



## Research Article

## The Effect of Education Given to Children with Functional Constipation and Fecal Incontinence and Their Mothers on Anxiety and Constipation Management

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**Cite this article as:** Yıldırım, A., Biçer, Ş., Hacıhasanoğlu-Aşıl, R., Özdamar, M. Y., Şahin, H., Gül, V. (2020). The Effect of Education Given to Children with Functional Constipation and Fecal Incontinence and Their Mothers on Anxiety and Constipation Management. *Florence Nightingale Journal of Nursing*, 28(3), 321-332.

### Abstract

**AIM:** This study aimed to determine the effect of multidimensional training program on children with constipation and fecal incontinence and their mothers on anxiety and their constipation management.

**METHOD:** The study had an experimental design with a pretest-posttest control group. The intervention group consisted of children diagnosed with functional constipation (n=20) and fecal incontinence (n=21) and their mothers in the Pediatric Surgery Clinic. The control group consisted of healthy (n=20) children who applied to two different Family Health Centers for any reason. Data were collected between February 2016 and June 2017 using a descriptive questionnaire, a nutrient consumption frequency form, the Rome III diagnostic criteria form, and the Trait Anxiety Scale for Children.

**RESULTS:** After the training program, the mean score of the Trait Anxiety Scale for Children decreased in both intervention groups (p<0.01) and increased in the control group (p<0.05). In addition, the frequency of the consumption of milk, caffeinated drinks, and white bread was reduced in the children of both intervention groups after the training program. The consumption of dried legumes, vegetables, and whole wheat bread increased. According to the Rome III diagnostic criteria, it was determined that constipation symptoms were not observed in 50% of the children.

**CONCLUSION:** The training program had a significant influence on the prevention and management of constipation and anxiety. Given that constipation is associated with both physical and mental health outcomes, the approach for the treatment should be holistic in nature, involving a multidisciplinary team.

**Keywords:** Child, constipation management, fecal incontinence, functional constipation, health professionals

### Introduction

Constipation affects 1%–30% of children worldwide and is rated as one of the most common chronic disorders in childhood. It accounts for 3% of the visits to pediatric clinics and 10%–25% of visits to pediatric gastroenterology (Nurko & Zimmerman, 2014). Pediatric constipation places a substantial financial burden on the healthcare system, and it often per-

sists into adulthood, translating into poor quality of life for affected individuals (Tabbers et al., 2014).

Constipation in childhood has a multifactorial origin, and there is no apparent organic cause in 90%–95% of patients (Kasirga, 2007; Nurko & Zimmerman, 2014). When left untreated, constipation in childhood can result in fecal retention (FR) and fecal incontinence (FI) (Van Dijk et al., 2015), and more than one-third

of affected children may experience behavioral problems owing to constipation (Xinias & Mavroudi, 2015). Functional constipation (FC) develops most commonly because of painful bowel movements that lead to voluntary FR (Van Dijk et al., 2015). These children usually develop a dislike for passing stool and retain their stool voluntarily. Familial, cultural, and social factors play a great role in this attitude of children (Nurko & Zimmerman, 2014; Van Dijk et al., 2015). Insufficient and inappropriate toilet training, dietary changes, stress, illness, toilet dislike, postponing toilet need owing to preoccupation with games or assignments or concerns about hygiene may all lead to constipation (Memeşa et al., 2004). In a study conducted in China with 2,318 primary school students diagnosed with constipation according to the Rome III criteria, constipation was found to be associated with not spending time with parents at home, not going to the toilet at school, spending too much time doing homework, insufficient sleep, insufficient fiber intake, and frequent consumption of fast food (Tam et al., 2012).

Family relationships and personality of the parents are also reported to have a role in the occurrence and continuation of FC and FI. Mothers of children with constipation have been reported to be dominant, prim, and proper characteristics that induce a resistant reaction in the child (Van Dijk et al., 2015). A study was conducted in Iran to identify personal traits of the mothers of children with FC and to compare them with those of the mothers of children without FI. It was found that the mothers of children with FC had lower levels of neuroticism and higher levels of extraversion, scrupulosity/sincerity, and sympathetic/pleasant disposition. Scrupulosity was found to be the dominant feature of personality in both groups. It was also shown that the child could respond to the mother's prim, dominant, strict, and meticulous behavior with resistant and retentive behavior, and the mother's personality was a factor directly affecting toilet behavior resulting in FC (Farnam et al., 2009). In a study conducted in the Netherlands with 133 children and their parents to investigate the relationship between the child-raising attitudes of parents and FC symptoms, it was found that the child-raising attitudes of parents were correlated with the frequency of defecation and FI. Accordingly, it was shown that low and high scores from the Autonomy Attitude Scale were correlated with low defecation frequency and increased FI, and the excessive protection and self-pity attitude scale scores with increased FI. The above-mentioned correlations were found to be

stronger in the group of children aged 6 years and above (Van Dijk et al., 2015).

