Figure 1). A total of 175 of the 191 patients

enrolled (91.6%) completed the FAQLQ-PF at the start of OIT and upon reaching full (*n* = 158) or partial (*n* = 14) maintenance, or upon treatment cessation (*n* = 3), and were studied. The control group comprised 48 food-allergic patients not undergoing OIT and who filled the FAQLQ-PF twice several months apart. The study group matched the control group in epidemiological data as well as in the severity of reactions upon accidental exposures to allergenic food before study entry (Table I). More than half the patients in each group had a single food allergy. Baseline QOL scores were also comparable between the OIT-treated patients and the control group (Table I).

The allergens treated in the OIT group were primarily milk and peanut (39.4% and 37.1%, respectively), followed by walnut

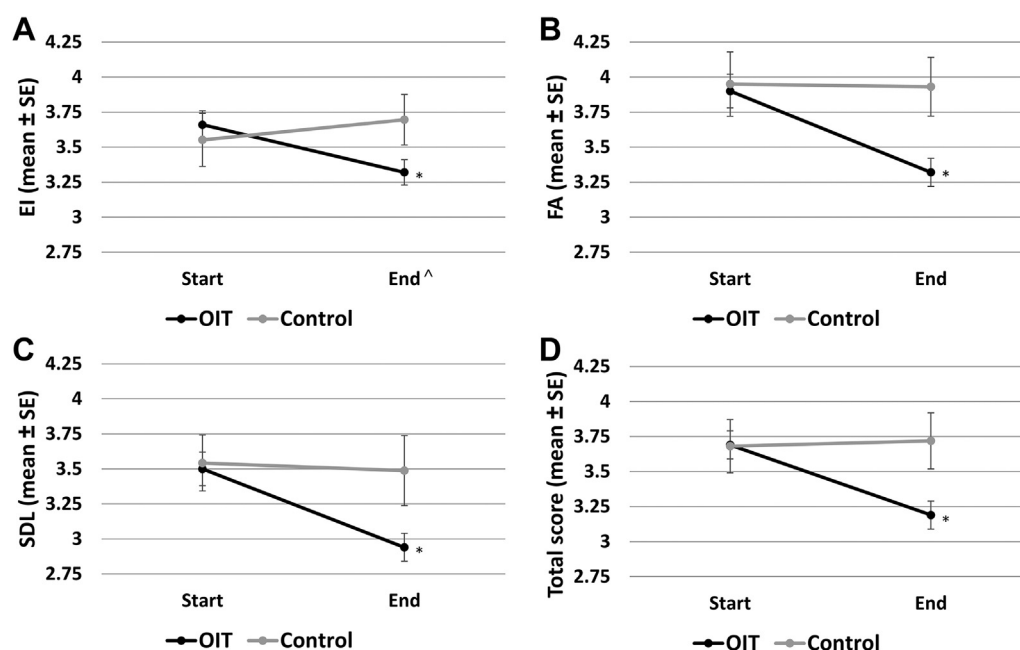


FIGURE 2. Changes in the FAQLQ-PF scores in OIT-treated patients vs controls from start to maintenance or treatment cessation: (A) EI, (B) FA, (C) SDL, and (D) total score. *Represents a significant change in the 2 time points during OIT treatment.

(7.4%), egg (6.9%), sesame (5.1%), cashew (2.9%), and hazelnut (1.1%). The mean duration of OIT until reaching full maintenance was 7.8 ± 5.7 months. Adverse reactions requiring epinephrine during in-hospital up-dosing and home doses were experienced by 24 (13.7%) and 13 (7.4%) patients, respectively. The FAQLQ-PF scores in the OIT group had significantly improved from the start to the end of treatment (full or partial maintenance, or failure) (EI, 3.66-3.32, $P = .001$; FA, 3.90-3.32, $P < .001$; SDL, 3.50-2.94, $P < .001$; and total score, 3.69-3.19, $P < .001$) (Figure 2). In contrast, there were no significant changes in QOL scores of the control group between the 2 time points (interval and 13.3 ± 11.2 months) in any of the domains or in the total score (Figure 2).

