

# Quality of Life among Caregivers and Growth in Children with Parent-reported Food Allergy

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## Abstract

**Background:** Some caregivers who believe their children have food allergy avoid feeding certain foods to their children without proper allergy tests. Such actions made without a proper diagnosis can negatively impact the child's health and impose an unnecessary burden on the caregivers.

**Objective:** This study aimed to evaluate the caregiver quality of life (QoL) and growth in children with a parent-reported food allergy.

**Methods:** An observational cross-sectional study was performed in 200 children younger than five years who had a parent-reported food allergy. The caregivers' QoL was evaluated by two questionnaires: the Food Allergy Quality of Life -Parental Burden and the Scale of Psychosocial Factors in Food Allergy. Growth of the children was evaluated by their weight-for-age and length/height-for-age percentiles.

**Results:** Among the caregivers, 50% expressed worry that their children might be allergic to some foods and 30% were concerned about leaving their children in the care of others. According to the QoL scores, caregivers whose children underwent an oral food challenge (OFC) test were significantly less stressed, while caregivers whose children had multiple food allergies and had experienced at least one anaphylactic reaction were significantly more stressed. The distributions of both weight-for-age and length/height-for-age percentiles were 50<sup>th</sup> comparable to the general population.

**Conclusions:** Parent-reported food allergy could put caregivers under high stress, but the OFC test could reduce stress among anxious, over-parenting caregivers. Parent-reported food allergy had no impact on a child's growth in our study.

**Keywords:** food allergy, quality of life, parent, stress, growth

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## Introduction

The prevalence of food allergies in children has been rising in recent decades.<sup>1</sup> Approximately 26 to 34% of children have a parent-reported food allergy, while true food allergy ranges from only 3% to 5% depending on the method and the population of the study.<sup>2-4</sup> Therapeutic elimination diets have been shown to result in the remission of symptoms and are the mainstay treatment of food allergy. The medical profession uses the clinical history and proper allergic testing of serum food specific immunoglobulin E (sIgE), skin prick tests (SPT) or oral food challenge tests to diagnose and to prescribe an elimination diet for children with a possible food allergy. However, these diagnostic tests are available only at a tertiary care center.

Because of concerns that foods contribute to allergic reactions, many caregivers avoid feeding certain foods to their children without consulting a physician. These concerns have led to a growing number of patients with over-diagnosis and unnecessary elimination diets. In these cases, the children and their caregivers are inevitably affected by a large number of tasks of daily living, including preparing extra meals, extra time spent shopping, careful label reading and limited participation in social activities involving food.<sup>5</sup> Accidental exposure may compromise the health of an individual and may have a tragic outcome. Furthermore, the first five years of life are critical to a child's growth. Food allergies in children usually involve cow's milk, egg, wheat, soy or shellfish, which are rich in essential

nutrients.<sup>6,7</sup> Therefore, children might be at risk of developing growth impairment and impose a large burden on the quality of life (QoL) of caregivers.<sup>5,8-10</sup>

Previous studies have gathered data on health-related QoL in children with food allergies and their caregivers among western populations.<sup>5,10</sup> However, these issues have not been studied sufficiently in Asian caregivers and children. In this study, we hypothesized that parent-reported food allergies without a proper diagnosis can result in higher stress levels for the caregivers and might deter the child's growth. Thus, we aimed to determine the effect of parent-reported food allergies with elimination diets on the QoL of the caregivers and the growth of their children.

## Methods

An observational cross-sectional study was performed in 200 children less than five years of age who had a parent-reported food allergy and undertook elimination diets at the Pediatric Allergy Clinic at Songklanagarind Hospital in Thailand. Data were collected between December 2013 and March 2015. Written informed consent was obtained. Children with chronic illnesses such as malabsorption, heart disease or chronic lung disease were excluded from the study.

Patient information included demographic data, clinical presentation, duration of symptoms, anthropometric data at the first visit and the duration of the elimination diet, as well as the follow-up duration at the Pediatric Allergy Clinic.