FC adversely affects physical and mental health also in adults, and FI has serious psychosocial consequences in children whose growth and development is in progress. Children with FI exhibit stances characterized with social competence, success at school, attention problems, depression, anxiety, and low self-esteem as well as aggression and destructive and introversive behaviors (Kovacic et al., 2015). In a study conducted in Turkey with 146 children diagnosed with FC and their mothers, the children were found to have, during defecation, emotional problems such as fear and anxiety, and behavioral problems such as nail-biting, thumb-sucking, twitches, and stuttering (Savaşer et al., 2011).

The treatment of chronic FC is conservative and is successful in almost all cases (Gfroerer & Rolle, 2015). The main components of the treatment are toilet training, diet, and careful use of laxatives (Gfroerer & Rolle, 2015; Özkan, 2007). Constipation is a problem associated with its physical and mental health outcomes. Therefore, the treatment of constipation should involve a multidisciplinary team understanding and holistic approach. Nurses in the team play an important role in the treatment of constipation by providing parental education, behavioral interventions, healthy eating suggestions, and drug use and follow-up assistance.

This research was conducted to determine the effect of training given to children with FC and FI and their mothers on the management of constipation.

### Study Hypotheses

The hypotheses were as follows:

1. A multidimensional training program administered to children with FC will alleviate continuous anxiety.
2. A multidimensional training program administered to children with FC and FI will alleviate continuous anxiety.
3. A multidimensional training program administered to children with FC will be effective in the management of constipation.
4. A multidimensional training program administered to children with FC and FI will be effective in the management of constipation.

## Method

### Study design

The study had an experimental design involving pre-test-posttest and a control group.

### Sample

The study was carried out with children aged between 9 and 17 years who were diagnosed with FC (n=20) and FC plus FI (n=21) based on the Rome III diagnostic criteria in the pediatric surgery outpatient clinic of a university training and research hospital in the Eastern Anatolia Region and their mothers, and healthy children not diagnosed with FC or FC plus FI (n=20) who presented in two Family Health Centers in the city center for any reason. The study was carried out between February 2016 and June 2017 with a total of 61 children and 41 mothers who met the inclusion criteria. A post hoc analysis was performed to test the adequacy of the sample size. The power analysis showed that the study had an effect size of 0.974 and a power of 0.99 at a significance level of 0.05 and 95% confidence interval. These values indicated that the sample size was sufficient (Çapık, 2014).

### Inclusion Criteria

**The inclusion criteria for children in the intervention group** were as follows: having FC based on complaints, anamnesis, and physical examination (abdominal and rectal) according to the Rome III diagnostic criteria at the pediatric surgery outpatient clinic, age between 9 and 17 years, and volunteering to take part in the study.

**The inclusion criteria for children in the control group** were as follows: having presented to the Family Health Center for some reason, having no FC or FC plus FI, age between 9 and 17 years, and volunteering to take part in the study.

**The inclusion criteria for mothers** were as follows: age between 18 and 60 years and volunteering to take part in the study.

### Exclusion Criteria

**The exclusion criteria for children in the intervention group** were as follows: a history of structural anomaly, metabolic and gastrointestinal disease, anal fissure, Hirschsprung's disease, anal or colorectal operation, other reasons such as a diagnosis of developmental retardation, use of drugs causing constipation, orthopedic problems, intolerance to cow's milk as well as FI and FR not associated with

chronic constipation, and the presence of a serious mental disorder, a physical (hearing, speaking disorders) or neurological disorder, and mental disability.

**The exclusion criteria for children in the control group** were as follows: having FC or FC plus FI and meeting the exclusion criteria mentioned for the children in the intervention group.

Children with serious mental and neurological disorders or mental disability and their mothers were assessed by a psychiatry specialist in the study team and were not included in the study.

### Data Collection

The study data were collected using a Descriptive Questionnaire, Nutrient Consumption Frequency Form, Rome III Diagnostic Criteria form, and Trait Anxiety Scale for Children (CASC).

### The Descriptive Questionnaire

The Descriptive Questionnaire consisted of 12 questions about age, gender, problems at school, aggressiveness/disobedience, method used in toilet training, mother's education status, perceived income, constipation complaints in family members, presence of enuresis, type of toilet, age at the onset of toilet training, and age at the onset of constipation complaints.