Factors that were found to be associated with greater improvement in FAQLQ-PF scores during treatment included having a single food allergy (SDL domain and total score), having experienced anaphylactic reactions before OIT (EI, SDL, and total score) (see Table E1 in this article's Online Repository at www.jaci-inpractice.org), as well as having a younger age (EI and total score) and higher (better) baseline QOL scores (see Table E2 in this article's Online Repository at www.jaci-inpractice.org). The food allergy treated, the SHTD, the reactions occurring during treatment, or the duration of OIT did not significantly affect the change in QOL during treatment. In the linear regression analysis, a single food allergy and a worse baseline QOL score predicted a greater improvement in the FAQLQ-PF scores during treatment, whereas a younger age showed borderline significance for EI and SDL (Table II).

In the 158 patients who reached full desensitization, a younger age did predict a greater improvement in the FAQLQ-PF scores in addition to single food allergy and worse baseline QOL scores (see Table E3 in this article's Online Repository at www.jaci-inpractice.org). Of these 158 patients who reached full maintenance, 62 patients reached maintenance in less than 4 months

and therefore their QOL was not assessed in mid up-dosing. Of the remaining 96 patients, 85 (88.5%) completed the FAQLQ-PF at the time of mid up-dosing (Figure 1). QOL scores for these 85 patients showed a statistically significant improvement between the start of OIT and the midpoint of the process for FA, SDL, and the total score but not for the EI domain (Figure 3). An additional improvement was observed between the midpoint to reaching maintenance, making the improvement in QOL from start to maintenance significant, both statistically and clinically. In accordance with our previous study, we then divided patients into 3 groups—those who experienced a clinically significant deterioration in QOL scores (an increase of >0.5 in the FAQLQ-PF scores), those without a significant change in QOL (a change of ≤ 0.5 in the FAQLQ-PF scores), and those with a clinically significant improvement (a decrease of >0.5 in the FAQLQ-PF scores) from start to mid up-dosing (Figure 4). Patients in the first subgroup, whose QOL deteriorated from start to mid up-dosing, experienced a reversal in trend, with improvement in FAQLQ-PF scores and return to near-baseline scores upon reaching maintenance. Overall QOL scores in this group did not significantly change from start to maintenance for EI ($P = 0.17$), FA ($P = .06$), SDL ($P = .78$), and total score ($P = .67$) (Figure 4). For the patients in the second group, for whom QOL did not change in the first phase of OIT, QOL scores improved from mid up-dosing to maintenance and have now shown a significant improvement from start to maintenance for FA ($P = .018$), SDL ($P = .019$), and total score ($P = .023$), but not for EI ($P = .12$). For the patients in the third group, who improved from start to mid up-dosing, a further improvement was noted between the midpoint of the process and maintenance (Figure 4).

A postmaintenance 6-month follow-up FAQLQ-PF was completed by 93 of 105 (88.6%) patients (Figure 5). An additional significant improvement in QOL scores was noted in these

TABLE II. Linear regression analysis for predictors of improved FAQLQ-PF scores from start to end of treatment

Variable	Group	Correlation			
		EI	FA	SDL	Total score
Age	Coefficient 95% CI	−0.1 −0.12 to 0.01	−0.05 −0.12 to 0.05	−0.1 −0.14 to 0.08	−0.09 −0.012 to 0.014
	P value	.095	NS	.08	NS
Single food allergy	Coefficient 95% CI	0.2 0.21 to 0.83	0.18 0.18 to 0.9	0.24 0.38 to 1.1	0.23 0.3 to 0.92
	P value	.001	.003	<.001	<.001
Baseline corresponding QOL domain	Coefficient 95% CI	−0.62 −0.76 to −0.51	−0.61 −0.71 to −0.47	−0.6 −0.71 to −0.47	−0.61 −0.72 to −0.48
	P value	<.001	<.001	<.001	<.001

NS, Not significant.