The caregivers' QoL was evaluated by two validated questionnaires: the Food Allergy Quality of Life-Parental Burden (FAQL-PB) and the Scale of Psychosocial Factors in Food Allergy (SPS-FA).<sup>11-13</sup> Each of the questions was assessed using a 0-10 cm visual analogue scale. The parents were asked to indicate his or her quality of life on a line, ranging from 0 (no complaint) to 10 (worst complaint). All of the questionnaires were involved in a forward and backward translation step by professional and approved translators. After review of the questionnaires, pilot testing was performed in 20 caregivers who were similar to the study population. The final version of the survey was proofread. The parents of eligible participants who visited the Pediatric Allergy Clinic were requested to complete the survey and return it during the visit.

The growth of the children from the first visit to the Pediatric Allergy Clinic was evaluated by their weight-for-age and length/height-for-age percentiles. Growth deficit was defined when the weight-for-age and length/height-for-age percentiles were below -2.0 standard deviations.<sup>14</sup>

Epidata version 3.1 was used for data entry. The statistical analysis was performed using R studio software. Demographic parameters, allergy history and symptom prevalence were calculated as proportions. Descriptive statistics (median and interquartile ranges-IQR) were used to describe the QoL of the caregivers. The Wilcoxon rank-sum test was used to analyze the significance of the association between variables related to parental perceptions or growth parameters and the differing outcomes. When the P value was <0.05, differences were considered statistically significant. The study was approved by the Human Research Ethics Committee (HREC) at the Faculty of Medicine, Prince of Songkla University, Thailand.

## Results

The demographic data of children with parent-reported food allergy are presented in **Table 1**. The study population had a slight male predominance. The mean age of the children was 21 months. Concomitant atopic diseases included asthma (7.5%), allergic rhinitis (5.6%) and drug allergy (5.6%). Eighty-eight percent of the parent-reported food allergy caregivers had a household income in the range of 25,000 to 49,999 Thai Baht. The median duration of food avoidance and duration since the first visit in the Pediatric Allergic Clinic were 10 and 3 months, respectively.

**Table 1. Demographic data of subjects with parent-reported food allergy**

Baseline characteristics	N (%)
Sex	
- Male	120 (60)
- Female	80 (40)
Age (months)	20.92 (16, 26)*
Underlying disease	
- Asthma	15 (7.5)
- Allergic rhinitis	11 (5.6)
- Drug allergy	11 (5.6)
Household income (Baht)	
- < 25,000	48 (24)
- 25,000 - 49,999	88 (44)
- 50,000 - 74,999	48 (24)
- > 75,000	16 (8)
Duration of food avoidance (months)	10 (5, 22)*
Duration since the first visit in the Pediatric Allergy Clinic (months)	3 (1, 7)*
Distribution of reported food allergens	
- Single food	139 (69.5)
- cow's milk	118 (59)
- egg	9 (4.5)
- wheat	8 (4)
- shrimp	2 (1)
- fish	2 (1)
- Multiple food†	61 (30.5)
- 2 allergens	42 (21)
- 3 allergens	12 (6)
- 4 allergens	6 (3)
- 7 allergens	1 (0.5)
Diagnosis of food allergy	
- Having a food allergy	130 (65)
- oral food challenge confirmed diagnosis	20 (10)
- a convincing history plus a positive food-sIgE or SPT	45 (22.5)
- a clinical history of reproducible symptom on repeated exposure plus elimination diet	65 (32.5)
- Not considered food allergy	66 (33)
- Loss to follow up	4 (2)

\*median (IQR)

†cow's milk, egg, soya bean, wheat, fish, shrimp, squid

Sixty-nine percent of the children were reported as being allergic to one food and the others to more than two foods. Cow's milk was the most common single food allergy, accounting for 59% of participants. Less common items were

**Table 2. The clinical manifestations of reported food reactions**

	Percentage of children with reported food reactions										
	Eczema	Urticaria	Angioedema	Nasal congestion	Rhinorrhea	Hypersecretion	Wheezing	Vomiting	Diarrhea	Mucous bloody stool	Anaphylaxis
Single food allergen											
- Cow's milk	62	14	3	6	15.5	23.5	10	9	13.5	16	0
- Egg	0.5	2	1	0	1	0	0	2	1	0	0
- Wheat	2	3.5	1.5	0	0	0	0.5	0.5	0	0	1.5
- Shrimp	0	1.5	0.5	0	0	0	0.5	0.5	0	0	0.5
- Fish	1	0	1	0	1	0	1	0	0	0	0
Multiple food allergens†	28	14	3	2	2	2	4	5	0.5	2	2

† > 2 of the followings; cow's milk, egg, soya bean, wheat, fish, shrimp, squid

egg (4.5%), wheat (4%), shrimp and fish (1%) and the most common multiple food allergies were reported as two allergens (21%), three allergens (6%) and four allergens (3%).