### The Nutrient Consumption Frequency Form

The Nutrient Consumption Frequency Form questions the frequencies of consuming the four basic nutrient groups necessary for individuals to have a sufficient and balanced nutrition, namely milk and dairy products, meat, eggs, legumes, vegetables and fruits as well as some foods in the grains group, sugar, fats, snacks and beverages. The frequencies provided in the form were as follows: every day, 1–2 times a week, 3–4 times a week, once in 15 days, once in a month, and never. This form was administered separately to the mothers and the children.

### The Rome III Diagnostic Criteria Form

The form was issued in 2006 as the Pediatric Rome III criteria to define functional gastrointestinal diseases. The Rome III criteria take into consideration a variety of aspects in the diagnosis of childhood constipation and are widely accepted across the world (Gfroerer & Rolle, 2015; Nurko & Zimmerman, 2014).

### Trait Anxiety Scale for Children (TASC)

Scale developed by Spielberg (1973), was tested for validity and reliability in Turkish by Özusta (1995). It

aims at measuring persistent personal differences in tendency to anxiety. It consists of 20 items exploring how a child feels. One of the options, "almost never," "sometimes," and "often," is selected depending on the frequency of the situation. A score between 20 and 60 can be obtained from this scale. Higher scores indicate higher levels of anxiety. The Cronbach alpha coefficient of the scale was found to be 0.81 in the initial assessment (Özusta, 1995) and 0.84 in this study.

After the children and their mothers were informed about the purpose, method, and content of the study, the pretests were administered. Then, a training conducted in four sessions held every other week, each lasting 40–50 min was given together with a training booklet to the children with FC and the children with FC plus FI and their mothers by a psychiatric nurse and a dietitian covering the subjects' healthy eating for constipation prevention and treatment, behavior changing, communication skills, problem-solving skills, coping with stress, improving self-confidence, and anger management. The contents were presented slowly, in a concise and easily understood language, and in an interactive way with plenty of repetitions.

The sessions covered the etiology, symptoms, and management of constipation and incontinence. It was emphasized that incontinence was involuntary, not a deliberate resistance, and the mothers were encouraged to support and sustain a positive attitude in the treatment process. The importance of long-term symptom improvement was highlighted, and the children and their mothers were urged to comply with the treatment plan (i.e., behavioral changes, diet, medication). In the first session, the underlying psychosocial problems were dealt with (e.g., shame, guilt, hopelessness, pressure to use a single-family toilet). Clear and simple messages were given during the sessions. Issues such as children postponing going to the toilet at school and questioning toilets in terms of cleanness were also discussed (Afzal et al., 2011; Madani et al., 2016).

Regarding behavioral changes, benefits of the child's sitting in the toilet for 5–10 min 3–4 times daily (depending on the age) and keeping a diary of defecations by the child and parent were explained (Kasirga, 2007). Moreover, information was provided about the importance of having a footstool on which children can support their legs to effectively increase intraabdominal pressure (Rowan-Legg et al., 2011) or sitting on a toilet with a foot support to enhance hip flexion (Hamadi, 2005), and praising and rewarding the child for sitting

on the toilet and passing stool (Rowan-Legg et al., 2011). It was pointed out that children with constipation and FI have no control over their bowel movements, for this reason they should not be punished for their incontinence and that they may experience anger, anxiety, depression, and introversion for being irritated and humiliated, which in turn can negatively affect their success at school. It was also discussed that older children should be encouraged to take responsibility for their own actions, children respond well to a carefully planned, consistent reward system promoting favorable behaviors; therefore, mothers can develop behavioral changes or reward systems urging their children to adopt proper toilet habits (North American Society for Pediatric Gastroenterology, Hepatology and Nutrition, 2019).

Regarding diet as part of constipation treatment, it was explained that a balanced diet including whole grains, fruits, and vegetables is important (carbohydrates found in dried plums, pears, and apple juices and particularly sorbitol could cause an increase in the frequency of defecations and the liquid content of feces; fiber intake less than the minimum amount recommended is a risk factor for chronic constipation in children, and the daily fiber consumption should be "age + 5" grams); excessive milk intake could aggravate constipation; and adequate intake of liquid during the day was important (National Institute of Diabetes and Digestive and Kidney Diseases, 2019; Rowan-Legg et al., 2011).