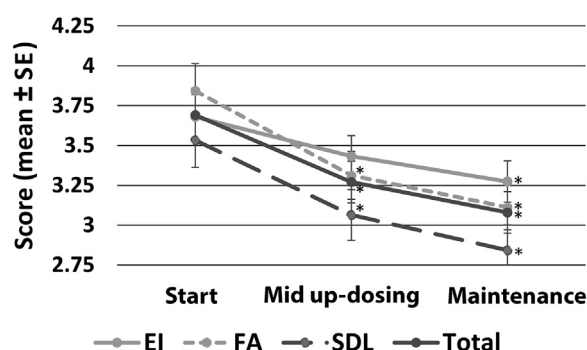


FIGURE 3. Changes in the FAQLQ-PF scores in OIT-treated patients from start to mid up-dosing and then to maintenance in the EI, FA, SDL, and total score. *Represents a significant difference from the start of OIT.

patients at follow-up. It is important to note that the improvement in QOL scores between maintenance and follow-up was larger compared with the improvement from OIT initiation to maintenance (EI, 3.55 at OIT initiation to 3.37 at maintenance to 2.87 at follow-up; FA, 3.78 to 3.32 to 2.55; SDL, 3.33 to 2.99 to 2.28; total score, 3.55 to 3.23 to 2.55). Examination of the distribution of patients between the 3 groups throughout the study demonstrated that the proportion of patients with both improved and deteriorated QOL scores increased from mid up-dosing to maintenance at the expense of those without a significant change (Figure 6). At follow-up, the proportion of patients with improved QOL scores increased significantly in all subcategories (Figure 6).

The 14 patients who reached partial maintenance (150–2700 mg of protein) were different from those who reached full maintenance: sex (male, 71.4% vs 39.2%; $P = .024$), food treated (cow's milk, 78.6% vs 35.4%; $P = .034$), reactions experienced and treatments required during in-hospital up-dosing (10.4 ± 5.4 and 6.0 ± 5.4 vs 4.3 ± 4.0 and 2.5 ± 2.7 ; $P = .01$ and $P = .029$, respectively), and home reactions requiring epinephrine (14.3% vs 1.3%; $P = .034$). Interestingly, baseline FAQLQ-PF scores in these patients were higher (worse) with differences in EI reaching statistical significance (see Figure E1 in this article's Online Repository at www.jaci-inpractice.org). Still, despite the more difficult OIT course and the inability to reach full maintenance, these patients experienced a significant improvement in QOL scores for FA ($P = .001$),

SDL ($P = .036$), and total score ($P = .015$), but not for EI ($P = .12$) during treatment as well. In the 3 failed patients, no significant change in QOL score was noted from the start of OIT to treatment cessation (range, 2.6–4.3 months).

DISCUSSION

To our knowledge, this is the first study that examines changes in QOL during the different phases of OIT in a large number of patients. Several important observations are made in this study. First, QOL of patients significantly improved from OIT initiation to maintenance. Some patients experienced diminished QOL at mid up-dosing, but that reversed and improved, whereas others with unchanged or improved QOL at mid up-dosing continued to improve upon reaching maintenance. Second, even patients who were able to achieve only partial maintenance during OIT had significantly improved QOL. Finally, additional significant improvement in QOL was found in patients during the 6 months of follow-up.

The goal of OIT is to desensitize patients, enabling them to freely consume the allergenic food.³² Many studies have demonstrated the effectiveness of OIT in treating patients having milk, egg, and peanut allergy.^{11,12,15,18,33,34} Several studies have shown improvement in QOL in patients who completed OIT, from the start of OIT to reaching maintenance.^{20–24} However, most of these studies included a small number of patients (up to 30) or lacked a control group. Our study, with the largest group studied thus far (175 patients followed from start to end of OIT), provides solid evidence that QOL of food-allergic patients undergoing OIT significantly improves, in contrast to an untreated matched control group. The improvement in QOL was not only statistically significant but also met criteria to be clinically significant in many of the domains, providing support for the clinical utility of OIT in the treatment of food allergy. In addition, patients who were able to reach only partial maintenance, although a small group, experienced a significant improvement in QOL. Although the 3 patients who failed did not experience an improvement, more importantly, their QOL did not deteriorate either.