#### Clinical manifestations of reported food reactions

Symptoms associated with reported food allergy were predominantly cutaneous manifestation (eczema and urticaria), whereas respiratory manifestations were less common (rhinorrhea, hypersecretion). Gastrointestinal symptoms were the third most common (diarrhea, mucous bloody stool) (Table 2).

#### Effect on quality of life

Among the caregivers, 50% expressed worry that their children might be allergic to some foods and 30% were concerned about leaving their children in the care of others. The mean question score for the caregivers whose children had multiple food allergies compared with those with single food allergy revealed a significantly greater effect on a caregiver's sleep time ( $P = 0.031$ ), caregiver's mood ( $P = 0.032$ ) and greater irritability ( $P = 0.015$ ). Interestingly, caregivers in the multiple food allergy group were significantly stressed by frustration over the lack of appreciation of other people for the seriousness of the food allergy ( $P = 0.049$ ), and were stressed about leaving their children in the care of others ( $P = 0.037$ ) (Table 3).

The parental perceptions to the questions related to the comparison of undergoing oral food challenge and never undergoing oral food challenge are shown in Table 4. The group that underwent a food challenge reported feeling significantly less troubled by sadness regarding the food allergy burden their child carried ( $P = 0.016$ ), less worried that they were unable to help their child's food allergic reaction ( $P = 0.032$ ) and less frightened by the thought their child would have a food allergic reaction ( $P = 0.009$ ). However, the other parameters were not different.

Responses of parents whose child had an anaphylactic reaction were statistically significantly affected more than those who had no anaphylactic reaction in seven parameters: spending extra time on preparing meals ( $P = 0.024$ ), special precautions before leaving the home ( $P = 0.003$ ), anxiety related

**Table 3. Parental perceptions in children who had single and multiple food allergies**

Quality of life	Single median (IQR)	Multiple median (IQR)	P value
Greater irritability	2 (0, 5)	3 (1, 6)	0.015
Affect sleep time	2 (0, 5)	4 (1, 7)	0.031
Affect caregiver mood	4 (2, 8)	6 (3, 8)	0.032
Lack of appreciation	0 (0, 4)	2 (0, 6)	0.037
In care of others	3 (0, 6)	4 (1, 8)	0.049

**Table 4. Parental perceptions in children who had oral food challenge and those who did not**

Quality of life	Non OFC* Median (IQR)	OFC* Median (IQR)	P value
Frightened by thought child will have food allergic reaction	6 (3, 9)	4 (1, 6)	0.009
Sadness regarding food allergy burden your child carries	3 (0, 7)	1 (0, 4.2)	0.016
Not able to help child's food allergic reaction	2 (0, 5)	1 (0, 4)	0.032

\*OFC, oral food challenge test

to the child's food allergy ( $P = 0.033$ ), sadness regarding the food allergy burden their child carried ( $P = 0.007$ ), limitations in attending group activities that involved food ( $P = 0.013$ ), worry about their inability to deal with their child's food allergic reaction ( $P = 0.017$ ) and being frightened by the thought that their child would have a food allergic reaction ( $P = 0.013$ ) (Table 5).

Considering the duration of food avoidance, the responses of the parents whose child had been avoiding a particular food for longer than 12 months were statistically significantly affected more than the group with food avoidance duration less than 12

**Table 5. Parental perceptions in children who had anaphylaxis and those who did not**

Quality of life	Anaphylaxis median (IQR)	Non anaphylaxis median (IQR)	P value
Extra time preparing meal	6 (5, 8)	3 (1, 5)	0.024
Precaution before going out home	8 (6.5, 10)	3 (0, 6)	0.003
Anxiety to child food allergy	6.5 (3, 8.5)	3 (0, 7)	0.033
Sadness to food allergy	6.5 (5, 10)	3 (0, 6)	0.007
Attend group activity	4 (2, 6.5)	0 (0, 3)	0.013
Not able to help	5 (4, 6)	2 (0, 5)	0.017
Frightened child food allergic reaction	9 (7, 10)	5 (2, 8)	0.013

months in three parameters: worry that food allergy will affect the development of their child’s physical activity (P = 0.038), limitations in choosing a restaurant (P = 0.017) and limitations in attending group activities that involved food (P = 0.005).