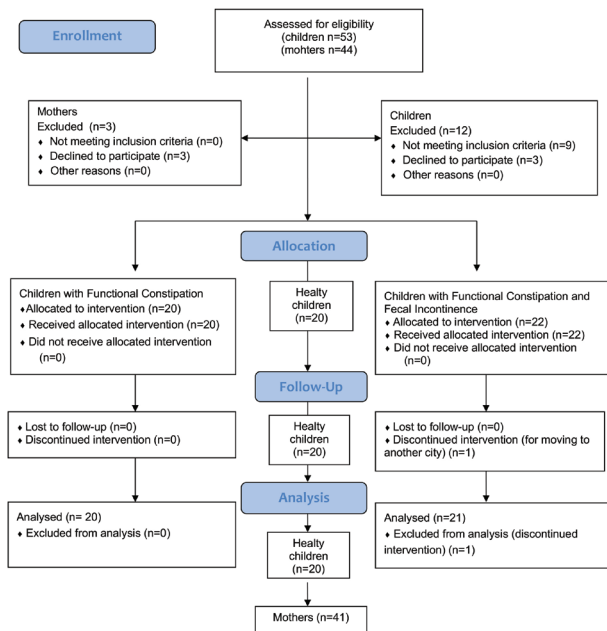
The sessions of the training program were held at the multipurpose training hall of Erzincan University Mengücekgazi Training and Research Hospital. The sessions included children of different age groups (9–10 years, 11–12 years, 13–14 years, and 15–17 years) and mothers in four groups of 10–11 persons in one group. The children and their mothers were given phone numbers, reachable at any time, of the psychiatric nurse and the dietitian; they were reminded of the session times by phone and their questions on the subjects they needed more information were answered. The study plan is shown in research plan chart 1.

### Statistical Analysis

Numbers, percentages, maximum and minimum values, and means and standard deviations were used for analyzing the data. The data were checked for a normal distribution using the Shapiro-Wilk and Kolmogorov-Smirnov tests. Because the data did not have a normal distribution, nonparametric tests were used. The Wilcoxon *T* test was used to compare the mean TASC

pretest scores with the posttest scores individually in the intervention and control groups, the Kruskal-Wallis variance analysis was used to compare the mean TASC pretest-posttest scores of the intervention group with those of the control group, the McNemar test was used to compare the food consumption frequencies

of the intervention and control group children, and the Mann-Whitney *U* test used to further analyze the origins of the differences. The statistical analyses were carried out using the SPSS (Statistical Package for the Social Sciences) package program version 20.0, and the level of  $p < 0.05$  was considered significant.



**Figure 1**  
Flow Diagram (TREND Statement)

**Table 1**

Distribution of Descriptive Features of Intervention and Control Group Children and Mothers (n=61)

Descriptive features	FC		FC and FC and FI		Control	
	n=20	%	n=21	%	n=20	%
Age, years						
9–11	12	60	14	66.7	4	20
12–14	3	15	6	28.6	10	50
15–17	5	25	1	4.8	6	30
Gender						
Female	8	40	6	28.6	12	60
Male	12	60	15	71.4	8	40
Problems with school						
No	11	55	10	47.6	10	50
Attention problem	5	25	6	28.6	4	20
Reading problem	4	20	1	4.8	3	15
Writing problem	0	0	1	4.8	0	0
Arithmetic problem	0	0	1	4.8	2	5

**Ethical Consideration**

Written permissions were obtained from the Human Research Ethics Committee of Erzincan University (numbered 02/13 and dated 04/02/2016) and the hosting hospital. The study followed the principles of the Helsinki Declaration, and the purpose, plan, and benefits of the study were explained to the mothers and their children included in the study. It was also stated that they can leave the study any time they wish, and written consents were obtained from the mothers for themselves and their children and verbal consents from the children; those who volunteered were included in the study.

**Results**

Of the children diagnosed with FC and FC plus FI who were included in the study, respectively, 60% and 66.7% were in the 9–11 years age group, 60% and 71.4% were boys, 25% and 28.6% had attention problems at school, 40% and 71.5% had aggression, shouting, and anger attacks, 55% and

**Table 1**

*Distribution of Descriptive Features of Intervention and Control Group Children and Mothers (n=61) (Continued)*