The large number of patients studied enabled us to examine factors that are associated with greater improvement in QOL during treatment. We found that the factors associated with greater improvement in QOL were the worse initial QOL scores, having a single food allergy, and a younger age. The impact of worse baseline QOL scores on the improvement during treatment, as we previously described,²⁷ likely reflects greater anxiety

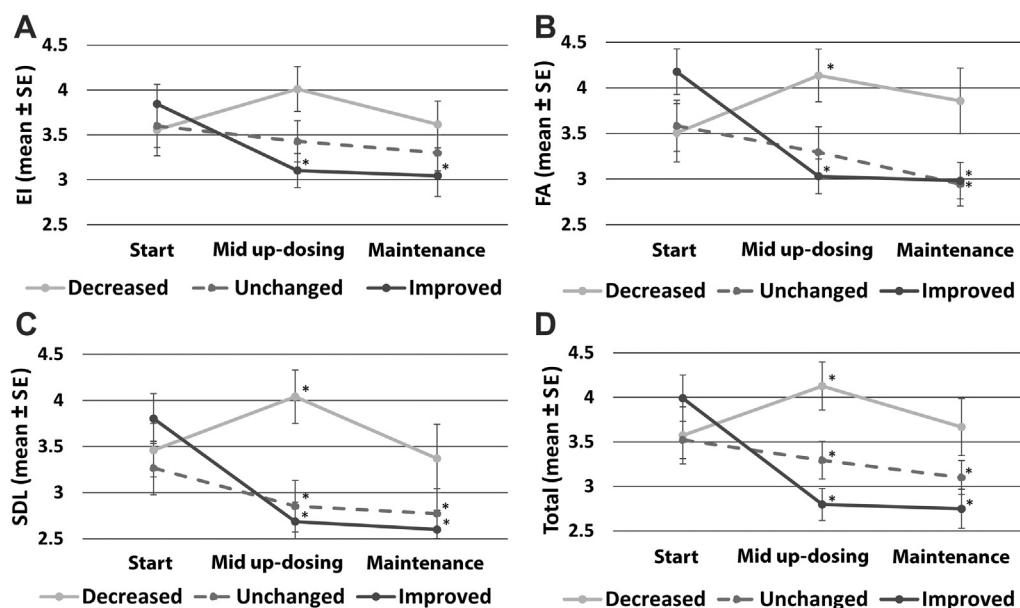


FIGURE 4. Changes in the FAQLQ-PF scores at maintenance in patients with improved, unchanged, and diminished QOL at mid up-dosing. Patients were divided into those with significant improvement (>0.5 decrease), no significant change (≤ 0.5 change), and significant deterioration (>0.5 increase) from start of OIT to mid up-dosing in the (A) EI, (B) FA, (C) SDL, and (D) total score, and their respective FAQLQ-PF domain was tested at maintenance. *Represents a significant difference from the start of OIT.

that is reassured by the treatment. The negative impact of multiple food allergies was not apparent during mid up-dosing, when all patients must endure difficulties having to do with anxiety and food aversion, but by the time they reach maintenance, patients with multiple allergies are still coping with the allergies not treated and the limitations they pose. The negative effect of older age on QOL of food-allergic children was

previously demonstrated.³⁵ Here we extend this observation to OIT as well, where it is likely to be easier for younger children to adapt to the regular consumption of the allergenic food.

Although OIT has shown efficacy in desensitizing patients with food allergy, the process itself imposes many difficulties that need to be endured by patients and their caregivers. The first few months of the OIT are extremely demanding and encompass