**Diagnosis of reported food allergy**

Of the 200 patients with parent-reported food allergy, 130 (65%) were diagnosed as having a food allergy. Twenty children (10%) were confirmed to have food allergy by a positive oral food challenge, while 45 children (22.5%) were diagnosed with a food allergy by a convincing clinical history of immediate-onset reaction plus evidence of specific food sensitization (positive food specific IgE or SPT). Sixty-five patients (32.5%) were diagnosed with a food allergy by a pediatric allergist based on a clinical history of reproducible symptom on repeated exposure *plus* symptom improvement with an elimination diet. Sixty-six children (33%) showed no clinically related symptoms to foods and were classified as food tolerant. The remaining four (2%) were lost to follow-up (Table 1).

**Effect on growth**

The distributions of both weight-for-age and length/height-for-age percentiles of the children’s growth were normal in the 50<sup>th</sup> percentile range, showing no significant differences from the general population. A comparison of the single and multiple food allergies groups did not show any statistically significant effects on weight-for-age and height for age (P = 0.38 and 0.24, respectively). In addition, there were no significant differences in weight-for-age and height-for-age between the cow’s milk and non-cow’s milk allergy groups (P = 0.22 and 0.94, respectively).

**Discussion**

There are published studies concerning the impact of food allergy on QoL. In those studies, the populations were the caregivers of children less than 18 years of age with food allergies in the United States.<sup>5,10</sup> They showed that the food allergies of the children had a significant impact on the

perception of health, parent emotions and the activities of the family. Our study confirms these findings in families of children in an Asian country with a different culture, eating behavior and types of food.

Kemp et al. studied the caregivers of children with egg sensitization attending a tertiary pediatric clinic in Australia. They reported that suspected food allergies could put caregivers under high stress, but the oral food challenge test could reduce stress among anxious and over-parenting caregivers.<sup>15</sup> A similar study by Van der Velde et al. supported these findings.<sup>16</sup> Our study compared the perceptions of caregivers whose children were challenged with those whose children had not undergone a food challenge. The parental perceptions were significantly better in the oral food challenged group. The reason is that parental burdens were related to the suspicion of a diagnosis and potential consequences, and these burdens were relieved after several children were tested for a food allergy after the oral food challenge test. Suspicions and anxiety were typical of caregivers with self-reported food allergies.<sup>17</sup> For many families of food allergic children, the main concerns were uncertainty and lack of information, rather than a fear of the challenge procedure.<sup>18</sup>

The findings of our study also suggest that parents of children who had multiple food allergies or a history of an anaphylaxis episode reported a greater impact on QoL and a socio-emotional effect. Similar results were shown by Sicherer et al. and Cohen et al.<sup>10-11</sup> It makes sense that caregivers and their children are confronted with the potential burden and several daily challenges.

In our study, cutaneous and respiratory symptoms were more common. In contrast, Vieira et al. suggested that there was a predominance of gastrointestinal manifestation in patients within the first two years of life.<sup>9</sup> The differences in the predominant clinical manifestations in this study were probably because our data were derived from parent-reported symptoms. Thirty-three percent of these children did not have a food allergy.

Previous studies have demonstrated that children with symptoms suggestive of cow’s milk allergy had a lower weight-for-age or height-for-age than the healthy group.<sup>9,19</sup> Similarly, Christie et al. found that children with multiple food allergies had a lower height-for-age than children with a single food allergy.<sup>8</sup> In contrast to our study, parent-reported food allergies did not result in diets that deterred the children’s growth. A similar study by Berry et al. also supports our findings.<sup>20</sup> This is probably due to the fact that our study populations were followed up by pediatric allergists. When a deficit of nutritional intake was detected, the substituted nutrients or appropriate alternatives were supplemented in good time.

Food allergies can have an important impact in several ways; therefore, in children with reported food allergies, an evaluation by a physician, including allergy testing to confirm or exclude the diagnosis is necessary. The oral food challenge test can reduce parental stress and anxiety. The parental burdens were less for those whose children had undergone an oral food challenge than for those whose children had not been challenged. Parent-reported food allergies had no impact on child growth in our study. However, close monitoring of growth

and the assessment of adequate nutrient intake should be performed in children with food allergies.

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