Descriptive features	FC		FC and FC and FI		Control	
	n=20	%	n=21	%	n=20	%
Inability to express yourself	0	0	2	9.5	20	10
Aggression/rebellion						
No	10	50	6	28.6	15	75
Reneged	1	5	0	0	0	0
Aggression	1	5	3	14.3	5	25
Shout	6	30	9	42.9	0	0
Tantrum	1	5	3	14.3	0	0
Self-mutilative behavior	1	5	0	0	0	0
Using methods for toilet training						
Yes	9	45	5	23.8	5	25
No	11	55	16	76.2	15	75
Educational status of the mother						
Literate	1	5	0	0	2	10
Primary school	9	45	10	47.6	7	35
Secondary school	2	10	6	28.6	5	25
High school	3	15	1	4.8	4	20
University	5	25	4	19.0	2	10
Economic status						
Income < expenditure	3	15	3	14.3	4	20
Income = expenditure	8	40	13	61.9	6	30
Income > expenditure	9	45	5	23.8	10	50
Constipation in family members						
Yes	0	0	13	61.9	12	60
No	20	100	8	38.1	8	40
Enuresis						
Yes	2	10	6	28.6	0	0
No	18	90	15	71.4	20	100
Toilet type						
Turkish-style	8	40	9	42.9	12	60
European-style	12	60	12	57.1	8	40
The age of starting toilet training (year)	Min=1; Max: 4 Mean±SD= 1.85±0.69		Min= 1.5; Max: 3.00 Mean±SD= 2.0±0.46		Min= 1; Max: 3 Mean±SD= 2.5±0.48	
Age of onset of constipation (year)	Min= 0; Max: 12 Mean±SD= 7±3.53		Min= 0; Max: 12 Mean±SD= 4.19±3.86		-	

Note. FC: Functional constipation, FI: Fecal incontinence, SD: Standard deviation

**Table 2**

Comparison of Pretest Trait Anxiety Scale for Children Scores Averages of Children in the Intervention and Control Groups

Groups	Mean±SD	Test and P
FC	38.25±7.31	
FC and FI	37.33±6.71	$\chi^2$ KW=20.998, p<0.001
Control	29.25±4.36	

Note.  $\chi^2$ KW: Kruskal-Wallis variance analysis, SD: Standard deviation

**Table 3**

Comparison of the Pretest-Posttest Trait Anxiety Scale for Children Scores of the Intervention and Control Group Children within the Groups

Groups	Before education	After education	Test and P value
FC	38.25±7.31	31.20±7.15	Z=-3.366, p=0.001**
FC and FI	37.33±6.71	31.28±6.95	Z=-2.729, p=0.006**
Control	29.25±4.36	30.25±4.45	Z=-2.442, p=0.015*

Note. \*p<0.05; \*\*p<0.01, Z: Wilcoxon T test

**Table 4**

Comparison of Posttest Trait Anxiety Scale for Children Scores Averages of Children in the Intervention and Control Groups

Groups	Mean±SD	Test and P value
FC	31.20±7.15	
FC and FI	31.28±6.95	$\chi^2$ KW=0.002, p=0.999
Control	30.25±4.45	

Note.  $\chi^2$ KW: Kruskal-Wallis variance analysis; SD: Standard deviation

76.2% had toilet training without following a certain method, the mothers of 45% and 47.6% were graduates of primary school, 40% and 61.9% perceived their income equal to their expenses, 0% and 61.9% had family members complaining about constipation, 10% and 28.6% wetted themselves, and 60% and 7.1% used western-type toilets. The age at the onset of toilet training in children diagnosed with FC and FC plus FI was 1.85±0.69 and 2.09±0.46 years, respectively; and the age at the onset of constipation was 7±3.53 and 4.19±3.86 years, respectively (Table 1).

The difference between the mean TASC scores of both intervention groups and the control group be-

fore the training was found to be significant and further analysis (Mann-Whitney U test) showed that the difference originated from the control group (p<0.001; Table 2).

After the training program, the mean TASC score decreased significantly in the FC (p<0.001) and FC plus FI (p<0.01) groups, whereas it increased in the control group (Table 3).

The mean posttest TASC score did not differ significantly between the intervention and control groups (p>0.05; Table 4).

The frequency of consumption of milk, caffeine-containing drink, and white bread significantly decreased, and the frequency of consumption of legumes, vegetables, and whole wheat bread increased in the children diagnosed with FC after the training program. Before the training, 75% of the children diagnosed with FC had been consuming milk, 95% of these children were consuming white bread, and 60% were taking caffeine-containing drinks every day. Owing to the trainings, the high rate of consuming these foodstuffs was reduced to "1–2 times in a week," "3–4 times in a week," "once a month," or "never" as stated by the subjects. As a result of the trainings, 25% of the children diagnosed with FC started consuming milk once in 15 days, 15% started consuming once a month, and 10% stopped consuming milk altogether. Moreover, 25% of the children diagnosed with FC stopped consumption of caffeine-containing drinks altogether, 15% reduced it to once a month, and 30% to once in 15 days. As a result of the trainings, 5% of the children diagnosed with FC started consuming white bread once in 15 days or once a month, and 10% of them stopped consuming white bread altogether (Table 5).