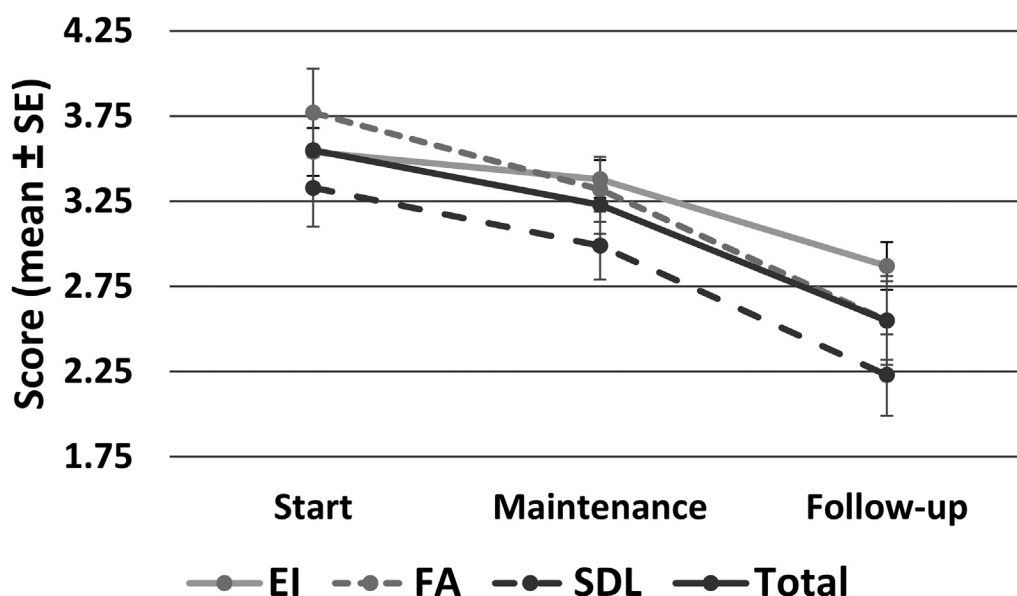


FIGURE 5. Changes in the FAQLQ-PF scores in OIT-treated patients from start to maintenance and then to follow-up in the EI, FA, SDL, and total score. Significant differences were found for FA, SDL, and total score between start and maintenance and for all domains from maintenance to follow-up.

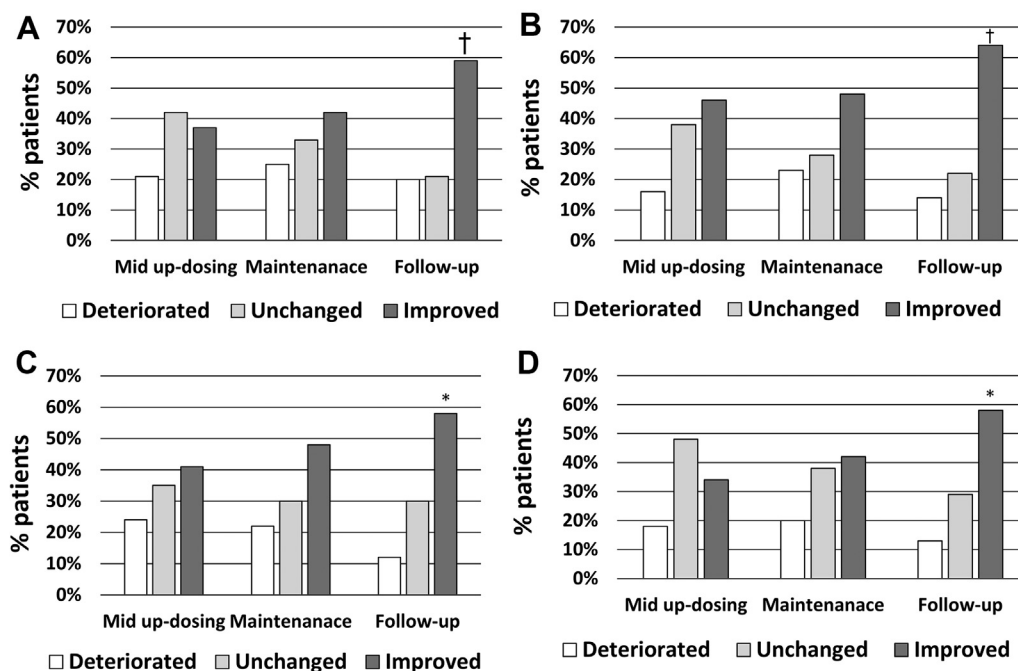


FIGURE 6. Percentage of patients with clinically significantly improved (>0.5 decrease), unchanged (≤0.5 change), and diminished (>0.5 increase) FAQLQ-PF scores at each treatment phase during mid up-dosing, maintenance, and follow-up: (A) EI, (B) FA, (C) SDL, and (D) total score. *Represents a significant difference between follow-up and mid up-dosing. †Represents a significant difference between follow-up and mid up-dosing and maintenance.