The frequency of consumption of milk, caffeine-containing drink, and white bread significantly decreased; and the frequency of consumption of legumes, vegetables, and whole wheat bread increased in the children diagnosed with FC and FC plus FI after the training program. Before the training, 61.9% of the children diagnosed with FC and FC plus FI had been consuming milk, 38.1% had been taking caffeine-containing drinks, and all of them consumed white bread every day; the frequency of consuming these foodstuffs decreased after the training. As a result of the trainings, 38.1% of the children diagnosed with FC and FC plus FI

**Table 5**

Comparison of Pretest-Posttest Consumption Frequency of Some Foods in Children with FC (n=20)

	BE	AE	BE	AE	BE	AE	BE	AE	BE	AE	BE	AE	Test and significance
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	
Milk	15 (75)	1 (5)	1 (5)	10 (50)	3 (15)	0 (0)	0 (0)	5 (25)	0 (0)	2 (10)	1 (5)	2 (10)	Z=-2.786 p=0.005*
Legumes	0 (0)	1 (5)	6 (30)	13 (65)	0 (0)	0 (0)	3 (15)	6 (30)	6 (30)	0 (0)	5 (25)	0 (0)	Z=-3.156 p=0.002*
Vegetables	2 (10)	1 (5)	3 (15)	11 (55)	2 (10)	3 (15)	8 (40)	5 (25)	3 (15)	0 (0)	2 (10)	0 (0)	Z=-2.693 p=0.007*
Caffeinated beverage	12 (60)	2 (10)	3 (15)	4 (20)	1 (5)	0 (0)	0 (0)	6 (30)	1 (5)	3 (15)	3 (15)	5 (25)	Z=-2.731 p=0.006*
White bread	19 (95)	12 (60)	0 (0)	1 (5)	0 (0)	3 (15)	0 (0)	1 (5)	0 (0)	1 (5)	1 (5)	2 (10)	Z=-2.384 p=0.017**
Whole wheat bread	1 (5)	5 (25)	0 (0)	3 (15)	0 (0)	12 (60)	1 (5)	0 (0)	2 (10)	0 (0)	16 (80)	0 (0)	Z=-3.916 p<0.001

Note. AE: After education, BE: Before education, FC: Functional constipation, Z: McNemar test, \*p<0.01, \*\*p<0.05

**Table 6**

Comparison of the Pretest-Posttest Consumption Frequency of Some Foods in Children with FC and FI (n=21)

Food groups	Everyday		1-2 in a week		3-4 in a week		Once in 15 days		Once a month		Never		Test and significance p
	BE	AE	BE	AE	BE	AE	BE	AE	BE	AE	BE	AE	
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	
Milk	13 (61.9)	0 (0)	3 (14.3)	5 (23.8)	1 (4.8)	0 (0)	1 (4.8)	8 (38.1)	0 (0)	2 (9.5)	3 (14.3)	6 (28.6)	Z=-3.550 p<0.001
Legumes	1 (4.8)	1 (4.8)	5 (23.8)	11 (52.4)	0 (0)	0 (0)	5 (23.8)	7 (33.3)	4 (19)	2 (9.5)	6 (28.6)	0 (0)	Z=-2.884 p=0.004*
Vegetables	0 (0)	0 (0)	5 (23.8)	15 (71.4)	0 (0)	2 (9.5)	5 (23.8)	2 (9.5)	2 (9.5)	2 (9.5)	9 (42.9)	0 (0)	Z=-3.430 p=0.001*
Caffeine	8 (38.1)	6 (28.6)	4 (19)	7 (33.3)	2 (9.5)	0 (0)	1 (4.8)	2 (9.5)	3 (14.3)	0 (0)	3 (14.3)	6 (28.6)	Z=-1.044 p=0.296
White bread	21 (100)	11 (52.4)	0 (0)	1 (4.8)	0 (0)	8 (38.1)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (4.8)	Z=-2.970 p=0.003*
Whole wheat bread	1 (4.8)	5 (23.8)	0 (0)	2 (9.5)	0 (0)	11 (52.4)	0 (0)	2 (9.5)	0 (0)	0 (0)	20 (95.2)	1 (4.8)	Z=-3.911 p<0.001

Note. \*p<0.01, AE: After education, BE: Before education, FC: Functional constipation, FI: Fecal incontinence, Z: McNemar test

started consuming milk once in 15 days, 9.5% once a month, and 28.6% stopped consuming milk altogether. As a result of the trainings, 28.6% of the children with FC plus FI stopped consumption of caffeine-containing drinks altogether and 9.5% reduced it to once in 15 days. All of the children had been consuming white bread every day before the training and 52.4% continued consuming white bread every day after the training, 38.1% reduced it to 3-4 days in a week, and 4.8% stopped consuming white bread altogether (Table 6).

The symptoms of constipation were no longer present in 50% of the children diagnosed with FC and FC plus FI according to the Rome III diagnostic criteria.

### Discussion

Constipation is a common childhood problem with physical and mental consequences. This study aimed to reveal the effect of training provided to children diagnosed with FC and FC plus FI and their mothers on anxiety and constipation. A limited number



of studies on these subjects were encountered, and the results obtained here were discussed in the light of the relevant literature.

Common constipation is a challenging issue that leads to distress in children, their families, and the health professionals (Rowan-Legg et al., 2011). Children with encopresis comprise a particularly vulnerable social group faced with social risks in terms of losing their feeling of belongingness with their peers and the society and of feeling marginalized in their community. Stigmatized by their parents, peers, neighbors, and community, these children need more tolerance, communication, and security (Olaru et al., 2016). It was found in this study that the children with FC and FC plus FI had more than moderate levels of anxiety before the training, significantly higher than that of the control group. It was found in a study conducted in Romania with 57 children aged 6–15 years who had chronic FC and encopresis that most of these children were from families living in cities that had a low socioeducational status. The children with encopresis were found to have more anxiety/depression symptoms, social problems, and destructive behaviors and less success at school. The impact of family atmosphere and socioeconomic factors on FC and encopresis symptoms was underlined (Olaru et al., 2016). In a study conducted in the Netherlands with 114 children diagnosed with FC plus FI, it was found that the frequency of FI was associated with low levels of emotional and social functioning, and 70%–80% of the children were anxious about involuntary incontinence and its social consequences (Bongers et al., 2009). Another study conducted in New Jersey, United States, revealed that children with constipation had lower health-related quality-of-life scores than healthy children, and in children with inflammatory bowel and gastroesophageal reflux diseases, such low quality-of-life scores reported by children could be a reflection of concomitant abdominal pain and painful defecation, and the reason the parents of children with constipation had lower perceived quality of life than their children was associated with the duration of constipation symptoms and family experiences (Youssef et al., 2005). Another prospective, multicenter (in five large regional academic medical centers) study carried out with 410 children found that children with FC plus FI had poorer quality of life and familial and psychosocial functioning than children with FC alone and their parents experienced more stress. Older children with FC and FI were reported to have

a poorer quality of life than their peers (Kovacic et al., 2015). A qualitative study conducted in Brazil to compare emotional aspects in children with and without constipation showed that constipation was associated with aggression and hostility in family environment, intolerance to obstruction and challenges at school, and anxiety and depression in mothers (Lisboa et al., 2008).

In a cross-sectional study conducted in Turkey to investigate the emotional and behavioral characteristics of 65 children diagnosed with FC and the psychological symptom levels and parental attitudes of their mothers, children who had constipation were found to have higher scores than those who did not from a childhood behavior checklist related to various emotional and behavioral problems. The mothers of children with constipation were found to have higher levels of psychological distress, excessively protective parenthood, and strict discipline (Kilincaslan et al., 2014).

Mental and social problems such as anxiety, depression, and feelings of shame, guilt, and hopelessness can be experienced in cases of constipation and incontinence (Madani et al., 2016; Van Dijk et al., 2015). In childhood constipation, firm support, training, and an elucidative, positive, and nonaccusatory approach to change parental attitude are recommended (Van Dijk et al., 2015). It was found in this study that the training program administered to children with FC and FC plus FI and their mothers on nutrition and behavioral change, communication skills, problem-solving skills, coping with stress, improving self-confidence, and anger control resulted in a significant decrease in anxiety in the groups with FC and FC plus FI and an increase in the control group. A study was conducted in Italy with 25 children with FC to evaluate the effect of a training provided by a pediatrician and a psychologist on dietary changes, laxatives, and family training (rulemaking, autonomy, and role of a father). The study revealed that the mean age at the onset of FC was 3.5 years and it started after stressful life events in most of the cases; the majority of the children lacked parent autonomy and independence and decided on eating habits and slept on their own; and despite symbiotic mother-child relationship, they had a superficial father relationship. A month after the medical and psychological treatment they received, 92% of the children showed changes in at least two behavioral patterns; after 3 months, 88% of them had regular

bowel movements; during follow-up (between 6 and 28 months) 48% had 2 or 3 repeating periods; and after a year, 68% of them adopted new behavioral patterns toward solving pathological problems. The study also reported that a multidisciplinary approach in the treatment of FC demonstrated consistent treatment outcomes through establishing rules and balancing family roles (Amendola et al., 2003). In the present study, the trainings were administered in consideration of the needs through face-to-face interviews with the children and their mothers in a cooperative and individual-oriented way. The program given in this manner proved effective in lowering the level of anxiety in children. This result verifies the first and second hypotheses of the study, "A multidimensional training program administered to children with FC will alleviate continuous anxiety" and "A multidimensional training program administered to children with FC and FI will alleviate continuous anxiety."