many challenges having to do with anxiety, fear of allergic reactions, food aversion, and parent-child confrontations revolving around the consumption of the daily dose. We previously showed that a subgroup of patients experienced a significant deterioration in QOL during these first months of OIT.²⁷ Here we show that patients whose QOL deteriorated during the first few months of OIT experienced improvement as they reached maintenance, ending OIT with QOL scores similar to the scores at the start. Importantly, patients who did not experience a change in QOL between the start and the mid up-dosing, and those who improved, experienced an additional improvement. These findings suggest that as the process progresses and the risk of allergic reaction progressively decreases, general anxiety and FA are reduced and QOL is improved. This may also indicate an increase in confidence although this was not directly measured.

Finally, QOL continued to improve during the 6 months of follow-up, now demonstrating a clinically significant improvement in all domains, including the EI. This is emphasized in the increasing rate of patients who experience improved QOL increases from start to maintenance and to follow-up. This means that patients incorporate the allergenic food into their daily routine and experience decreased anxiety and social confinement. Upon reaching maintenance, many patients mistakenly perceive themselves as “cured” and are therefore disappointed to learn that they must continue to consume the daily dose for an unlimited period of time to preserve their state of desensitization. Moreover, allergic reactions, albeit mild, can be experienced even in this stage. Thus, it is important to show that patients’ QOL actually continues to improve, mainly because of the success of incorporating the food into their daily lives without the burden of allergic reactions and anxiety.

Our study is limited by the small number of patients who achieved partial desensitization or failed treatment as well as by the lack of a long-term assessment of patients’ QOL. In addition, although the control group was randomly selected, a potential selection bias could exist. Still, our OIT and control groups were comparable, and despite these limitations, our information reflects changes in QOL in a large group of patients undergoing OIT and lends support for an additional advantage of OIT, in contrast to strict avoidance, as a treatment modality.

CONCLUSIONS

This study demonstrates the beneficial effects of OIT on QOL in a large group of patients. It shows that patients with worse QOL initially, and those who are younger or have a single food allergy, benefit the most. A temporary deterioration in QOL, which later reverses, could be experienced in the early phase. Implementation of methods to help patients overcome the initial, and most challenging, phase of OIT should be sought.

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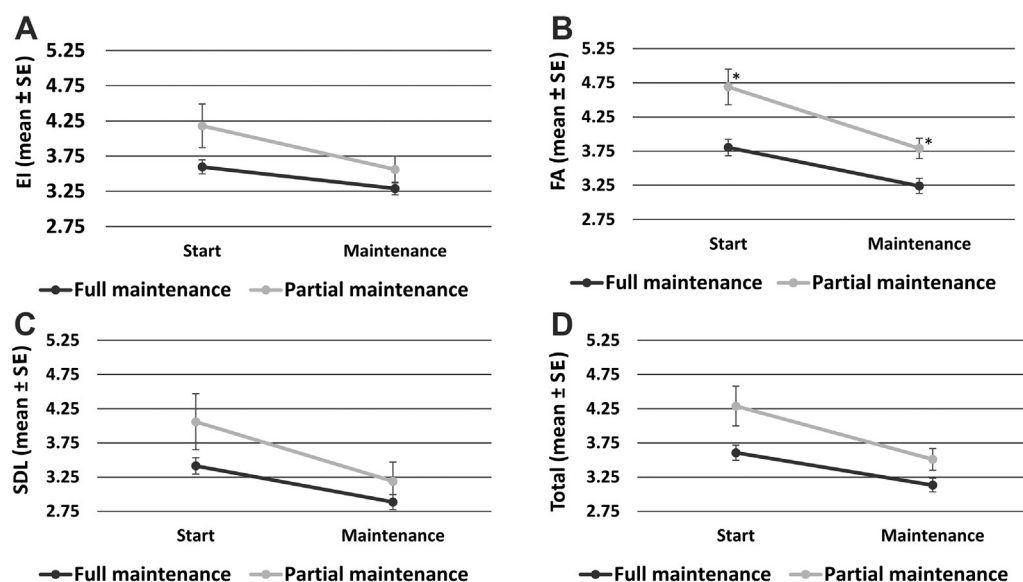