The purpose of constipation treatment is to achieve a smooth and painless defecation and to prevent accumulation of feces (Rowan-Legg et al., 2011). The treatment involves parent education, behavioral interventions, precautions to enable proper defecation and bowel movements occurring in normal intervals, dietary changes, close follow-up, and organization and proper utilization of drugs (Nurko & Zimmerman 2014; Rowan-Legg et al., 2011; Xinias et al., 2015). In this study, the frequency of consumption of milk, caffeine-containing drink, and white bread significantly decreased, and the frequency of consumption of legumes, vegetables, and whole wheat bread increased in children with FC and FC plus FI after the training program. In a study conducted in Turkey with 74 children aged between 1 month and 16 years who had chronic constipation, 92% of these children were reported to have FC and 4% reported chronic constipation accompanied by an underlying psychological problem. Children who had no need for medical treatment were administered an appropriate diet and toilet trainings, whereas the other children received medical treatment in addition to these. The remission and response to treatment rate was reported to be 92% after 4–8 weeks in those who were under regular outpatient clinic follow-up (Şahin et al., 2014). In another study conducted in Turkey in a pretest-posttest pre-experiment design, the constipation prevention training and consultancy service provided by a nurse to the mothers of babies 0–12 months of age with constipation resulted

in a reduction of constipation in the babies (Hisar et al., 2019). A study conducted in Egypt assessing the effect of a health training on physical activity and behavioral changes in children with FC on reducing the recurrence rate showed that the health training decreased the time needed to treat constipation and the number of recurring attacks and increased the length of normal bowel habits significantly (Khalil, 2015). In a randomized study conducted in the United States comparing three treatment protocols in children aged between 6 and 15 years who had encopresis, a consolidated toilet training was shown to be more effective in the treatment of encopresis than an intensive medical treatment or anal sphincter biofeedback therapy (Borowitz et al., 2002). The result of the present study demonstrated that the multidimensional training program administered to children with FC and FC plus FI was effective on the level of anxiety and management of constipation in children. This result verifies the third and fourth hypotheses of the study, "A multidimensional training program administered to children with FC will be effective in the management of constipation" and "A multidimensional training program administered to children with FC and FI will be effective in the management of constipation."

### Conclusion and Recommendations

The study showed that a multidimensional training program had significant effects on the prevention and management of constipation and anxiety in children. Effective management of constipation and anxiety, which are associated with physical and mental health outcomes, not only necessitates a strong relationship between health professionals, parents, and children but also mandates a multidisciplinary team understanding and a holistic approach involving multidimensional training, medical treatment, continuation of treatment, and long-term follow-up in areas such as healthy eating, behavioral changes, communication skills, problem-solving skills, coping with stress, improving self-confidence, and anger control.

**Ethics Committee Approval:** This study was approved by Ethics committee of Erzincan University (Approval No: 04/02/2016 - 02/13).

**Informed Consent:** Written consent was obtained from the mothers of the children who participated in this study.

**Peer-review:** Externally peer-reviewed.

**Author Contributions:** Concept – A.Y., Ş.B., R.H.A., M.Y.Ö., H.Ş., V.G.; Design – A.Y., Ş.B., R.H.A., M.Y.Ö., H.Ş., V.G.; Supervision – A.Y., Ş.B., R.H.A., M.Y.Ö., H.Ş., V.G.; Resources – A.Y., Ş.B., R.H.A., M.Y.Ö., H.Ş., V.G.; Materials – A.Y., Ş.B., R.H.A., M.Y.Ö., H.Ş., V.G.; Data Collection and/or Processing – A.Y., Ş.B., M.Y.Ö., H.Ş., V.G.; Analysis and/or Interpretation – R.H.A., A.Y., H.Ş.; Literature Search – A.Y., Ş.B., R.H.A., M.Y.Ö., H.Ş., V.G.; Writing Manuscript – A.Y., Ş.B., R.H.A., M.Y.Ö., H.Ş., V.G.; Critical Review – A.Y., Ş.B., R.H.A., M.Y.Ö., H.Ş., V.G.

**Conflict of Interest:** The authors have no conflict of interest to declare.

**Financial Disclosure:** The research was supported by the Erzincan University Scientific Research Projects Fund (TSA-2016-343).

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