FIGURE E1. Changes in the FAQLQ-PF scores in OIT-treated patients who reached full vs partial maintenance from start to maintenance: (A) EI, (B) FA, (C) SDL, and (D) the total score. *Represents a significant difference between the 2 groups at the specified time point.

TABLE E1. The effect of variables before and during OIT on FAQLQ-PF score change from OIT start to full/partial maintenance or cessation of treatment

Variable	Group	Median (IQR) change in QOL scores from start to maintenance			
		EI	FA	SDL	Total score
Sex	Male (n = 103)	-0.2 (-0.9 to 0.4)	-0.3 (-1.3 to 0.4)	-0.4 (-1.4 to 0.2)	-0.3 (-1.1 to 0.3)
	Female (n = 72)	-0.3 (-1.4 to 0.6)	-0.6 (-1.9 to 0.4)	-0.6 (-1.4 to 0.3)	-0.6 (-1.5 to 0.3)
Food allergies	Single (n = 101)	-0.3 (-1.2 to 0.4)	-0.6 (-1.5 to 0.2)	-0.8 (-1.7 to 0.2)	-0.5 (-1.4 to 0.2)
	>1 (n = 74)	-0.1 (-0.9 to 0.6)	-0.2 (-1.3 to 0.5)	-0.3* (-1.0 to 0.8)	-0.2* (-1.0 to 0.5)
Pre-OIT anaphylaxis	No (n = 88)	-0.1 (-0.9 to 0.8)	-0.3 (-1.4 to 0.6)	-0.2 (-1.2 to 0.6)	-0.3 (-1.0 to 0.6)
	Yes (n = 87)	-0.4* (-1.3 to 0.4)	-0.7 (-1.5 to 0.3)	-0.8* (-1.7 to 0.0)	-0.5* (-1.4 to 0.1)
Pre-OIT ER	No (n = 109)	-0.1 (-0.9 to 0.8)	-0.4 (-1.4 to 0.5)	-0.3 (-1.3 to 0.3)	-0.4 (-1.0 to 0.5)
	Yes (n = 66)	-0.4 (-1.2 to 0.3)	-0.6 (-1.5 to 0.3)	-0.9 (-1.7 to 0.3)	-0.5 (-1.4 to 0.1)
Pre-OIT hospitalization	No (n = 159)	-0.2 (-1.0 to 0.5)	-0.4 (-1.4 to 0.4)	-0.4 (-1.3 to 0.3)	-0.4 (-1.1 to 0.3)
	Yes (n = 16)	-0.45 (-1.3 to 0.6)	-0.4 (-1.8 to 0.3)	-1.3 (-1.8 to -0.5)	-0.7 (-1.5 to 0.1)
Pre-OIT Adrenaline	No (n = 121)	-0.2 (-1.0 to 0.6)	0.4 (-1.5 to 0.4)	-0.3 (-1.3 to 0.3)	-0.4 (-1.1 to 0.3)
	Yes (n = 37)	-0.3 (-1.0 to 0.7)	-0.1 (-1.4 to 0.6)	-0.8 (-1.4 to 0.2)	-0.4 (-1.1 to 0.2)
Asthma	No (n = 76)	-0.2 (-1.1 to 0.7)	-0.4 (-1.4 to 0.6)	-0.7 (-1.4 to 0.6)	-0.4 (-1.4 to 0.4)
	Yes (n = 99)	-0.3 (-1.0 to 0.4)	-0.6 (-1.5 to 0.4)	-0.4 (-1.4 to 0.2)	-0.4 (-1.1 to 0.1)
Epinephrine during treatment	No (n = 145)	-0.3 (-1.1 to 0.6)	-0.4 (-1.5 to 0.4)	-0.4 (-1.4 to 0.3)	-0.4 (-1.2 to 0.4)
	Yes (n = 30)	-0.3 (-0.9 to 0.4)	-0.6 (-1.2 to 0.3)	-0.8 (-1.4 to 0)	-0.4 (-1.2 to 0.1)
Treatment type†	PTS (n = 94)	-0.2 (-1 to 0.6)	-0.3 (-1.4 to 0.4)	-0.2 (-1.3 to 0.2)	-0.3 (-1.1 to 0.3)
	ME (n = 81)	-0.3 (-1.1 to 0.4)	-0.6 (-1.5 to 0.3)	-0.8 (-1.7 to 0.5)	-0.5 (-1.4 to 0.2)
Maintenance	Full (n = 158)	-0.2 (-1 to 0.6)	-0.4 (-1.4 to 0.4)	-0.4 (-1.4 to 0.3)	-0.4 (-1.1 to 0.3)
	Partial + failed (n = 17)	-0.4 (-1.8 to 0.4)	-0.8 (-1.5 to 0.1)	-0.9 (-1.8 to 0.4)	-0.4 (-1.7 to 0.3)

ER, Emergency room; IQR, interquartile range; ME, milk or egg; PTS, peanut or tree nuts or sesame.

*Statistically significant with $P < .05$.

TABLE E2. The correlation between variables before and during OIT and between FAQLQ-PF score change from OIT start to full/partial maintenance or cessation of treatment

Variable	Group	Correlation			
		EI	FA	SDL	Total score
Age	Correlation	−0.21	−0.15	−0.09	−0.16
	<i>P</i> value	.006	.05	NS	.03
MITD (% maintenance)	Correlation	0.059	0.073	0.096	0.087
	<i>P</i> value	NS	NS	NS	NS
Reactions during OIT	Correlation	0.017	0.082	0.05	0.06
	<i>P</i> value	NS	NS	NS	NS
Treatments during OIT	Correlation	−0.09	0.06	−0.05	0.03
	<i>P</i> value	NS	NS	NS	NS
Epinephrine during treatment	Correlation	0.16	0.04	−0.04	−0.01
	<i>P</i> value	NS	NS	NS	NS
Treatment duration	Correlation	−0.06	−0.07	−0.16	−0.10
	<i>P</i> value	NS	NS	NS	NS
Baseline EI	Correlation	−0.59	−0.45	−0.48	−0.56
	<i>P</i> value	<.001	<.001	<.001	<.001
Baseline FA	Correlation	−0.46	−0.57	−0.43	−0.54
	<i>P</i> value	<.001	<.001	<.001	<.001
Baseline SDL	Correlation	−0.39	−0.36	−0.59	−0.49
	<i>P</i> value	<.001	<.001	<.001	<.001
Baseline total score	Correlation	−0.52	−0.5	−0.54	−0.58
	<i>P</i> value	<.001	<.001	<.001	<.001

MITD, Maximal individualized tolerated dose; NS, not significant.

TABLE E3. Linear regression analysis for predictors of improved FAQLQ-PF scores from start to full maintenance (n = 158)

Variable	Group	Correlation			
		EI	FA	SDL	Total score
Age	Coefficient 95% CI	−0.14 −0.15 to −0.08	−0.07 −0.13 to 0.04	−0.14 −0.18 to −0.014	−0.13 −0.015 to −0.003
	<i>P</i> value	.029	NS	.021	.042
Single food allergy	Coefficient 95% CI	0.22 0.26 to 0.93	0.2 0.24 to 1.0	0.26 0.43 to 1.2	0.25 0.35 to 1.0
	<i>P</i> value	.001	.002	<.001	<.001
Baseline corresponding QOL domain	Coefficient 95% CI	−0.61 −0.76 to −0.5	−0.62 −0.75 to −0.49	−0.6 −0.74 to −0.48	−0.61 −0.75 to −0.49
	<i>P</i> value	<.001	<.001	<.001	<.001